

Association of 1890 Research Directors, Inc.

17th Biennial Research Symposium

April 7-10, 2013

**Hyatt Regency Jacksonville Riverfront
Jacksonville, Florida**

Program and Abstracts

**Symposium Theme:
1890 Research: Sowing Seeds of Change for the
Global Community**

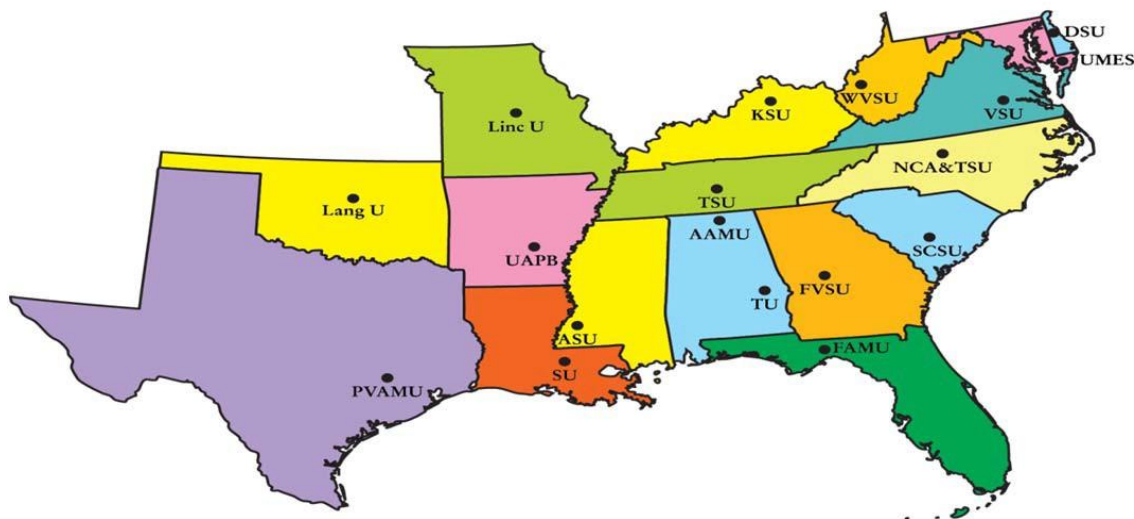


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OFFICE OF THE MAYOR

ALVIN BROWN
MAYOR

ST. JAMES BUILDING
117 W. DUVAL STREET, SUITE 400
JACKSONVILLE, FL 32202
(904) 630-1776



April 7, 2013

Dear Friends:

On behalf of the great city of Jacksonville, it is my pleasure to welcome the Association of 1890 Research Directors (ARD) to Jacksonville for its 17th Biennial Research Symposium.

The ARD's mission is a unique and important one, promoting coordination of research initiatives among 18 autonomous land-grant universities. This year's symposium will no doubt contain many well-researched and relevant presentations, and I encourage you to explore them all and congratulate their creators.

It gives me great pleasure to see such a successful learning-oriented convention come to Jacksonville. I believe that education is the great equalizer, and our quest for learning must be of lifelong duration. By conducting the sort of research you will see this week, we are laying the foundation for a more responsible and prosperous future for the next generation. I sincerely thank all of the educators, students, staff members and volunteers who have made this symposium possible.

Again, welcome to our city. Please accept my best wishes for a successful event and a memorable stay in Jacksonville.

Sincerely,

A handwritten signature in black ink that reads "Alvin Brown". The signature is written in a cursive, flowing style.

Alvin Brown
Mayor



Greetings from the Chair

On behalf of the Association of 1890 Research Directors, Inc. (ARD), I welcome you to the Seventeenth Biennial Research Symposium. The ARD is the official representative body of the agricultural research administrators of the eighteen 1890 Land Grant Universities. The mission of the Association is *to provide visionary and enlightened leadership to member institutions as they continuously address issues impacting their ability to accomplish the food and agricultural research challenges fac-*

ing the state, the nation and the world at large. The ARD therefore undertakes a variety of activities to undertake this mission which include encouraging and supporting cutting edge basic and applied research, conducting scientific conferences, establishing and financially supporting consortia/multistate programs, implementing workshops, forums, and meetings relating to agricultural research; supporting graduate, undergraduate, and pre-college students involved in research or exposure to the food and agricultural sciences; and providing the support and advocacy for national legislation to enhance agricultural research and education. We are strongly focused on assisting our institutions to become more involved in integrated, multidisciplinary, collaborative and multistate projects and will continue to work with all facets of the 1890 Family to increase the number of initiatives that would have these characteristics.

The ARD is fervently proud of its member institutions and their stellar contributions in educating outstanding students, discovery, and helping to enhance the well being of those we passionately serve. We look forward to even greater contributions as we continue to grow in size and continue to evolve our complex, cutting-edge, specialized programs of advanced science and technology.

We hope this, the seventeenth of the symposia that we have conducted since the first one, which was implemented in 1976, will be a beneficial and enjoyable experience for each of you. We sincerely thank you for your participation that will be a major factor in making this experience exciting, fruitful, and impactful. Our symposium goal continues to be “providing a forum for interactions, knowledge sharing, building networks for expanded partnerships and showcasing the talents and achievements of the 1890 community.”

Sincerely,

Shirley Hymon-Parker, Chair
Association of 1890 Research Directors, Inc.



1890 Land-Grant Universities

The 1890 Land-Grant Universities and Tuskegee University, commonly referred to as ‘the 1890s,’ are those institutions established under the Second Morrill Act of 1890. These Historically Black Institutions share the land-grant mission of teaching, research and extension. The eighteen (18) 1890s are located in seventeen states (17) shown as the logo of the Association of 1890 Research Directors, Inc. (ARD).

The ARD brings together the research administrators of the 1890 Land-Grant Programs at these universities to conduct regional research projects and initiatives and to collectively promote the training of young researchers as well as the research goals of their institutions in a way that benefits their states, region and the nation. ARD members serve on state, regional, national and international bodies.

The Presidents and Research Directors for member 1890 Universities:

University	President	Director
Alabama A&M University	Andrew Hugine	Lloyd Walker
Alcorn State University	M. Christopher Brown, II	Barry Bequette
Delaware State University	Harry L. Williams	Dyremple Marsh
Florida A&M University	Larry Robinson	Robert Taylor
Fort Valley State University	Larry Rivers	Govind Kannan
Kentucky State University	Mary E. Sias	Teferi Tsegaye
Langston University	Kent J. Smith, Jr.	Marvin Burns
Lincoln University in Missouri	Connie B. Hamacher	Steve Meredith
North Carolina A&T State University	Harold Martin	William Randle
Prairie View A&M University	George C. Wright	Alton B. Johnson
South Carolina State University	Cynthia Warrick	John Rosenthall
Southern University	Ronald Mason, Jr.	Adell Brown
Tennessee State University	Glenda B. Glover	Chandra Reddy
Tuskegee University	Gilbert L. Rochon	Walter Hill
University of Arkansas Pine Bluff	Calvin Johnson	James Garner
University of Maryland Eastern Shore	Juliette Bell	Moses Kairo
Virginia State University	Keith T. Miller	Wondi Mersie
West Virginia State University	Brian O. Hemphill	Orlando F. McMeans

Officers of the ARD for 2012– 2014

Shirley Hymon-Parker—Chair
 James Garner—Chair-Elect
 Dyremple Marsh—Immediate Past Chair
 Steve Meredith—Secretary
 Conrad Bonsi—Treasurer
 Orlando McMeans—Member-At-Large
 Carolyn B. Brooks—Executive Director (Ex-officio)

<i>Program of Events for the 2013 Research Symposium</i>		
Event	Time	Location
<i>Saturday, April 6, 2013</i>		
Registration	1PM – 6 PM	2 nd floor registration room
Early poster set up for students only	1 PM – 7 PM	Conference Center A
Early Exhibit set-up	1 PM – 7 PM	Skybridge or Conf. Ctr. A
Technology Office Availability (uploads if necessary)	1 PM – 6 PM	Orlando Room
Committee or group meetings (scheduled only)	1 PM – 9 PM	Boardrooms 1,2,or4
Judges and Moderators' Meeting	6PM – 8 PM	River Terrace 2
Social networking with music	TBD	At the 'Landing'
<i>Sunday, April 7, 2013</i>		
Poster set up for students only	8 AM – 2:45 PM	Conference Center A
Exhibit set up	8 AM – 2:45 PM	Skybridge or Conf. Ctr. A
Registration	8 AM – 6 PM	2 nd Floor Registration Room
Student Competitive Paper Session (Oral)	8:30 AM – 5 PM	City Terrace 4,5,6,7,8,9,10,11,12
Morning Break	10 AM – 10:30 AM	City Terrace Foyer
Lunch (on your own)	Noon – 1 PM	
Cyber Café	1PM – 5 PM	Boardroom 3
Afternoon Break	2:30PM – 3PM	City Terrace Foyer
Student Competitive Poster Judging (location is closed to all at this time but the judges and the student presenters)	2:45 PM – 6 PM	Conference Center A
Ribbon Cutting Ceremony	6:45 PM - 7 PM	End of Sky Bridge
Welcome Reception	7 PM – 9 PM	River Deck 2
<i>Monday, April 8, 2013</i>		
Buffet Breakfast	7 AM- 8:15 AM	Ballroom Foyer 1,2,3- 2 nd Floor
Registration	7 AM – 4 PM	2 nd floor registration room
Opening Session	8:30 AM – 10 AM	Grand Ballroom 1 – 4 (2 nd floor)
Cyber Café	10 AM – 11:30 AM and 2PM – 5 PM	Boardroom 3
Morning Break	10 AM – 10:30 AM	City Terrace Foyer
Exhibit Viewing	10:15 AM – 11:45 AM	Skybridge and Conference Center A
Posters with Authors	10:15 AM – 11:45 AM	Conference Center A
Student Awards Luncheon	12 PM – 1:45 PM	Grand Ballroom 5 - 8 (2 nd floor)
Student photo session	1:45 PM – 2PM	River Deck 2
Student posters removed and faculty's posters put up; Visits with exhibitors	2 PM – 5 PM	Conference Center A or Skybridge
Oral Presentations of faculty	2 PM – 5:30 PM	City Terrace 4,5,6,7,8,9,10,11,12

Event	Time	Location
Graduate School presentations for students	4 PM – 5:30 PM	River Terrace 1
Dinner on your own		
Committee/group meetings (scheduled only)	5 PM – 9 PM	Boardrooms 1,2, or 4
IPM Group Meeting and Planning Session	6 PM – 9 PM	4108
Student Social	9:00 PM – midnight	River Terrace 1
<i>Tuesday, April 9, 2013</i>		
Buffet Breakfast	7 AM – 8 AM	Grand Ballroom Foyer 1,2,3 - 2 nd floor
Registration	8 AM – 11 AM	2 nd Floor registration room
Plenary Session	8:30 AM – 10:30 AM	Grand Ballroom 1 – 4 (2 nd floor)
Cyber Café	10:30 AM – 11:30 AM	Boardroom 3
Morning Break	10:30 AM – 11AM	City Terrace Foyer
Exhibit and poster viewing (At noon posters and exhibits will begin to be taken down)	10:45 AM – noon	Conference Center A and Skybridge
Student professional development sessions (Career Counseling for USDA Employment)	10:30 AM – noon	River Terrace 1
Lunch on your own		
Concurrent workshop sessions for faculty	1:30 PM – 5 PM	City Terrace 4,5,6,7,8,9,10,11,12
Professional Development Workshop for students	1:30 PM – 3:30 PM	River Terrace 1
Afternoon Break	3 PM– 3:30 PM	City Terrace Foyer
Morrison-Evans & B.D. Mayberry Awards Banquet	7 PM – 10 PM	Grand Ballroom 1 – 4 (2 nd floor)
<i>Wednesday, April 10, 2013</i>		
Travel Day		

Note: All activities are on the third floor except registration, the breakfasts, lunch, banquet and General Sessions which are on Floor 2.

Concurrent Sessions - Tuesday, April 9, 2013

Workshops begin at 1:30 PM and will be concurrent

City Terrace 4 – “*Successful Integration of Extension and Research to Meet the Needs of Clientele*” – Moderator L. Washington Lyons, Association of Extension Administrators

Panel members: Gina E. Eubanks, Southern University Ag Center; Ghebreiyesus Yemane, Southern University Ag Center; M. Ray McKinnie, North Carolina A&T State University; Ralph Nobles, North Carolina A&T State University; and Franklin Jackson, Virginia State University

City Terrace 5 – “*SARE and NIFA Funding Opportunities*” - Moderator – Candace Pollock, University of Georgia

Presenters: James Hill, Southern SARE Minority Outreach Specialist, Fort Valley State University

City Terrace 6 – “*Workshop on Partnering to Implement STEAM Programs*” Moderator - Orlando McMeans, West Virginia State University

City Terrace 7 – “*Keys to Increasing Collaboration and Effective Team Building*” Moderator - Shirley Hymon-Parker, North Carolina A&T State University

Presenter: David Bauer of David G. Bauer Associates, Inc.

City Terrace 8 – “*Partnering to Develop Multistate Programs on Obesity Prevention*” Moderator – Louis Whitesides, South Carolina State University

City Terrace 9: “*Emotional Intelligence (EQ)- Managing Behavior & Making Personal Decisions for Positive Results*” Moderator – Carolyn B. Brooks, Association of 1890 Research Directors, Inc.

Presenter: Arlen Leholm, Executive Director, North Central Regional Association, University of Wisconsin

City Terrace 10 – “*Forging Effective Cooperative Partnerships: The ARD Multistate Food Safety Consortium*” Moderator – Moses Kairo, University of Maryland Eastern Shore

Presenters: Robert Holland, Institute of Food Safety and Nutrition, NIFA
Salam Ibrahim, North Carolina A&T State University
Jennifer Adsit, Virginia State University
Makuba Lihono, University of Arkansas Pine Bluff
Hashem Fawzy, University of Maryland Eastern Shore

City Terrace 11 – “*Workshop to Develop Biofuels/Bioproducts Collaborations*” Moderators - Mike Bomford and Teferi Tsegaye, Kentucky State University

City Terrace 12 – “*Workshop of the ‘Integrating Farming Systems’ Consortium Team*” Moderator - Govind Kannan, Fort Valley State University

Presenter: Vince C. Chapman, USDA/APHIS “Animal Traceability Regulation”
Bharat Singh, Fort Valley State University – “Integrated Agricultural Systems”

Student Workshops- “Preparing for Your Future”

Monday, April 8, 2013, 4 – 5:30 PM

River Terrace 1

Presentations on Graduate School Programs in the Food and Agricultural Sciences – Moderator Larry Hartsfield, USDA Office of Advocacy and Outreach

Presenters: University of Illinois – Urbana-Champaign – Jesse Thompson
North Carolina State University – Lisa Guion Jones
Iowa State University - Ruth McDonald and Carla Peterson
South Carolina State University – Frederick Evans
University of Maryland – Evelyn Cooper
Virginia Polytechnic Institute and State University – Randy Grayson

Tuesday, April 9, 11 AM – noon

River Terrace 1

Careers in the USDA, Moderator – Horace Hodge, USDA Office of Advocacy and Outreach

Presenter: Tracey Troutman, USDA Agricultural Research Service

Tuesday, April 9, 1:30 – 3:30

River Terrace 1

Professional Development Moderators – Karla Martin and Larry Hartsfield, USDA Office of Advocacy and Outreach

Presenters: LaWanda Thomas and Kenneth E. Johnson, USDA Animal & Plant Health Inspection Service

Sunday Morning, April 7

Concurrent Student Oral Presentations – Graduate Competition

Animal Health and Production and Animal Products

Dr. Kirk Pomper, Presiding

City Terrace 4

- | | | |
|-------|---|---|
| 8:30 | 1 | Effects of Continuous or Rotational Grazing Schemes on Performance, Parasite Burden, and Reproductive Measurements by Yearling Katahdin Ewes Grazing Tall Fescue in Late Spring through Summer. E. A. Backes, Lincoln University |
| 8:45 | 2 | Evaluation of Sericea Lespedeza (<i>Lespedeza cuneata</i>) Pellets for Control of Coccidia and Gastrointestinal Nematodes in Weaned Goats.
T. Barker, Fort Valley State University |
| 9:00 | 3 | Assessing the Effects of the Interaction between Progesterone and IGF-1 on the Survival of Transferred Embryos. J. Copeland, Alcorn State University |
| 9:15 | 4 | Inclusion of Oat in a Sow's Diet May Help Prevent Post Weaning Diarrhea in Piglets. T. Daniels, North Carolina Agricultural and Technical State University |
| 9:30 | 5 | The Effect of Yeast Culture and Oat Feed Supplementation on Probiotic and Immunoglobulin Levels in Porcine Milk.
B. Donovan, North Carolina Agricultural and Technical State University |
| 9:45 | 6 | The Effects of Taurine Supplementation in Largemouth Bass (<i>Micropterus salmoides</i>) Diets on Growth Performance and Survival.
C. A. Frederick, Kentucky State University |
| 10:00 | 7 | Quantification of C-kit Ligand and C-kit Receptor mRNA in the Goat (<i>Capra hircus</i>) Testis. T. Hebb, Tuskegee University |
| 10:15 | 8 | Production Comparison of All-Male and Mixed-Sex Freshwater Prawns <i>Macrobrachium Rosenbergii</i> in Ponds. Z. Kupchinsky, Kentucky State University |
| 10:30 | 9 | Analysis of the Impact of Production Style on Porcine Airway Morphology and Proteome Dynamics.
C. J. McClendon, North Carolina Agricultural and Technical State University |

Sunday Morning, April 7

Concurrent Student Oral Presentations – Undergraduate Competition

Animal Health and Production and Animal Products

Dr. Kirk Pomper, Presiding

City Terrace 5

- 8:30 18 **Performance and Behavior by Katahdin Lambs Weaned Using Either Fenceline or Traditional Weaning Methods in the Morning or Afternoon.**
T. H. Bruemmer, Lincoln University
- 8:45 19 **Quantification of C-MYC and NKX3.1 in the *Capra hircus* Testis.**
L. N. Clark, Tuskegee University
- 9:00 20 **Antioxidants Reduce Swine Housing Dust-Mediated Stress and Toxicity in Porcine Tracheobronchial Epithelial Cells.**
C. L. Gerald, North Carolina Agricultural and Technical State University
- 9:15 21 **Effects of Dietary Carbohydrate: Lipid Ratios on Liver, Visceral, and Gonadal Somatic Indexes in Northern Bluegill *Lepomis macrochirus macrochirus*.**
B. D. Hayes, Lincoln University
- 9:30 22 **Development of a Two-Step Multiplex Real-Time PCR for the Rapid Detection of *Vibrio anguillarum* from Sea Water.** M. E. Hickey, Delaware State University
- 9:45 23 **Effect of Incubation Time and Level of Fungus Myceliated Grain Supplemented Diet on Growth and Health of Broiler Chickens.**
V. Hines, North Carolina Agricultural and Technical State University
- 10:00 24 **Housing and Feeding Effects on the Growth and Nematode Loads in Kids under Mixed-Species Grazing System.** A. Jackson, Southern University
- 10:15 25 **Evaluation of the Effect of Probiotics on Gastrointestinal Parasite Levels in Goats.**
T. Martin, North Carolina Agricultural and Technical State University
- 10:30 26 **Effects of Dietary Carbohydrate and Cellulose on Growth and Feed Conversion in Northern Bluegill *Lepomis macrochirus macrochirus*.**
E. S. Musick, Lincoln University
- 10:45 27 **Behavior and Performance by Fall Born Calves Weaned in the AM or PM Using Either Fenceline or Traditional Weaning Methods.** K. R. Ness, Lincoln University
- 11:00 28 **Housing and Feeding Effects on the Carcass Yield and Quality Traits in Kids Under Mixed-Species Grazing System.** L. Profit, Southern University
- 11:15 29 **STAT-3 mRNA Expression in the Goat (*Capra hircus*) Testis.**
S. Thomas, Tuskegee University
- 11:30 30 **Using Sagittal Otoliths to Examine Juvenile Delaware Bay Spot, *Leiostomus xanthurus*, and Summer Flounder, *Paralichthys dentatus*.**
A. Toure, Delaware State University
- 11:45 31 **Evaluation of Fetal Goat Serum as a Cheaper Alternative to Fetal Bovine Serum for Culturing Goat Cells.** O. White, Fort Valley State University

Sunday Morning, April 7

Concurrent Student Oral Presentations – Undergraduate Competition

Family, Youth, Community and Economic Development

Dr. L. Washington Lyons, Presiding

City Terrace 6

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|-------|----|--|
| 8:30 | 32 | Introduction and Overview on Disaster Relief Supply Chain for Rural Communities. D. Agu, South Carolina State University |
| 8:45 | 33 | Do State Sponsored Labels Make Any Difference? The Case of “Georgia-Grown” Label. C. Allen, Fort Valley State University |
| 9:00 | 34 | Improving Agricultural Extension Service in Belize: An International Service Learning Experience. K. B. Brown, University of Maryland Eastern Shore |
| 9:15 | 35 | Consumers’ Perception and Willingness to Buy Goat Meat.
M. Cosby, Fort Valley State University |
| 9:30 | 36 | Impact of the Panama Canal Expansion on Corn Exports in the Southeastern Region of the United States. L. Curry, South Carolina State University |
| 9:45 | 37 | Is More Preferred to Less? M. Davis, Fort Valley State University |
| 10:00 | 38 | Inhibition of the Growth of Food Borne Pathogen by Acetic Acid.
K. Huckaby, South Carolina State University |
| 10:15 | 39 | Literature Review on Facility Location Optimization Models for a Disaster Relief Supply Chain. T. Isaac, South Carolina State University |
| 10:30 | 40 | An Empirical Investigation of Factors Influencing University Students Body Mass Indices. D. J. Ross, Southern University |
| 10:45 | 41 | Feasibility of an Alpaca Fiber Herd in the Mid-Atlantic Region.
M. J. Schofield, Virginia State University |
| 11:00 | 42 | Effectiveness of Export Assistance Programs in Reducing Export Barriers: Implications for South Carolina Small-Scale Agribusinesses.
E. Uwimana, South Carolina State University |

Sunday Morning, April 7

Concurrent Student Oral Presentations – Graduate Competition

Food Safety, Nutrition and Health
Dr. Louis Whitesides, Presiding
City Terrace 7

- 8:30 43 **The Antibacterial Effect of White, Red, and Yellow Onions on the Reduction of *Salmonella typhimurium*, *Listeria monocytogenes* and *Escherichia coli* O157:H7.**
S. Anderson, Prairie View A&M University
- 8:45 44 **Lentils, Green and Yellow Split-Peas (Sprouted and Non-sprouted), on Azoxymethane-Induced Colon Carcinogenesis.**
K. Busambwa, Alabama A&M University
- 9:00 45 **Transverse Thin Cell Layer Culture of *Bacopa monnieri* (L.) Wettst and Optimization of *Agrobacterium tumefaciens*-Mediated Genetic Transformation.**
L. A. Croom, Fort Valley State University
- 9:15 46 **Determination of the Potential of Cocoa and Coffee on Tumor Formation and Effects on Selected Antioxidant Enzymes.** L. Dalrymple, Alabama A&M University
- 9:30 47 **Susceptibility of the Chicken Egg, Whole and Parts to *Salmonella*.**
J. East, Prairie View A&M University
- 9:45 48 **Cactus Moth (*Cactoblastis cactorum*) and the Potential Expansion of its Host Range.**
A. Galette, Florida A&M University
- 10:00 49 **Comparison of Textural Characteristics of Goat Milk Yogurts Supplemented with Different Concentrations of Two Selected Gums.**
B. Gupta, Fort Valley State University
- 10:15 50 **Assessment of the Consumer Food and Physical Activity Environment in the Alabama Black Belt Using GIS.** R. Gyawu, Tuskegee University
- 10:30 51 **Investigating Total Aerobic Bacteria and *Vibrionaceae* Densities in the Eastern Oyster, *Crassostrea virginica*, Cultured in the Lewes-Rehoboth Canal in Delaware.**
K. Hannum, Delaware State University
- 10:45 52 **Surface Decontamination of Goat Skin and Carcasses using Innovative Pre Slaughter Spray-Washing.** C. Harris, Fort Valley State University
- 11:00 53 **Use of Ultraviolet Light for Inactivation of Foodborne Microorganisms: A Review.**
A. L. Hill, Fort Valley State University
- 11:15 54 **Pilot-Testing a Nutrition and Physical Activity Education Program for Cancer Prevention Among African American Children in the Alabama Black Belt.**
N. Houston, Tuskegee University
- 11:30 55 **Airborne Transport of *Staphylococcus* and Heterotrophic Bacteria to Tomato Plants Downwind of Mechanical Clean-Out of Litter From a Poultry House.**
M. James, University of Maryland Eastern Shore

Sunday Morning, April 7

Concurrent Student Oral Presentations – Undergraduate Competition

Food Safety, Nutrition and Health
Dr. Louis Whitesides, Presiding
City Terrace 8

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|-------|----|---|
| 8:30 | 56 | Isolation of DNase and Protease-Producing Bacteria on Catfish Spoilage.
G. Accumanno, Delaware State University |
| 8:45 | 57 | Application of Organic Acid and Refrigeration in Eliminating <i>Salmonella enterica</i> on Cantaloupes. J. Adsit, Virginia State University |
| 9:00 | 58 | Utilizing Kitchen Steamers to Inactivate <i>Salmonella</i> and <i>Listeria</i> on Whole Cantaloupe Melons. M. Bower, Virginia State University |
| 9:15 | 59 | Minority Students' Perception of Genetically Modified Food Product Risks: Evidence from Georgia. J. Bright, Fort Valley State University |
| 9:30 | 60 | A Case Study to Examine the Impact of Tomatoes, a High Acid Food, on a Dialysis Patient with Hypertension and Diabetes. K. L. Chibanguza, Florida A&M University |
| 9:45 | 61 | Human Health-Related Constituents in Fenugreek Seeds and Sprouts.
C. Davis, Virginia State University |
| 10:00 | 62 | Storage Practices and Microbiological Contamination of Home Refrigerated Foods.
A. Frederick, Tennessee State University |
| 10:15 | 63 | Molecular Structure and Physicochemical Properties of Starches in Virginia-Grown Corn, Potato, and Mungbean. C. Grizzard, Virginia State University |
| 10:30 | 64 | Sex, Stress, and Inflammation in a Murine Model of Ulcerative Colitis.
D. Hampton, Tuskegee University |
| 10:45 | 65 | Identification of <i>Trypanosoma cruzi</i> in <i>Anasa tristis</i>, the Common Squash Bug.
D. Herbert, Tuskegee University |
| 11:00 | 66 | Alternative and Traditional Marketing Strategies for Peppers.
L. C. Hughes, Tennessee State University |

Sunday Morning, April 7

Concurrent Student Oral Presentations – Graduate Competition

Plant Health and Production and Plant Products

Dr. Moses Kairo, Presiding

City Terrace 9

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|-------|----|--|
| 8:30 | 67 | Differential Expression of miRNA Across the Grafted Tissues Collected From Heterografts Involving Different Genera of Cucurbitaceae Family.
A. Almeida, West Virginia State University |
| 8:45 | 68 | Gene Expression Across Ploidy Levels of Watermelon.
R. Cantrell, West Virginia State University |
| 9:00 | 69 | Potentials for Beneficial Use of Fly Ash as a Growth Media in Production of Agriculture Crops. S. DeGraphenreed, Tennessee State University |
| 9:15 | 70 | Selected Insecticides for Soil Insect Control in Sweetpotato.
S. A. Francis, University of Arkansas at Pine Bluff |
| 9:30 | 71 | Leafhoppers (Hemiptera: Cicadellidae) Associated with New Blackberry Plantings in Central Kentucky: Preliminary Results. J. J. Haak, Kentucky State University |
| 9:45 | 72 | Nitrogen Use Efficiency (NUE) Through Sensor-based Algorithms and On-the-go Application. C. Hartman, University of Maryland Eastern Shore |
| 10:00 | 73 | Crop Pollen Effects on the Ovipositional Rate of Western Flower Thrips on Tropical Soda Apple. A. Hutcherson, Florida A&M University |
| 10:15 | 74 | Mulching Effects on the Production of Late Season, Organic <i>Solanum melongena</i> Under Drip Irrigation. S. Kennedy, Tennessee State University |
| 10:30 | 75 | Application of Trichoderma, Vesicular-Arbuscular Mycorrhizae, and <i>Azospirillum</i> Influenced the Growth and Development of Jamaican Scotch Bonnet Pepper.
L. Lee, University of Maryland Eastern Shore |
| 10:45 | 76 | Comparison of Hay and Polyethylene Mulch Effects on Soil Properties and Organic Produce Yield and Quality. J. Nelson, Kentucky State University |

Sunday Morning, April 7

Concurrent Student Oral Presentations – Undergraduate Competition

Plant Health and Production and Plant Products

Dr. Moses Kairo, Presiding

City Terrace 10

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|-------|----|--|
| 8:30 | 77 | Phylogenetic Analysis of Bioenergy Crops Using Cellulose Synthase Genes.
J. Davis, Tuskegee University |
| 8:45 | 78 | Use of Hydroponics to Study 'Basal' Plant Growth and Development: A Precollege RATLR Project. X. Faust, Florida A&M University |
| 9:00 | 79 | Biochar Effects on Soybean Growth and Soil Properties. B. King, Lincoln University |
| 9:15 | 80 | Germplasm Screening for High Acetogenin Activity in Pawpaw Twig and Fruit Tissues. L. Kronmaah, Kentucky State University |
| 9:30 | 81 | Screening of Viruses Infecting Sweetpotato in Arkansas.
J. Montgomery, University of Arkansas at Pine Bluff |
| 9:45 | 82 | High Frequency Plant Regeneration from Axillary Shoot in <i>Moringa oleifera</i>.
A. Norris, Fort Valley State University |
| 10:00 | 83 | Pepper Fruit Shape Analysis Using Morphometric and Morphology Attributes Implemented in Tomato Analyzer Software Program.
J. Poe, West Virginia State University |
| 10:15 | 84 | Citrus Leafminer, <i>Phyllocnistis citrella</i> Stainton (Lepidoptera: Phyllocnistinae), and its IPM on Young Citrus Plants. J. Richardson, Florida A&M University |

Sunday Morning, April 7

Concurrent Student Oral Presentations – Undergraduate Competition

Renewable Energy, Natural Resources, and Environment

Dr. Wondimagegnehu Mersie, Presiding

City Terrace 11

- | | | |
|-------|----|--|
| 8:30 | 85 | Isolation of Lignocellulolytic Microorganisms with Implications for Biofuels.
P. Gorrell, Jr., Tuskegee University |
| 8:45 | 86 | Nutrient Modulation and Feeding Strategy Influenced Biomass and Lipid Yield in <i>Scenedesmus</i> sp. J. Haslag, Lincoln University |
| 9:00 | 87 | Plant Regeneration and Genetic Transformation in <i>Arundo donax</i> Using Particle Bombardment. M. Melvin, Fort Valley State University |
| 9:15 | 88 | Testing Alternative Sweetpotato Varieties for Potential Bioenergy and Neutraceutical Yield on Organic Land in Kentucky.
S. Stephens, Kentucky State University |
| 9:30 | 89 | Effect of Antibiotic on Ethanol Yield from Sweet Sorghum.
J. Beckwith, Kentucky State University |
| 9:45 | 90 | Potential for Sweet Sorghum Bagasse as a Feedstock for On-Farm Power Generation Through Gasification. N. Cook, Kentucky State University |
| 10:00 | 91 | Mycorrhizal Relations in Sweet Sorghum (<i>Sorghum bicolor</i>).
A. Leach, Virginia State University |
| 10:15 | 92 | Vermiculture of Poultry Waste and Paper for Sustainable Agriculture.
E. L. Goodman, University of Maryland Eastern Shore |
| 10:30 | 93 | Impact of Soil Amendments on Antioxidant and Trace-Element Content of Bell Pepper and Melon Fruits at Harvest. M. Johnson, Kentucky State University |
| 10:45 | 94 | Complexation of Aluminum by Nitrogen-Containing Ligands.
H. M. Cavender, West Virginia State University |
| 11:00 | 95 | Nitrogen Cycling in a Pine Forest Ecosystem in Response to Fertilizer Application.
A. Faison, Virginia State University |
| 11:15 | 96 | Genetic Diversity in Six Pawpaw Patches from Franklin County, Kentucky as Revealed by SSR Markers. D. Davidson, Kentucky State University |
| 11:30 | 97 | The Effects of Synthetic Dyes on People and their Environment.
S. M. Pearsall, Delaware State University |

Sunday Morning, April 7

Concurrent Student Oral Presentations – Graduate Competition

Renewable Energy, Natural Resources, and Environment

Dr. Wondimagegnehu Mersie, Presiding

City Terrace 12

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| 8:30 | 98 | UV-B and UV-A Radiation Ten-Year Trends in Different Latitude Regions of the United States and Relativity to Skin Cancer in Humans.
M. Wang, Southern University and A&M College |
| 8:45 | 99 | Understanding the Potential Impact of Carbon Emission Policies on Catfish, Crawfish and Baitfish Farming in the United States.
O. L. Chen, University of Arkansas at Pine Bluff, |
| 9:00 | 100 | Comparison of Carbon Dioxide Flux within Three Different Urban Wetland Types in the Blackwater Conservation Area. C. Chappell, Southern University |
| 9:15 | 101 | Carbon Mineralization Dynamics in a Biochar-Soil System.
K. L. Hatakka, Florida A&M University |
| 9:30 | 102 | Design and Evaluation of a Spectrally Optimized Algal Photobioreactor for Carbon and Nitrogen Capture from Fossil Fuel Efflux.
X. Henry, University of Maryland Eastern Shore |
| 9:45 | 103 | Genome Structure and Protein Expression for Cellulosic Activities of a New Bacterial Strain. H. Li, Tennessee State University |
| 10:00 | 104 | Microalgae Grown on Swine Wastewater as a Biofuel Feedstock.
R. Hasan, North Carolina Agricultural and Technical State University |
| 10:15 | 105 | Effect of Time of Harvest on Sweet Sorghum Biomass Yield and Juice Storage Properties. G. J. Whitehead, Fort Valley State University |
| 10:30 | 106 | Performance of Seashore Mallow (<i>Kosteletzkya virginica</i>) on Managed Agricultural Land. A. Forde, Florida A&M University |
| 10:45 | 107 | Effect of Cover Crop Rhizosphere Soil on Phosphorus Solubilization from Phosphate Rocks. M. J. Shitindi, Tuskegee University |
| 11:00 | 108 | Decomposition Rates of Legume Winter Cover Crops Under Three Kill Methods and Resulting Soil Microbial Activity. J. P. Shelton, North Carolina State University |
| 11:15 | 109 | Screening of Purslane Arsenic Tolerance Identifies Two Accessions with Strong Arsenic Tolerance and their Potential Use in Bioremediation.
S. Battle, Virginia State University |
| 11:30 | 110 | Removal of Phytic Acid-Phosphorus from Broiler Litter.
P. P. Defoe, Tuskegee University |
| 11:45 | 111 | Analysis of Trace Elements in Some Arkansas Soils.
T. Weatherspoon, University of Arkansas at Pine Bluff |

Sunday Afternoon, April 7

Concurrent Student Oral Presentations – Graduate Competition

Animal Health and Production and Animal Products

Dr. Kirk Pomper, Presiding

City Terrace 4

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| 1:00 | 10 | Molecular and Genetic Basis of Drug Resistance in <i>Haemonchus contortus</i> in Goats.
M. McHugh, Tuskegee University |
| 1:15 | 11 | Postmortem Cell Survival Pattern of Goat Skin Tissues Stored in Refrigerator at 4°C. C. Okonkwo, Fort Valley State University |
| 1:30 | 12 | Recovery of Total Aerobic Bacteria in Grass Samples from Small Flocks in Delaware. A. F. Shelton, Delaware State University |
| 1:45 | 13 | Investigating the Effect of <i>Moringa oleifera</i> on Lymphocytes: A Mouse Model.
D. Smith, North Carolina Agricultural and Technical State University |
| 2:00 | 14 | Aquaculture Potential of Paddlefish, <i>Polyodon spathula</i>, in Intensive Systems.
A. Squadrito, Kentucky State University |
| 2:15 | 15 | The Effects of Ocean Acidification on the Occurrence of Otolith Deformities in the mummichog (<i>Fundulus heteroclitus</i>). A. T. Stoneman, Delaware State University |
| 2:30 | 16 | The Effectiveness of an Herbal Dewormer in Reducing Gastrointestinal Nematode Infections in Meat Goat Kids. D. A. Sutherland, Delaware State University |
| 2:45 | 17 | Susceptibility of the Small Hive Beetle (<i>Aethina tumida</i> Murray) to Fungal Pathogens and New Generations of Insecticides. S. Wheeler, Florida A&M University |

Sunday Afternoon, April 7

Concurrent Student Oral Presentations – Graduate Competition

Family, Youth, Community and Economic Development

Dr. L. Washington Lyons, Presiding

City Terrace 6

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|------|-----|---|
| 1:00 | 112 | Consumer Demand and Willingness to Purchase Asian Fruits and Vegetables Produced by Local Farmers in Selected Korean Communities in Alabama and Georgia. D. Alkordi, Tuskegee University |
| 1:15 | 113 | Participation in Selected USDA Programs by Socially Disadvantaged Farmers in Selected Black Belt Counties of Georgia. L. Asare-Baah, Tuskegee University |
| 1:30 | 114 | Literature Review on Simulation Models for a Disaster Relief Supply Chain. E. Bizimana, South Carolina State University |
| 1:45 | 115 | Marketing of Small Scale Aquaculture Products in Kentucky. R. Bryant, Kentucky State University |
| 2:00 | 116 | Use of Cow Pea and Goat Manure to Facilitate Natural Yield of Scotch Bonnet Peppers Using Low Input Systems for Historically Underserved Farming Communities. M. Cooke, Florida A&M University |
| 2:15 | 117 | Putting Theory into Practice: Aquaculture as a STEM Tool in the Classroom. C. R. Janiak, Delaware State University |
| 2:30 | 118 | The Cost Effectiveness of Biological Control: The Case of Invasive Mole Crickets and Florida's Commercial Pastureland. G. Mhina, Florida A&M University |
| 2:45 | 119 | Building Capacity and Enhancing Economic Development through Experiential Learning in Apparel Merchandising and Textiles (AMTX). A. D. Scott, Southern University and A&M College |
| 3:00 | 120 | Investing in the Future of Agribusiness via Ag-Discovery. S. E. Smiling, South Carolina State University |
| 3:15 | 121 | Calibrating Dissimilar Payment Vehicles in Contingent Valuation Studies: An Example of Reducing Hydrilla in Two North Florida Spring-Fed River Systems. V. Thomas, Florida A &M University |
| 3:30 | 122 | CYPRESS as a Model that Facilitates Year-Round Learning. K. L. Wilson, South Carolina State University |
| 3:45 | 123 | Perception of Store and Restaurant Managers about Crawfish, and their Willingness to Pay for Graded Crawfish Products. S. Yasmin, University of Arkansas at Pine Bluff |

Sunday Afternoon, April 7

Concurrent Student Oral Presentations – Graduate Competition

Food Safety, Nutrition and Health
Dr. Louis Whitesides, Presiding
City Terrace 7

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| 1:00 | 124 | Textural Properties of Goat Milk Ice Creams Formulated with Three Different Levels of Milk Fat. C. McGhee, Fort Valley State University |
| 1:15 | 125 | Assessment of the Antioxidant Property of Methanolic Extract of <i>Vernonia amygdalina</i> (Bitter Leaf). A. Murphy, Delaware State University |
| 1:30 | 126 | Effects of Estrogen and Progesterone Treatment on HB-EGF Expression in RL95-2 Cells. P. Otenyo, Prairie View A&M University |
| 1:45 | 127 | Economic Impact of the Deepwater Horizon Oil Spill on Domestic Gulf Coast Seafood Industry. P. Phillips, Prairie View A&M University |
| 2:00 | 128 | Chemical Characterization of Crude Oil from the Seed of <i>Ricinodendron heudelotii</i> (Njangsa). A. A Salako, Delaware State University |
| 2:15 | 129 | Development of a Plant-Based Treatment Regimen Against HIV Replication in Sweet Potato [<i>Ipomoea batatas</i> (L.) Lam] Expressing Synthetic Lytic Peptide Genes <i>Jc41n</i> and <i>Jc41n</i>. S. B. Samuels, Tuskegee University |
| 2:30 | 130 | School Lunch Project: If They Cook It, They Will Eat.
M. A. Schwarz, University of Maryland Eastern Shore |
| 2:45 | 131 | Increasing the Protein Yield of Peanuts and Cow Peas to Alleviate Malnutrition.
S. M. South, Prairie View A&M University |
| 3:00 | 132 | Chemical Composition, Functional Properties, and Microstructural Characteristics of Virginia-Grown Kabuli Chickpea (<i>Cicer arietinum</i> L.) Cultivars.
M. Thomas, Virginia State University |
| 3:15 | 133 | Antioxidant Potential and its Possible Role in Antitumor Activity of <i>Scutellaria</i>.
B. N. Vaidya, Fort Valley State University |
| 3:30 | 134 | Physiological Implications of Alerted Thyroid Function and High Fat Diets in Rats.
V. Welch-White, Tuskegee University |
| 3:45 | 135 | Effects of Different Post-Chill Shipping Methods on the Survival of <i>Salmonella</i> on Chicken Skin over Time. S. Williams, Prairie View A&M University |
| 4:00 | 136 | Isolation and Screening of Lactic Acid Bacteria (LAB) from Kimchi and Chicken Intestine and Feces for Use as Probiotics. J. Young, Delaware State University |

Sunday Afternoon, April 7

Concurrent Student Oral Presentations – Undergraduate Competition

Food Safety, Nutrition and Health
Dr. Louis Whitesides, Presiding
City Terrace 8

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| 1:00 | 137 | Promising Bone Implant Materials: Hydroxyapatite Grafted Carbon Nanotubes.
C. Johnson, Prairie View A&M University |
| 1:15 | 138 | Consumers' Willingness to Pay for Genetically Modified Salmon: Results from a Georgia Survey. V. King, Fort Valley State University |
| 1:30 | 139 | Effect of Proximity of Compost Piles on Fly Populations in High Tunnel Tomato Production. W. Mallory, Virginia State University |
| 1:45 | 140 | The Effect of Refrigerated Storage on Proteolysis and Lipolysis of Commercial Cow Milk and Goat Milk Yogurts. M. Mobley, Fort Valley State University |
| 2:00 | 141 | Capsaicin Levels in Pepper (<i>Capsicum annuum</i> L.) Collections.
R. Morris, West Virginia State University |
| 2:15 | 142 | Investigating the Effects of Resistance Band-Training on Elderly Type 2 Diabetics.
E. Onwasigwe, South Carolina State University |
| 2:30 | 143 | Effects of Purple Sweet Potato Powder on Bone Mineral Content of Ovariectomized Rats. T. Smith, Kentucky State University |
| 2:45 | 144 | Attitudes and Practices of Healthy Lifestyles in Students Attending a Historically Black University. A. Taltoan, Kentucky State University |
| 3:00 | 145 | Effectiveness of Parent-Focused Interventions in Childhood Obesity Prevention.
T. R. Thompson, Alcorn State University |
| 3:15 | 146 | Association Between Television Viewing, Physical Activity, and Obesity among Preschool Children. J. Wilson, Alcorn State University |

Sunday Afternoon, April 7

Concurrent Student Oral Presentations – Graduate Competition

Plant Health and Production and Plant Products

Dr. Moses Kairo, Presiding

City Terrace 9

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| 1:00 | 147 | Effects of NPK Fertilizer Combination on Yield Study of <i>Hibiscus sabdariffa</i> Grown in Baton Rouge, Louisiana. R. C. Nicholas, Southern University and A&M College |
| 1:15 | 148 | Aluminum Accumulation in Tomato Seeds harvested from A1-Treated Plants and the Effect on Proteome Expression During Seed Maturation and Germination Processes. I. Okekeogbu, Tennessee State University |
| 1:30 | 149 | Attracting Beneficial Insects to Blackberries Using Methyl Salicylate-Based Lures. J. A. Riddick, Kentucky State University |
| 1:45 | 150 | Proteomic Analysis of Tomato Roots Under Aluminum Stress. S. Sangireddy, Tennessee State University |
| 2:00 | 151 | Enhancing Tomato (<i>Lucopersicon esculentum</i>) Production and Utilization in Southwest Mississippi. Q. Thomas, Alcorn State University |
| 2:15 | 152 | Characterizing Population and Genetic Structure of <i>Aleurodicus rugioperculatus</i> Martin (Hemiptera: Aleyrodidae) in Florida. M. Wilkerson, Florida A&M University |
| 2:30 | 153 | Sustainable Medicinal Plant (<i>Tanacetum parthenum</i>) Production and Utilization in Mississippi. R. Williams, Jr., Alcorn State University |
| 2:45 | 154 | Developing Root Growth Models for Switch Grass Under Different Levels of Water Deficits. Z. Ye, Tennessee State University |
| 3:00 | 155 | Differential Root Proteome Expression in Tomato Genotypes with Contrasting Drought Tolerance Exposed to Dehydration. S. Zhou, Tennessee State University |

Sunday Afternoon, April 7

Concurrent Student Oral Presentations – Graduate Competition

Renewable Energy, Natural Resources, and Environment

Dr. Wondimagegnehu Mersie, Presiding

City Terrace 12

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| 1:00 | 156 | Mobility of Cadmium, Arsenic, Copper, Nickel and Chromium in Alabama Ultisols.
E. L. Cadet, Tuskegee University |
| 1:15 | 157 | Defense Against Invasive Species by <i>Asimina triloba</i> Through Competition.
B. May, Kentucky State University |
| 1:30 | 158 | Evaluation of Monitoring Methods for the Redbay Ambrosia Beetle (<i>Xyleborus glabratus</i>), a New Invasive Species from Southeast Asia.
L. Tanner, Florida A&M University |
| 1:45 | 159 | Assessing the Efficacy of <i>Cricotopus lebetis</i> Sublette (Diptera: Chironomidae) for Controlling <i>Hydrilla verticillata</i> (L.F.) Royle in the Wacissa River.
E. K. Kariuki, Florida A&M University |
| 2:00 | 160 | Patterns of Forest Cover, Hydrologic Regime, and Freshwater Fish in North and Central Alabama Streams. C. A. White, Alabama A&M University |
| 2:15 | 161 | Characterization of Floristic Composition and Diversity of the Depression Marsh, Munson Sandhills, Apalachicola National Forest.
S. M. Sapp, Florida A&M University |
| 2:30 | 162 | Effects of Stream Impoundment on Aquatic Insect Communities in Headwater Steephead Ravines of the Apalachicola River Basin, Florida.
A. M. Heupel, Florida A&M University |
| 2:45 | 163 | Assessing Total Economic Impacts of Wildfires.
K. Blakemore, Prairie View A&M University |
| 3:00 | 164 | The Economic Impact of Federal Sustained Yield Unit on Community Well-Being.
R. Taylor, Prairie View A&M University |
| 3:15 | 165 | Conservation Agriculture Production Systems for Food Security in Cambodia.
L. Hok, North Carolina Agricultural and Technical State University |
| 3:30 | 166 | Natuculture: Conservation Agriculture in Urban Landscapes.
D. I. A. Edralin, North Carolina Agricultural and Technical State University |
| 3:45 | 167 | Urban Forest Structure Characteristics of Typical City Parks in Beijing.
L. Gong, Southern University |
| 4:00 | 168 | Effects of Urbanization on Rural Tennessee: Verifying Green Remediation for Remediation of Environmental Quality Issues in Williamson County, TN.
A. Smith, Tennessee State University |

Monday Afternoon, April 8

Concurrent Scientist Oral Presentations

Plant Health and Production and Plant Products

Dr. Moses Kairo, Presiding

City Terrace 4

- 2:00 169 **Cloning of a cDNA Encoding the Muscadine Dihydroflavonol-4-reductase (DFR) and its Expression in Transgenic Cell Lines Increases Flavonoid Flux.**
A. Ananga, Florida A & M University
- 2:15 170 **A Hierarchy of H4K12ac AND H3K9me2 Acquisition in Common Bean (*Phaseolus vulgaris* L.).** V. Ayyappan, Delaware State University
- 2:30 171 **Alternative Food Legumes as Forages.** H. L. Bhardwaj, Virginia State University
- 2:45 172 **Holistic Organic Farm Approach Update.** J. E. Brown, Fort Valley State University
- 3:00 173 **The Effects of Salinity on *Phytophthora ramorum* Viability and Infectivity.**
D. Collins, Alcorn State University
- 3:15 174 **Cell Suspension of Native American Muscadine Grape as Prospective Source of Nutraceuticals-Rich Biomass.** V. Georgiev, Florida A & M University
- 3:30 175 **Identification and Characterization of Gene-based SSR Markers in Date Palm (*Phoenix dactylifera* L.).** G. He, Tuskegee University
- 3:45 176 **Epigenetic Mechanisms in Plants with a Special Focus on Epigenomics of Biotic Stress in Common Bean.** V. Kalavacharla, Delaware State University
- 4:00 177 **Proteomic Analysis of Ripening Muscadine Berry to Identify and Characterize Proteins Associated with Synthesis of Metabolites Responsible for Superior Enological Characteristics.** D. M. Kambiranda, Florida A&M University
- 4:15 178 **Pollination Efficacy of the Blue Orchard Bee (*Osmia lignaria* Say) in Eastern Orchards.** M. Kraemer, Virginia State University
- 4:30 179 **Effects of Organic Mulching on Microbial Biomass, Enzyme and Mineralization Activity in Relation to Soil Organic Carbon, P, and N under Organic System.**
R. N. Mankolo, Alabama A&M University
- 4:45 180 **A More Improved Peanut (*Arachis hypogaea* L.) Protocol for Direct Shoot Organogenesis in Mature Dry-cotyledonary and Root Tissues.**
K. Matand, Langston University
- 5:00 181 **Quantification and Analyses of Histone Deacetylase Activity During Rust Fungal Inoculation in Common Bean (*Phaseolus vulgaris* L.).**
K. Melmaiee, Delaware State University
- 5:15 182 **Map Based Phylogenies, Linkage Disequilibrium and Association Mapping for Fruit Traits in Melon.** P. Nimmakayala, West Virginia State University

Monday Afternoon, April 8

Concurrent Scientist Oral Presentations

Plant Health and Production and Plant Products

Dr. Moses Kairo, Presiding

City Terrace 5

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| 2:00 | 183 | An Update on New Pawpaw Variety Development at Kentucky State University.
K. W. Pomper, Kentucky State University |
| 2:15 | 184 | Transcriptome Analyses of the Sweetpotato Root: Towards Identification of Genes Involved in Tuber Formation. S. K. Ponniah, University of Arkansas at Pine Bluff |
| 2:30 | 185 | Molecular and Cellular Approach to Understand Sugar Metabolism in Muscadine Grape. S. M. Basha, Florida A&M University |
| 2:45 | 186 | Response of <i>Ocimum tenuiflorum</i> (Basil) Photochemical Content to Different Levels of Nitrogen in North Alabama. C. A. Sims, Alcorn State University |
| 3:00 | 187 | Developing Resources for Understanding Epigenomics in Common Bean (<i>Phaseolus vulgaris</i> L.). Y. Thurston, Delaware State University |
| 3:15 | 188 | Identification and Analyses of Leaf Transcriptomes in Fungal Rust-Challenged Common Bean (<i>Phaseolus vulgaris</i> L.). A. Todd, Delaware State University |
| 3:30 | 189 | DArT Markers for Pumpkin Phylogenies and Association Mapping.
V. G. Vajja, West Virginia State University |
| 3:45 | 190 | <i>de novo</i> Next-Generation Sequencing, Assembling and Annotation of <i>Arachis hypogaea</i> L. Spanish Botanical Type Whole Plant Transcriptome.
N. Wu, Langston University |
| 4:00 | 191 | Characterization and Compilation of Polymorphic Simple Sequence Repeat (SSR) Markers of Peanut from Public Database. Y. Zhao, Tuskegee University |
| 4:15 | 192 | Implementation of Extension IPM on Selected Vegetable and Fruit Crops in North Florida. M. Haseeb, Florida A&M University |
| 4:30 | 193 | Specialty Crops in North Carolina Piedmont: Making Meaningful Choices for Sustainable Pest Suppression (IPM).
L. E. N. Jackai, North Carolina Agricultural and Technical State University |
| 4:45 | 194 | Developing Trap Cropping Systems for Effective Organic Management of Key Insect Pests of Cucurbit Crops (IPM). J. C. Piñero, Lincoln University |
| 5:00 | 195 | Using Native Perennial Plant Borders for Small Farm Integrated Pest Management Programs at Kentucky State University (IPM).
J. D. Sedlacek, Kentucky State University |

Monday Afternoon, April 8

Concurrent Scientist Oral Presentations

Animal Health and Production and Animal Products

Dr. Kirk Pomper, Presiding

City Terrace 6

- 2:00 196 **Molecular Biomarkers and Resistance in Goats Pasture-Exposed to *Haemonchus contortus*.** M. M. Corley, Virginia State University
- 2:15 197 **Reclaimed Water Aquaculture: An Innovative Sustainable Technology of Producing Fish.** R. Cuevas-Urbe, Kentucky State University
- 2:30 198 **Effects of Feeding a Pelletized Diet Containing Pumpkin Seeds on Nematode Fecal Egg Counts (FEC), and Blood Hematocrit (PCV) in Meat Goat Kids.** E. N. Escobar, University of Maryland Eastern Shore
- 2:45 199 **Effects of Dietary Lipid Levels on the Growth, Feed Efficiency and Mitochondrial Function in Rainbow Trout.** J. C. Eya, West Virginia State University
- 3:00 200 **Chemical Composition of Liver and Skeletal Muscle of Laying Hens Fed Supplements of Waterleaf (*Talinum triangulare*).** M. Ezekwe, Alcorn State University
- 3:15 201 **Monitoring and Mechanisms of Resistance to Miticides in the Ectoparasitic Mite, *Varroa destructor*, Populations in Honey Bee, *Apis mellifera*, Colonies.** L. Kanga, Florida A&M University
- 3:30 202 **Use of Scanning Electron Microscopy to Determine Effects of Sericea Lespedeza Diet on Adult Female *Haemonchus contortus* in goats.** D. S. Kommuru, Fort Valley State University
- 3:45 203 **Effects of Sea Level Rise on Barrier Island Stopover Points for Transient Birds in Apalachicola, Florida.** L. A. Lester, Delaware State University
- 4:00 204 **The Role of Progesterone in Early Bovine Development and the Communication Between the Dam and the Conceptus.** M. C. Mason, Alcorn State University
- 4:15 205 ***Moringa oleifera* Tea Abrogates Inflammation.** R. C. Minor, North Carolina Agricultural and Technical State University
- 4:30 206 **Sheep Skin Fibroblast Cell Cultures from Room Temperature Stored Tissues After Ten Days of Animal Death.** M. Singh, Fort Valley State University
- 4:45 207 **Effects on Growth, Body Composition, and Processing Traits of Australian Red Claw Crayfish, *Cherax quadricarinatus*, Fed Diets Containing Two Different Protein Levels with Alfalfa Hay in Ponds.** K. R. Thompson, Kentucky State University
- 5:00 208 **Potential Use of the African River Prawn, *Macrobrachium vollenhoveni*, as a Biological Control for Schistosomiasis in West Africa.** J. H. Tidwell, Kentucky State University
- 5:15 209 **Carcass Yield and Composition of Meat from Sheep Artificially Infected with *Haemonchus contortus*.** A. B. Yousuf, Virginia State University

Monday Afternoon, April 8

Concurrent Scientist Oral Presentations

Renewable Energy, Natural Resources, and Environment

Dr. Wondimagegnehu Mersie, Presiding

City Terrace 7

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| 2:00 | 210 | Quantifying Household Carbon Footprint and Reduction Opportunities for Selected Communities in the Huntsville Metropolitan Area.
B. S. Herbert, Alabama A&M University |
| 2:15 | 211 | Reversible Carbon Dioxide Capturing Using Biocompatible Polymeric Blends.
V. V. Volkis, University of Maryland Eastern Shore |
| 2:30 | 212 | Relative Abilities of Selected Urban Tree Species in Mitigating Elevated CO₂.
Z. Ning, Southern University |
| 2:45 | 213 | Urban Forest Ecosystem Assessment in Baton Rouge, Louisiana, Using I-Tree Eco Model. K. K. Abdollahi, Southern University |
| 3:00 | 214 | Ecological Assessment of an Urban Forest Through a Sample Street Tree Inventory.
S. Elavarthi, Delaware State University |
| 3:15 | 215 | Qualification and Quantification of Selected Phenolic and Flavonoid Compounds in Twelve Tree Species. V. A. Ferchaud, Southern University |
| 3:30 | 216 | Microclimatic Differences Between Mature Pine Silvopasture and Open-Pasture.
U. Karki, Tuskegee University |
| 3:45 | 217 | Nanotechnology for Forest Protection and Wood Preservation.
Y. Qi, Southern University |
| 4:00 | 218 | A Catastrophe in Fort Valley, Georgia: The Woolfolk Chemical Works Superfund Site and its Environmental Impact on the Community.
J. Surrency, Fort Valley State University |
| 4:15 | 219 | The Chemistry and Distribution of Phosphorus Species in River Sediments.
A. Atalay, Virginia State University |
| 4:30 | 220 | Gypsum Curtains: A New Frontier in Nutrient Management.
A. L. Allen, University of Maryland Eastern Shore |
| 4:45 | 221 | Assessment of Benthic Diatoms as Water Quality Indicators in the Blackbird Creek Watershed, Delaware. K. Chintapenta, Delaware State University |
| 5:00 | 222 | Hydrologic Processes Controlling Stream Water Quality in a Missouri Claypan Watershed. F. Liu, Lincoln University |
| 5:15 | 223 | Exploration of Effluence and Inexpensive Means for Microalgal Biomass Production. S. Palanisami, Lincoln University |

Monday Afternoon, April 8

Concurrent Scientist Oral Presentations

Renewable Energy, Natural Resources, and Environment

Dr. Wondimagegnehu Mersie, Presiding
City Terrace 8

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| 2:00 | 224 | Screening of Microalgal Strains Grown on Swine Wastewater for High Lipid Production. B. Zhang, North Carolina Agricultural and Technical State University |
| 2:15 | 225 | Economics and Energy Efficiency of On-Farm Ethanol Production from Sweet Sorghum Using a Microfueler. M. Bomford, Kentucky State University |
| 2:30 | 226 | Adoption Of Winter Canola (<i>Brassica napus</i>) in Southeastern United States. R. Ward, Alabama A&M University |
| 2:45 | 227 | Characterization and Fractionation of Crude Glycerine from Biodiesel Production for Value-Added Reuse. M. Guo, Delaware State University |
| 3:00 | 228 | Agglomeration of Biochar for Agronomic Use. D. P. Patel, West Virginia State University |
| 3:15 | 229 | Response of Rice Cultivars to Arsenic Accumulation as Influenced by Arsenic Level and Water Management Practices in Soil. J. Yang, Lincoln University |
| 3:30 | 230 | Soil and Plant Mineral Properties in Ramp and Black Cohosh Populations from Different Appalachian Locations. L. K. Rutto, Virginia State University |
| 3:45 | 231 | Plant Response to Struvite Application in Appalachia Acid Soil. A. Hass, West Virginia State University |
| 4:00 | 232 | Ascorbic Acid and Phenols in Kale and Collard Greens Grown in Sewage Sludge and Chicken Manure Amended Soil. R. R. Hill, Kentucky State University |
| 4:15 | 233 | Yield and Quality of Collard and Kale Greens. E. T. Turley, Kentucky State University |
| 4:30 | 234 | Enzymatic Activity and Half-Lives of Capsaicin, Dihydrocapsaicin, and Hexadecanoic Acid in Soil Sprayed with Hot Pepper Extracts. G. F. Antonious, Kentucky State University |
| 4:45 | 235 | Testing Methyl Ketones for Development of an Organic Insecticide. K. L. Kamminga, Kentucky State University |
| 5:00 | 236 | A Survey of Pest Management of the German Cockroach in Child Care Centers in Selected Urban and Rural Areas of North Carolina. B. N. Dingha, North Carolina Agricultural and Technical State University |
| 5:15 | 237 | Distribution Patterns of Invasive Exotic Species in Alabama. X. Chen, Alabama A & M University |

Monday Afternoon, April 8

Concurrent Scientist Oral Presentations

Renewable Energy, Natural Resources, and Environment

Dr. Wondimagegnehu Mersie, Presiding

City Terrace 9

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| 2:00 | 238 | Urbanization and Agricultural Land Loss in the North Alabama Region: A Remote Sensing and Geographic Information System Based Study.
T. Gabre, Alabama A&M University |
| 2:15 | 239 | Green Infrastructure Analysis of Scott's Bluff, Louisiana.
F. L. Namwamba, Southern University |
| 2:30 | 240 | Biomimetic Spider Silk: End Use Marketing Research.
L. K. Crippen, University of Arkansas at Pine Bluff |
| 2:45 | 241 | Global Partnerships in Agriculture, Renewable Energy, Natural Resources, and Sustainable Environment. Z. N. Senwo, Alabama A&M University |
| 3:00 | 242 | Enhancing Teaching and Learning in Natural Resources Conservation Engineering and the Geosciences. M. Gitau, Florida A&M University |
| 3:15 | 243 | Experiential Learning Projects and Research to Address Contemporary Issues Related to Energy, Environment and Sustainability.
A. Nagchaudhuri, University of Maryland Eastern Shore |
| 3:30 | 244 | Sowing the Seeds for Future Globally Competent Scientists in Agricultural and Other Related Sciences: Research and Cultural Experience for Undergraduate and Graduate Students in China. Y. Wang, Alabama A&M University |

Monday Afternoon, April 8

Concurrent Scientist Oral Presentations

Food Safety, Nutrition and Health

Dr. Louis Whitesides, Presiding

City Terrace 9

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| 4:00 | 245 | Prevalence of Metabolic Syndrome and Individual Criteria in Students Attending a Historically Black University. A. M. Topè, Kentucky State University |
| 4:15 | 246 | Self-Perception of Body Weight Status and Willingness to Adopt Healthy Eating and Activity Behaviors Among Kentucky Adults.
C. Wang, Kentucky State University |
| 4:30 | 247 | Resistant Starch as a Prebiotic Ingredient in Functional Food Development.
Y. Xu, Virginia State University |
| 4:45 | 248 | Comparison of Fatty Acid Composition and Antioxidant Contents of Grape Seed Oils from Some Grape Cultivars Grown in North Carolina.
J. Yu, North Carolina Agricultural and Technical State University |
| 5:00 | 249 | Insertion Sequences of 16S rDNAs of Fecal Indicator Bacteria are Useful Genetic Markers for Fecal Source Tracking. G. Zheng, Lincoln University |

Monday Afternoon, April 8

Concurrent Scientist Oral Presentations

Food Safety, Nutrition and Health
Dr. Louis Whitesides, Presiding
City Terrace 10

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| 2:00 | 250 | Residual Amounts of Tetracycline in the Milk of Alpine, Nubian, and La Moncha Goats after Treatment. R. Attaie, Prairie View A&M University |
| 2:15 | 251 | Rural Community Members Engaged in a Cancer Awareness and Prevention Program. N. L. Dawkins, Tuskegee University |
| 2:30 | 252 | The Application of Performance Measures for Assessing Food System Sustainability. R. J. Fricano, Alabama A&M University |
| 2:45 | 253 | Student Incorporation of Nutrition Education and Exercise Both in School and at Home: A Holistic Approach. K. R. Grimes, Kentucky State University |
| 3:00 | 254 | Current Perspectives on Microbial Food Safety of Fresh Produce: Pathogen Survival and Persistence in Soil, in Water, and on Fresh Produce.
F. M. Hashem, University of Maryland Eastern Shore |
| 3:15 | 255 | Effects of Purple Sweet Potato Powder and Dietary Calcium Intake on Body Weight of Ovariectomized Rats. L. Huang, Kentucky State University |
| 3:30 | 257 | A Review of the Oxidative Capacity of a Variety of Brand Cooking Oils.
V. McWhinney, Prairie View A&M University |
| 3:45 | 258 | Assessing School Personnel Knowledge of Wellness Policies.
S. L. McWhinney, Prairie View A&M University |
| 4:00 | 259 | Efforts to Mitigate Climate Change Repercussions on Oyster Populations and Natural Oyster Recruitment in Delaware Inland Bays.
G. Ozbay, Delaware State University |
| 4:15 | 260 | The Effect of Chilling on Persistence of <i>Salmonella serovars</i> on Chicken Carcasses.
S. Parveen, University of Maryland Eastern Shore |
| 4:30 | 261 | Systems Based Approach to Childhood Obesity Prevention.
M. D. Ravola, Alcorn State University |
| 4:45 | 262 | Exploratory Research Involving Consumer Preferences for Organic and Local Food Products in North Carolina.
R. D. Robbins, North Carolina Agricultural and Technical State University |
| 5:00 | 263 | Food Supply Chains and Emergence of Organized Retailing: A Case of Indian Food Industry. S. P. Sing, Tennessee State University |

Monday Afternoon, April 8

Concurrent Scientist Oral Presentations

Family, Youth, Community and Economic Development

Dr. L. Washington Lyons, Presiding

City Terrace 11

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|------|-----|---|
| 2:00 | 264 | Lending Profiles of African-American Families in North Carolina: The 2006 and 2009 HMDA Data. S. Lee, North Carolina Agricultural and Technical State University |
| 2:15 | 265 | Race and the Delivery of Municipal Services in Small Towns in South Carolina. W. M. Legette, South Carolina State University |
| 2:30 | 266 | Lessons Learned Field Testing a Low-cost High Tunnel with Growers in West Virginia. B. E. Liedl, West Virginia State University |
| 2:45 | 267 | Measuring Parental Satisfaction to Improve Family and Youth Outcomes in a Campus Childcare Center. D. Long, University of Maryland Eastern Shore |
| 3:00 | 268 | Impact of the Influx in Hispanic Population on Usage of Social Services Programs in South Carolina. C. C. Mathis, Jr.*, South Carolina State University |
| 3:15 | 269 | Assessing the Fit of Garments Using 3D Virtual Draping. G. N. Namwamba, Southern University |
| 3:30 | 270 | The Effect of Experiential Food Science Activities on the Attitudes of Middle School Children Towards Stem Subjects. C. Newman, Florida A&M University |
| 3:45 | 271 | Internet Access and Economic Development in Africa: Problems and Possibilities. Z. Olorunnipa, Florida A&M University |
| 4:00 | 272 | Stomp, Rattle and Roll: Celebrating A Legacy of Excellence” at FAMU’s 12th Annual Grape Harvest Festival. B. R. Phills, Florida A&M University |
| 4:15 | 273 | Establishment of Precollege Summer Institute: In Search of The Next George Washington Carver. G. S. Phills, Florida A&M University |
| 4:30 | 275 | Demand Analysis of Agricultural Education and Training in Sub-Saharan Africa: The Case of Ghana. S. L. Tubene, University of Maryland Eastern Shore |
| 4:45 | 276 | Community Capital and Economic Development Efforts in Rural Alabama. A. A. Zekeri, Tuskegee University |
| 5:00 | 277 | Food Insecurity among Women Living with HIV AIDS in Alabama’s Black Belt. A. A. Zekeri, Tuskegee University |

Monday Afternoon, April 8

Concurrent Scientist Oral Presentations

Family, Youth, Community and Economic Development

Dr. L. Washington Lyons, Presiding

City Terrace 12

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|------|-----|---|
| 2:00 | 278 | CURES: Authentic Course-based Undergraduate Research Experiences. A Potential Tool in STEAM Education. A. D. Alexander, Tuskegee University |
| 2:15 | 279 | Developing Garden Skills as a Transition Tool from Prison to Community. M. Berhane, Southern University |
| 2:30 | 280 | The Tuskegee University AgDiscovery Summer Program: Increasing Minority Participation in Agriculture and Related Areas. O. Bolden-Tiller, Tuskegee University |
| 2:45 | 281 | Head Start on Healthy Start by Kindergarten (HS-HS by K) Program. E. Bonsi, Tuskegee University |
| 3:00 | 282 | The 'RATLR Program Model' - An Innovative Recruitment Approach to Attracting, Retaining and Graduating Students. J. Bourne Smothers, Florida A&M University |
| 3:15 | 283 | Partnerships to Internationalize Faculty and Student Training in Sustainable Agricultural Systems: Lessons from the Africa Summer Internship Program. J. O. Bukenya, Alabama A&M University |
| 3:30 | 284 | Regional Tourism at the Cross-Roads: Perspectives of Caribbean Tourism Stakeholders. C. S. Christian, Alabama A&M University |
| 3:45 | 285 | Seasonal and Spatial Variations in Demand for Frozen and Chilled Finfish Products in the United States: An Analysis of Fourteen Unbreaded Products Based on Market-level Scanner Data. M. M. Dey, University of Arkansas at Pine Bluff |
| 4:00 | 286 | Teens as Agents of Change to Deliver Childhood Obesity Prevention Programs: A Strategy for Effective Youth Programming. P. K. Doamekpor, Tuskegee University |
| 4:15 | 287 | CYPRESS: A Capacity Building Grant Concept Funded by USDA-NIFA. M. A. Fields, South Carolina State University |
| 4:30 | 288 | Spatial Analysis of Small Farmland Productivity in Southeastern United States. B. R. Gyawali, Kentucky State University |
| 4:45 | 289 | Examining Constraints on Economic Growth: Selected Counties in Southwest Mississippi. T. Hargrave, Alcorn State University |
| 5:00 | 290 | The Impact of iPad Utilization and Integration in the Work Place. P. M. Johnson, Prairie View A&M University |
| 5:15 | 291 | The Impacts of Regional Free Trade Agreements and Exchange Rate Volatility on World Vegetable Trade Flows: A Gravity Model Analysis. D. Karemera, South Carolina State University |

Sunday, April 7 to Monday, April 8

Student Poster Presentations – Undergraduate Competition

Animal Health and Production and Animal Products

Dr. Edward Buckner, Presiding

- 292 **Effects of Gender and Breed on Chevron Quality and Sensory Attributes.**
A. Andrews, Tuskegee University
- 293 **Carcass Yield and Composition of Meat from Goats Artificially Infected with *Haemonchus contortus*.** K. Ashton, Virginia State University
- 294 **Fatty Acids Composition in Intact or Castrated Boer, Kiko and Boer x Kiko Meat Goats (*Capra hircus*) Under Intensive Management System.** S. Baltimore, Tuskegee University
- 295 **Growth Rate and Parasite Burden in Lambs of Two Hair Sheep Breeds of Different Sex Classes.** V. M. Brunson, Virginia State University
- 296 **Supplementation of Hair Sheep Fed Forage Diets of Plant-Derived Agro Byproducts.**
J. S. Davis, Virginia State University
- 297 **The Use of Nematophagous Fungi as Biological Control Methods against Parasitic Nematodes.** A. Donaldson, Florida A&M University
- 298 **Growth and Back Fat Thickness of Berkshire (*Sus scrofa*) Reared Outdoors.**
K. Esparza-Harris, North Carolina Agricultural and Technical State University
- 299 **The Effect of a Small Ruminant Farm Operation and Sustainable Farm Practices: Run-Off and Soil Quality at Hickory Hill Farm, Delaware.** J. Ferguson, Delaware State University
- 300 **Effects of Feeding a Pelletized Diet Containing Pumpkin Seeds on Hematocrit (Percent Packed Cell Volume) of Wether Goats.** A. N. Gideon, University of Maryland Eastern Shore
- 301 **Performance and Behavior Measurements by Fall Born Calves Fenceline Weaned with or without Companion Goats.** E. G. Goose, Lincoln University
- 302 **Performance by Crossbred Wether Lambs Grazing Oat and Turnip Pastures in Late Spring through Early Summer Using Either Continuous or Rotational Grazing Schemes.**
J. K. Hanlin, Lincoln University
- 303 **Retention of Sperm Motility in Cooled Ram Semen Stored for Up to 24 Hours.**
B. J. Jacques, Virginia State University
- 304 **Performance and Behavior by Dorper-Katahdin Crossbred Lambs Using Fenceline and Traditional Weaning Methods.** M. A. Jaster, Lincoln University
- 305 ***Capra hircus* (Boer goats) Performance on a Silvopasture System.**
S. R. Kelly, Florida A&M University
- 306 **Estimation of Body Weight from Body Measurements in Meat Goats.**
C. McGill, Virginia State University
- 307 **Growth and Feed Intake of Piglets Born of Sows that Consumed Diets Supplemented with Yeast Culture or Oat.** M. McKnight, North Carolina Agricultural and Technical State University

- 308 **Performance by Fall-Calving Cow/Calf Pairs Rotationally Grazing Either Chicory or Toxic Tall Fescue in the Spring.** G. T. Otto, Lincoln University
- 309 **Evaluating Pellet and Mash Myceliated Grain Diets on Performance of Young Broiler Chickens.** M. Paylor, North Carolina Agricultural and Technical State University
- 310 **Effects of Feeding a Pelletized Diet Containing Pumpkin Seeds on Nematode Fecal Egg Counts of Wether Goats.** V. Purnell-Cropper, University of Maryland Eastern Shore
- 311 **Excess Estrus in Meat Goats.** B. A. Schulte, Lincoln University
- 312 **Identification of Novel Caprine Uterine Epithelial Cell Apical Plasma Membrane Proteins Carrying the H-type 1.** S. D. Schuman, Prairie View A & M University
- 313 **The Influence of Two Timed Artificial Insemination Protocols on Pregnancy Rates in Angus Cows and Heifers.** J. G. Scott, Delaware State University
- 314 **Performance by Different Meat Goat Breeds Grazing Woodlands at Lincoln University Busby Farm – One Year Summary.** J. S. Stieferman, Lincoln University
- 315 **Effects of Protein-to-Energy Diets on Bluegill (*Lepomis macrochirus*) Juveniles Growth with Observations on Sexual Dimorphism.** K. Vandeloecht, Lincoln University
- 316 **Determination of Sex-Hormone Binding Protein Expression in the Goat Testis.** R. C. White, Tuskegee University
- 317 **Spring Stopover Ecology of Migratory Birds on a Barrier Island in Apalachicola, Florida.** M. Gutierrez-Ramirez, Delaware State University

Student Poster Presentations – Graduate Competition

Animal Health and Production and Animal Products

Dr. Edward Buckner, Presiding

- 318 **Isolation of Aerobic and Anaerobic Bacteria from Footrot Infections in Sheep and Goats.** S. Azarpajouh, Lincoln University
- 319 **Development of a Cell Biological Tool for Genetic Modification of Goats.** V. N. Degala, Fort Valley State University
- 320 **Replacing Corn with Brewers Rice in Swine Diets and Effect on Performance and Carcass Quality of Growing-Finishing Pigs.** T. Dokes, University of Arkansas at Pine Bluff
- 321 **Insecticide Resistance Management in the Ectoparasitic Mite, *Varroa destructor*, of Honey Bee, *Apis mellifera*, Populations and Susceptibility of this Invasive Alien Pest to Fungal Pathogens.** C. Eddington, Florida A&M University
- 322 **Effect of Dietary Supplementation of Ferrous Sulfate on Feed Intake, Growth, and Carcass Characteristics of Finishing Lambs.** J. Howard, Alabama A & M University
- 323 **Molecular Analysis of TRPC1 in Goats Pasture-Exposed to *Haemonchus contortus*.** L. M. Judd, Virginia State University
- 324 **Effect of Different Types of Fat on Performance and Organ Weights of Cornish Rock Broilers.** K. M. Liles, Tuskegee University

- 325 **Gene Expression of Interleukin 9 in Goats Pasture-Exposed to *Haemonchus contortus*.**
S. Nettles, Virginia State University
- 326 **Effects of Feeding a Pelletized Diet Containing Pumpkin Seeds on Nematode Fecal Egg Counts (FEC), and Blood Hematocrit (PCV) in Lambs.**
J. Rodriguez, University of Maryland Eastern Shore
- 327 **Isolation and Characterization of Prosaposin from Milk of Goat Breeds.**
A. Robertson-Byers, North Carolina Agricultural and Technical State University
- 328 **The Major Histocompatibility Complex and Genetic Resistance of Small Ruminants to the Gastrointestinal Nematode *Haemonchus Contortus*: Evaluation of the DRB1 Locus.**
A. Savage, Virginia State University
- 329 **Comparison of Tilapia *Oreochromis niloticus* Growth, Water Quality and Microbial Community Structures in Indoor Biofloc Systems Supplemented with Either Organic or Inorganic Carbon Sources.** R. C. Shultz, Kentucky State University
- 330 **Cortisol and Thyroid Hormones in Dairy and Meat Goats of Different Ages.**
L. Touray, Fort Valley State University
- 331 **Growth Performance Characteristics, Mitochondrial Enzymatic Activities and Relative Expression of Mitochondrial and Nuclear-Encoded Genes in Rainbow Trout: Diet and Family Effects.** V. Ukwuaba, West Virginia State University
- 332 **Birdies, Eagles, and...Bats? Unexpected Public Outreach Opportunities for Bat Conservation on Golf Courses.** M. Wallrichs, Delaware State University
- 333 **The Effect of Divergent Selecting Parent Population Boer Does for High and Low Parasite Resistance on Subsequent Parasite Resistance, Survival Rate, Reproductive Efficiency, and Kid Performance: 1-Year Summary.** L. S. Wilbers, Lincoln University

Student Poster Presentations – Undergraduate Competition

Food Safety, Nutrition and Health Dr. Shirley Hymon-Parker, Presiding

- 334 **Efficacy of Anti-Inflammatory Synthetic Peptides in a Murine Model Of Ulcerative Colitis: IL-10 Deficient Mice.** E. Andrews, Tuskegee University
- 335 **Develop a Comprehensive Laboratory Medium for the Routine Enumeration of Bifidobacterium in Probiotic Samples.** A. A. Ayad, North Carolina A&T State University
- 336 **Consumer Evaluation and Shear Force of Retail Domestic Grain-Finished, Imported New Zealand Grass-Finished, and Missouri-Produced Grass-Finished Lamb Racks.**
K. L. Basinger, Lincoln University
- 337 **Nutritional, Textural, and Microbiological Quality Attributes of Fresh Water Prawn *Macrobrachium rosenbergii* Grown in Virginia.** S. Bragg, Virginia State University
- 338 **Effects of Tissue Culture and Mycorrhiza Applications on Phenolic Contents and Antioxidant Capacities in Ginger Rhizome and Leaves from Organic Farming (*Zingiber Officinale*).** K. Brathwaite, University of Maryland Eastern Shore
- 339 **Microfluidic Sensor for Rapid Diagnosis of Multiple Myeloma Cancer.**
S. Butler, Alcorn State University

- 340 **The Correlation Between a Soccer Coaches' Perception of Players' Strength and Endurance Using Standardized Measures.** R. Dale, South Carolina State University
- 341 **Antioxidant Capacities of Whole Black and White Peppercorns.**
D. A. Elder, Prairie View A&M University
- 342 **The Effect of Different Extracting Solvents from Mushroom and *Sophora flavescens* (Ku Shen) Root on the Antiproliferation Of HT-29 Human Colon Cancer Cells.**
T. Flournoy, Virginia State University
- 343 **Prevalence of Obesity Among Pre-School Children in Head Start Programs.**
M. Gidi, Alcorn State University
- 344 **Utilizing Myplate as an Effective Means of Providing Visual Regulations of Portion Sizes for Elementary Students in Grades 3-5.** B. Gordon, South Carolina State University
- 345 **Spin-Coated Agar Microfluidic Device for Enhanced Imaging of Bacterial Cell Dynamics.**
I. Henry, Florida A&M University
- 346 **Regulation of Allergenic Protein by Nadplus Dehydrogenase.**
D. Johnson, Prairie View A&M University
- 347 **Antibacterial Effects of Lactic Acid on a Foodborne Pathogen, *E. coli*.**
J. Johnson, South Carolina State University
- 348 **The Effects of the Pedometer in the Battle Against Childhood Obesity.**
R. Johnson, South Carolina State University
- 349 **Inclusion of Dietary Fiber in Imitation Cheese.** J. Ladmirault, Prairie View A&M University
- 350 **Effective Weight-Loss Through the Use of a Body-Propelled Trikke.**
J. Lawrence, South Carolina State University
- 351 **Portable Optical Sensor for Food Safety and Clinical Diagnostics.**
B. Lewis, Alcorn State University
- 352 **A Reusable Microfluidic Impedimetric Biosensor for the Specific Detection of Low Concentrations of *Salmonella typhimurium* in Food Samples.** H. Loos, Lincoln University
- 353 **Interventions for the Obesity Epidemic in Mississippi.** J. Marshall, Alcorn State University
- 354 **Processing Methods on Flavonoid and Phenolic Content of Peanuts and Walnuts.**
B. McArthur, Alabama A&M University
- 355 **Dietary Fiber and Polyphenol Composition of Grape Pomaces from Four Grape Cultivars Grown in North Carolina.** A. McMillan, North Carolina A&T State University
- 356 **Using Modern Technology to Track Eating and Exercise Habits in Overweight and Obese Elementary Students in Grades 3-5.** R. Morgan, South Carolina State University
- 357 **Investigating the Effects of Isokinetic Resistance Training on Elderly Type 2 Diabetics.**
D. Murphy, South Carolina State University
- 358 **The Accountability and Transparency Across the Supply Chain of Any Food Product Using Radio Frequency Identification (RFID) Technology.** J. Murray, South Carolina State University

- 359 **Antimicrobial Effect of *Allium sativum* (Garlic) and *Allium ampeloprasum* (Elephant Garlic) on *Salmonella typhimurium* Stored at Room and Refrigeration Temperature.**
R. Nicholson, Prairie View A&M University
- 360 **Differential Display of Mirna Genes in Various Fruit Development Stages among Pepper Species Using RT-PCR.** Z. Perry, West Virginia State University
- 361 **Nanomaterial Sensor for Rapid Detection of Cancer Markers.**
C. Raven-Pilate, Alcorn State University
- 362 **Inhibition Effect of Tea Extract by Infusion Time and Degree of Fermentation against Bacterial Growth.** T. Rhodes, Tuskegee University
- 363 **Exploring Computer Applications in the Field of Computational Epidemiology.**
J. Richardson, South Carolina State University
- 364 **The Correlation Between Muscle Mass and Strength of the Knee/Hip in Female College Soccer Players.** S. Searle, South Carolina State University
- 365 **Consumers' Perceptions of Non-Traditional Vegetable Products in the Southern United States.** K. Tarleton, Alcorn State University
- 366 **Macro and Micro Mineral Concentrations of Retail Domestic Grain-Finished, Missouri-Produced Grass-Finished, and Imported New Zealand Grass-Finished Lamb Chops.**
C. L. Thomas, Lincoln University
- 367 **A Descriptive Study of Kaolin Geophagia in Macon County, Alabama.**
D. Thomas, Tuskegee University
- 368 **Development of an On-The-Go Breakfast Waffle.** J. Thomas, Jr., Alabama A&M University
- 369 **The Knowledge of and Attitude Towards Hand Sanitizers among Young Adults.**
S. Thomas, Florida A&M University
- 370 **Evaluation of Lipolytic Characteristics of Caprine Milk Ice Creams Formulated with Three Different Levels of Milk Fat During Eight Weeks Frozen-Storage.**
K. Walker, Fort Valley State University
- 371 **The Effects of the Wii Gaming System on Increasing Physical Activity in Grades 3-5.**
D. Washington, South Carolina State University

Student Poster Presentations – Graduate Competition

Food Safety, Nutrition and Health Dr. Shirley Hymon-Parker, Presiding

- 372 **Metabolite Biodiversity in Pepper Fruits and Prospects of Pharmaceuticals.**
V. L. Abburi, West Virginia State University
- 373 **Usage and Beliefs About Dietary Supplements Among Professional Athletes in Saudi Arabia.** S. O. Aljaloud, North Carolina A&T State University
- 374 **Toward Development of Capsaicin Patch Using Functional Genomics in Peppers.**
A. Almeida, West Virginia State University

- 375 **Fifty Percent Acetone from Several Fruits and Spices Were Tested for AntiProliferation Effects on HT-29 Human Colon Cancer Cells.** P. Awhaity, Virginia State University
- 376 **Food Safety Technology: Integration of Teaching, Research and Technology Transfer.** R. Boateng, Alcorn State University
- 377 **Chemopreventive Potential of Lentils, Green and Yellow Split-Peas (Sprouted and Non-Sprouted) on Azoxymethane-Induced Aberrant Crypt Foci in Fisher 344 Male Rats.** K. Busambwa, Alabama A&M University
- 378 **Dietary Patterns and its Impact on Colon Cancer Risk in African American and Caucasians in North Alabama.** K. M. Campbell, Alabama A&M University
- 379 **Chemopreventive Effects of Cocoa and Coffee on Selected Hepatic Detoxification Enzymes in Fisher 344 Male Rats.** L. Dalrymple, Alabama A&M University
- 380 **Evaluation of Practical Post-Harvest Mitigation Strategies to Reduce the Abundance of *Vibrio vulnificus* and *Vibrio parahaemolyticus* in Chesapeake Bay Oysters (*Crassostrea virginica*).** S. Elmahdi, University of Maryland Eastern Shore
- 381 **The Impact of Wild Birds and Farm Management on the Prevalence of *Campylobacter* and *Salmonella* in Small Ruminants.** B. Hagens, University of Maryland Eastern Shore
- 382 **Use of Sweet Potato (*Ipomoea Batatas*) to Develop a Medium for Cultivation of Lactic Acid Bacteria.** S. A. Hayek, North Carolina A&T State University
- 383 **Impact of Cholesterol Removal on Physiochemical Properties of Queso Fresco Cheese.** P. Jackson, Delaware State University
- 384 **Persistence and Survival of Generic *E. coli* and Total Coliforms on Field-Grown Tomatoes Irrigated with Contaminated Water.** T. Khairi, University of Maryland Eastern Shore
- 385 **Monitoring Physiochemical Properties of Restructured Chevron Jerky Processed under Non-Commercial Condition.** B. B. Lemma, Fort Valley State University
- 386 **The Investigation of Negative Eating Habits in Regards to Economically Challenged Families and How it Prevents Children from Eating Healthy.** S. F. Neal, Prairie View A&M University
- 387 **Chemopreventive Potential of Fresh and Processed Ginger on Mammalian Cells-HEG2 and Caco2.** R. Offei-Okanye, Alabama A&M University
- 388 **Efficacy of Selected Solvents on the Extraction of Phenolic Yield and Antioxidant Activities of Culinary Herbs and Spices in an *in vitro* System.** V. L. Shoots, Alabama A&M University
- 389 **Assessing Honey Bee (*Apis mellifera* L.) Health in Conventional and Organically Kept Apiaries for the Development of Sustainable Beekeeping Practices.** S. Siebert, Florida A&M University
- 390 **Fortification of White Bread with Grape Pomace from North Carolina Wineries.** I. N. Smith, North Carolina A&T State University
- 391 **Hydrolyzed Organic Fish Fertilizer and Poultry Litter Influence Total Phenolic and Antioxidants Content but Not Yield of Amaranth, Celosia, Gboma and Long Bean.** L. Staley, Tuskegee University

- 392 **Reported Food Safety Practices of Older Adults Place Them at Risk for Foodborne Illness.**
R. Stone, Tennessee State University
- 393 **Chlorine Inactivation of Non-Resistant and Antibiotic Resistant Strains of *Salmonella typhimurium* Isolated from Pre-Chill and Post-Chill Poultry Carcasses.**
R. Tasmin, University of Maryland, Eastern Shore
- 394 **An Assessment of the Relationship between Nutrition Education and Food Consumption in a Nashville, TN Youth Summer Program.** D. Towns, Tennessee State University
- 395 **Survival and Persistence of Non-Pathogenic *Escherichia coli* and *Escherichia coli* O157:H7 in Soils Amended with Animal Manure in a Greenhouse Environment.**
C. Whyte, University of Maryland Eastern Shore
- 396 **Synergistic Effects on Nuclear Factor Kappa B Expression in an Ovarian Cancer Cell Line, SKOV-3, in the Presence of Chitosan and Docosahexanoic Acid.**
E. L. Williams, Prairie View A&M University
- 397 **Subacute Toxicity Study of Herbal Tea Supplementation and Effects on Toxicological Biomarkers: Oxidative Stress and Drug Metabolizing Enzymes.**
S. Willis, Alabama A&M University
- 398 **Expression of Kallikrein 6 in a Chitosan-Treated Ovarian Cancer Cell Line, SKOV-3.**
C. Woodard, Prairie View A&M University
- 399 **Quality Changes on Fresh Southern Peas in Vented and Closed Clamshells during Refrigeration Storage.** K. Wright, University of Arkansas at Pine Bluff

Student Poster Presentations – Undergraduate Competition

Family, Youth, Community and Economic Development Dr. James Garner, Presiding

- 400 **Divergence in Non-farm Labor Force Participation of Men and Women.**
S. Allen, Alcorn State University
- 401 **Sustainable Vegetable Gardening Using IPM Practices.** K. Barr, Florida A&M University
- 402 **Survey Results of North Central Missouri 4-H Sheep and Goat Camp Participants.**
K. A. Cash, Lincoln University
- 403 **Understanding the Marketing Strategies of Georgia Goat Producers.**
R. Clark, Fort Valley State University
- 404 **Mayoral Leadership and the Delivery of Municipal Services in Small Towns in South Carolina.** A. Grant, South Carolina State University
- 405 **Research and Outreach Approaches at the Kentucky State University Environmental Education and Research Center.** R. Graves, Kentucky State University
- 406 **Panama Canal Expansion, Toll Increase and Impact on U.S. Corn Exports in the Southeast Region of the United States.** A. James, South Carolina State University

Student Poster Presentations – Graduate Competition

Family, Youth, Community and Economic Development

Dr. James Garner, Presiding

- 407 Nutrition Education and Fitness Camp: Can it Prevent Obesity?**
T. Kelley, Alabama A&M University
- 408 Obesity Intervention in Low-Income Children from High Risk Families.**
S. Long-Lambi, Alabama A&M University
- 409 Factors Influencing Graduation Rates in two Mississippi School Districts.**
C. Mawusi, Alcorn State University
- 410 Financial Challenges of the NC Elderly Population: Supplemental Nutrition Assistance Program (SNAP) and Housing Expenditures.** J. Wade, North Carolina A&T State University

Student Poster Presentations – Undergraduate Competition

Plant Health and Production and Plant Products

Dr. Lurline Marsh, Presiding

- 411 The Effect of Nitrogen Treatment on the Anthocyanin and Polyphenols Content of *Aronia melanocarpa* Grown in Maryland.** B. Aroh, University of Maryland Eastern Shore
- 412 Identification of Proteins Associated with Pierce's Disease Tolerance in Xylem Tissue of *Vitis* Species.** K. Chibanguza, Florida A&M University
- 413 Effect of Fertilizers on Eggplant Resistance to Insects.** J. Coleman, Jr., Alcorn State University
- 414 Germination and Growth of Fall Cover Crops Following Organic Tomatoes.**
C. Cooper, University of Maryland Eastern Shore
- 415 Characterization, Molecular Cloning, and *in silico* Analysis of UDP-Glucose: Flavonoid-3-O-Glucosyltransferase (UFGT) Gene from *Muscadinia rotundifolia*.**
P. Corbiere, Florida A&M University
- 416 Role of MicroRNA Regulation for Sex Expression of Melon.**
L. Dingess, West Virginia State University
- 417 Emergence and Growth of Teff (*Eragrostis tef*) Varieties as Influenced by Seedbed Compaction and Row-spacing.** C. Epps, Virginia State University
- 418 Chromatin Immunoprecipitation (ChIP) Assay and Methylation Analysis Protocols in Common Bean (*Phaseolus vulgaris* L.).** E. Fiedler, Delaware State University
- 419 Plant Growth Inhibitor on Sweetpotato Growth and Yield: Application Timing and Frequency.** J. L. Freeman, Alcorn State University
- 420 Increasing Production Efficiencies through Better Germination in Food-Type Soybeans.**
C. Greene, Virginia State University

- 421 **Assessing Trends in Selected Agricultural Commodity Prices: A Correlation Analysis.**
M. Griffin, Alcorn State University
- 422 **High Frequency Propagation Regeneration in *Valeriana officinalis*: A Rare Medicinal Plant.**
C. Hicks, Fort Valley State University
- 423 **Growth and Yield of Native Warm-Season Grasses as Affected by Root-Loss at Transplanting and Cutting Height.** D. Johnson, Virginia State University
- 424 **Effect of Biodegradable Polymer on the Growth and Development of Plants: Part II.**
S. Lewis, Prairie View A&M University
- 425 **The Effects of Fly Ash on Germination and Growth of Lettuce, Mustard and Tomato Seedlings.** K. Martin, Tennessee State University
- 426 **Influence of Hydrolyzed Fish Fertilizer and Poultry Litter as Organic Amendments on Yield and Leaf Nitrogen Concentration of Four Sweetpotato Varieties.**
L. Parks, Tuskegee University
- 427 **A Comparative Evaluation of EM on Soil Quality and Fresh Yield of *Brassica oleracea* var. *acephala* Grown on Orangeburg Loamy Sand Soil.** H. Reed, Florida A&M University
- 428 **Forage Yield and Flowering of Teff (*Eragrostis tef*) Varieties as Influenced by Seedbed Compaction and Row-spacing.** L. Robinson, Virginia State University
- 429 **Effects of Larval Density of Cabbage Looper, *Trichoplusia ni*, on Defoliation and Performance of the Predator Spined Soldier Bug, *Podisus maculiventris*.**
J. Rowell, Lincoln University
- 430 **Evaluation of Tasks Necessary for Maintaining an Organic Blueberry Orchard through One Growing Season.** B. F. Schmitz, Lincoln University
- 431 **Yield Trials for Hot and Specialty Peppers for Small Farm Production.**
J. A. Thaxton, West Virginia State University
- 432 **Increase Yield and Quality of Vegetable Soybean through Optimum Planting Practices.**
I. Thompson, Virginia State University
- 433 **An Efficient Plant Regeneration Protocol from Hypocotyl and Leaf Explants of Alfalfa.**
S. Williams, Fort Valley State University
- 434 **Comparison of the Structural Changes in US and Mississippi Agricultural Production and Productivity.** R. Yates, Alcorn State University

Student Poster Presentations – Graduate Competition

Plant Health and Production and Plant Products Dr. Lurline Marsh, Presiding

- 435 **Association Mapping of Fruit Traits in Watermelon.** L. Aburri, West Virginia State University
- 436 **Dynamic Regulation of Novel and Conserved miRNAs across Various Tissues of Diverse *Cucurbit* spp.** A. Alvarado, West Virginia State University

- 437 **Differential Gene Expression in Developing Sweetpotato Storage Roots in Response to Infection by the Root Knot Nematode *Meloidogyne* spp.** G. C. Bernard, Tuskegee University
- 438 **Effect of Organic and Inorganic Fertilizer on the Production, Elemental Composition and Quality of Roselle Hibiscus Calyces.** M. Breithaupt, Southern University and A&M College
- 439 **Detailed Outline of Plant Molecular Genetics and Genomics Research in Common Bean (*Phaseolus vulgaris* L.) at Delaware State University.** A. Brown, Delaware State University
- 440 **Investigating *Stevia* for High Yield and Biomass Production *in vitro*.** P. Bumpus, Fort Valley State University
- 441 **Symbiotic Performance of Genetically Diverse Cowpea Genotypes on the Delmarva Peninsula.** N. M. Burton, University of Maryland Eastern Shore
- 442 **Effect of Fertilizer Application on Elemental Content of Roselle Hibiscus Leaves.** S. Chin, Southern University
- 443 **Acoustical Detection of the Pametto Weevil, *Rhynchoporus cruentatus* (Fabricius) [Coleoptera: Dryophthoridae].** O. Dosunmu, Florida A&M University
- 444 **Monitoring for Susceptibility of the Asian Citrus Psyllid to Insecticides and Potential Microbial Control Agents.** J. Eason, Florida A&M University
- 445 **A Faunistic Survey of Mealybugs (Hemiptera: Pseudococcidae) Occurring on Coffee (*Coffea arabica* L.) and Cacao (*Theobroma cacao* L.) Agroecosystems in the Dominican Republic.** E. G. Ramirez, Florida A&M University
- 446 **Performance of Genetically Developed *Gladiolus* Genotypes in Southeast Arkansas Conditions.** M. Hossain, University of Arkansas at Pine Bluff
- 447 **Controlling Cherry Leaf Spot Disease in Flowering Cherry.** J. Joshua, Tennessee State University
- 448 ***in vitro* Investigation of Neem for Higher Yield of Azadirachtin and its Biopesticidal Applications.** S. Konkayala, Fort Valley State University
- 449 **Increasing Fresh Virginia-Grown Edamame Supply through Season Extension Techniques.** S. Nolen, Virginia State University
- 450 **Molecular Characterization and *in silico* Expression Analysis of a MYB Gene Family in *Muscadinia* Grapes (*Muscadinia rotundifolia*).** L. Oglesby, Florida A&M University
- 451 **Arkansas Grand Grassland Prairie Switchgrass, *Panicum virgatum*, Adaptability for Production in Southwest Mississippi.** K. Olowola, Alcorn State University
- 452 **Investigating Medicinally Important Phytochemicals of Peach While Employing *in vitro* Studies for PTSL Evaluation.** S. Johnson, Fort Valley State University
- 453 **Effect of Muscadine Grape Extracts on Proteome Profiles of Cancer Cell Lines and Identification of Associated Anticancer Compounds.** V. Sridhar, Florida A&M University
- 454 **Greenhouse Noni (*Morinda citrifolia*) Production and Utilization in Southwest Mississippi.** Q. Thomas, Alcorn State University

- 455 **Chromatin Structure and Genome Response in Maize.** Z. Wiggins, Florida A&M University
- 456 **Greetings from Viruses: the Development and Applications of Plant Virus-Based Functional Genomics Technology.** S. Williams, Alcorn State University
- 457 **Protein-Protein Interactions among Water Stress Responsive Proteins in Peanut Leaf.** C. Williams, Florida A&M University
- 458 **Factors Influencing Electroporation-mediated Gene Transfer to *Stevia rebaudiana* Protoplast.** A. L. Williams, Fort Valley State University
- 459 **Hot Pepper (*Capsicum frutescens*) Processing in Southwest Mississippi.** R. Williams, Jr., Alcorn State University
- 460 **Survey of *Liriomyza trifolii* (Diptera: Agromyzidae) and *Liriomyza sativia* (Diptera: Agromyzidae) Parasitoids from Vegetables in Leon County, Florida.** J. Williamson, Florida A&M University

Student Poster Presentations – Undergraduate Competition

Renewable Energy, Natural Resources, and Environment Dr. Frieda Eivazi, Presiding

- 461 **Water Dispersible Carbon Nanotubes Silica Hybrids.** G. Beharie, Prairie View A&M University
- 462 **Urban Forests and Climate Change - A Comparative Study in Beijing and Shenyang, China.** B. Benjamin, Southern University
- 463 **Determining Urea Persistence in a Coastal Plain Soil: An Incubation Study.** I. Bottone, University of Maryland Eastern Shore
- 464 **Plant Decomposition and Production of Byproducts that Potentially Serve as Biofuel Feedstocks.** D. Clarke, Prairie View A&M University
- 465 **Use of Fly ash and Poultry Litter Mixtures for Biomass Production by the Cellulosic Herbaceous Perennial, Eastern Gamgrass.** A. Harrell, Tennessee state University
- 466 **Molecular Genetic Variation in *Arundo donax* Populations in South Georgia.** S. Harrison, Fort Valley State University
- 467 **Public Awareness and Perceptions of Green Infrastructures for Mitigating Storm Water Runoff.** C. Hopkinson, Florida A&M University
- 468 **Assessing Correlations between Soil Organic Carbon and Phosphatase Activity in Southeast US Soils Across Various Land Use Types.** S. Jones, Tuskegee University
- 469 **Genetic Engineering *Cytophaga hutchinsonii* Toward High Efficient Bio-Ethanol Production: Gene Transformation and Reporter Gene Expression.** K. Jones, Virginia State University
- 470 **Comparison of Modified Chitosan Derivatives.** O. Macaulay, Prairie View A&M University
- 471 **Native Plant Seed and Nursery Stock Production from the Mark Twain National Forest at Lincoln University.** E. Skornia, Lincoln University

- 472 **Environmental Monitoring of Water Quality Conditions in East Central Texas.**
R. Somers, Prairie View A&M University
- 473 **Analyses of Spatial Variability of Iron and Manganese in a Seasonally Pondered Wetland in East Central Texas.** C. Stewart, Prairie View A&M University
- 474 **Temporary Variation of Stream Water Quality as Affected by Land Use in a Midwest Watershed.** R. Thompson, Lincoln University
- 475 **Genetic Variation of Copper Tolerance in Purslane (*Portulaca oleracea*).**
L. White, Virginia State University
- 476 **Continuing the Search for a Renewable/Biodegradable Hydroponic Substrate.**
B. J. Wooten, West Virginia State University

Student Poster Presentations – Graduate Competition

Renewable Energy, Natural Resources, and Environment Dr. Frieda Eivazi, Presiding

- 477 **Transition to Organic Fruit Production with Animal and Forest Wastes: Impact on Yield and Environmental Performance of Muscadine (*Vitis rotundifolia*) in a Heavy Soil.**
J. Banks, Alcorn State University
- 478 **Quantification of Soil Color and Redoximorphic Features in Four Soil Treatments on the Texas Gulf Coast Prairie.** A. R. Bryant, Prairie View A&M University
- 479 **Microbial Diversity and Biogeography of Freshwater Sediments in the Desert of Cuatro Ciénegas, Coahuila, México.** A. Cervantes, West Virginia State University
- 480 **Sustainability in Urban-Rural Interface.** R. Chambers, Southern University
- 481 **Evaluating Variability in Overload Stress Responses and Bioenergy Production in Replicate Thermophilic Anaerobic Digesters.** E. Chavarría, West Virginia State University
- 482 **Monitoring of Resistance Allele Frequencies in the Glassy-Wing Sharpshooter, *Homalodisca vitripennis*, the Destructive Pest of Grape.** G. Chelliah, Florida A&M University
- 483 **Subsurface Soil Application of Dry Poultry Litter: A Novel Nutrient Management Technology.** N. Chepketer, University of Maryland Eastern Shore
- 484 **Biodiesel Production by Transesterification of Non-Edible Triglycerides.**
E. S. Dilworth, Prairie View A&M University
- 485 **Global Sensitivity Analysis (GSA) Applied to the Anaerobic Digestion Process.**
R. Domínguez-Puerto, West Virginia State University
- 486 **Downstream Movement of Urea in Estuarine Zones of the Manokin River.**
B. Edje, University of Maryland Eastern Shore
- 487 **Natuculture: Growth of Sedum and Grasses and Nutrient Losses from an Ecoroof.**
L. Hok, North Carolina A&T State University

- 488 **Evaluation of the Impacts of Long Term Cotton Rotation on Soil Enzyme Activities and Microbial Diversity.** A. Howard, Tuskegee University
- 489 **Mississippi River Basin Healthy Watershed Initiative: Bayou Meto Watershed.** Y. Huang, University of Arkansas at Pine Bluff
- 490 **The Kentucky State University Campus Community Water Survey.** J. Hubbard-Sánchez, Kentucky State University
- 491 **Use of Rainfall Simulation to Determine Urea Persistence and Mobility in a Coastal Plain Soil.** L. C. Kibet, University of Maryland Eastern Shore
- 492 **Natuculture: Experiential Learning System.** L. N. Kieu, North Carolina A&T State University
- 493 **Using *Escherichia coli* and Newly Identified Ecological Indicators to Assess the Impacts of Land Users on Stream Water Quality.** J. M. Lester, Lincoln University
- 494 **Impact of a Fish Protein Based Organic Amendment on Soil Enzyme Activity and Microbial Community.** L. Lindsey, Tuskegee University
- 495 **Evaluation of Long-Term Impacts of Herbicide Use on Forest Soil Bacterial Community.** C. McKoy, Tuskegee University
- 496 **Testing the Effects of Carbohydrate Perturbations on the Stability of Thermophilic Anaerobic Digestion.** N. Montenegro, West Virginia State University
- 497 **Assessing the Expansion and Impact of the Common Reed *Phragmites australis* on Blue Crab (*Callinectes sapidus*) Population of Blackbird Creek, Delaware.** K. Roeske, Delaware State University
- 498 **The Impact of Cyanide Treatment on Soil Microbial Community Composition and Function.** M. Scott, Tuskegee University
- 499 **Carbon Dioxide Fluxes in a Forest Soil in the Citronella Oil Field, South Alabama.** L. T. Staley, Alabama A&M University
- 500 **Establishment of *Paulownia elongata* as a Potential Forage Crop.** W. M. Stewart, Fort Valley State University
- 501 **Green Report Card of an HBCU Campus: Assessment of Sustainability Practices and Campus Initiatives.** B. Talley, Alabama A&M University
- 502 **Factors that Affect the Willingness to Pay for Biogas in Burkina Faso.** M. T. Traore, Tuskegee University
- 503 **Effects of Crawfish Waste Amendments in Compacted Urban Soils on Sunflower Plants.** L. Wells, Southern University
- 504 **Natuculture: the Benefits of Practicing Conservation Agriculture in Urban Landscapes.** M. Williams, North Carolina A&T State University
- 505 **Mineral Properties and Arbuscular Mycorrhizal Infectivity of Soils Associated with Appalachian Ramp and Black Cohosh Populations.** H. Wynn, Virginia State University
- 506 **Characterization of Slow Pyrolysis Bio-oil from Different Organic Wastes.** P. Xiao, Delaware State University

Monday, April 8 to Tuesday, April 9

Scientist Poster Presentations

Animal Health and Production and Animal Products

- 507 Design and Development of a Field Applicable Gold Nanosensor for the Detection of Luteinizing Hormone in Sheep.** Z. Afrasiabi, Lincoln University
- 508 Use of Meat Goats to Control Undesirable Plants in Hill Side Pastures.** K. M. Andries, Kentucky State University
- 509 Sensory Evaluation of Dark and White Meat from Broilers Fed Different Levels of Sweet Potato Root Meal.** J. R. Bartlett, Tuskegee University
- 510 Nutritional Analysis of Leaves and Stems of Four Sweet Potato Cultivars as a Potential Source of Livestock Feed.** R. C. Beckford, Tuskegee University
- 511 Evaluation of Forage Yield and Quality in Mixed Cattle and Goats Grazing Practices.** Y. Ghebreyessus, Southern University
- 512 GIS Grid Analysis of Utilization of Adjacent Pastures by Two Herds of Goats.** T. A. Gipson, Langston University
- 513 Different Supplement Treatments for Lactating Meat Goat Does Grazing Grass Forb Pastures.** A. L. Goetsch, Langston University
- 514 Efficacy of a Bovine Colostrum Replacement Product for Goat Kids.** S. Hart, Langston University
- 515 Evaluation of Burnt Corn Gluten Meal in Layers Diets.** S. Manuel, Southern University
- 516 Effects of Level and Length of Supplementation on Body Weight and Harvest Characteristics of Yearling Boer and Spanish Wethers.** R. C. Merkel, Langston University
- 517 Changes in Small, Medium and Large Follicle Numbers in Response to Co-Synch and Select-Synch Synchronization Treatments in Dairy Goats.** L. C. Nuti, Prairie View A&M University
- 518 Ruminal Methane Emission by Boer and Spanish Does Supplemented with Garlic.** R. Puchala, Langston University
- 519 Use of Garlic as a Potential Natural Dewormer in Small Ruminants.** J. G. Schwarz, University of Maryland Eastern Shore
- 520 Anthelmintic Efficacy of Medicinal Herbs in Goats Infected with Nematode Parasites.** Z. Wang, Langston University
- 521 Nutrition and Pathogens Affect Honey Bee Peritrophic Matrix Integrity.** T. C. Webster, Kentucky State University
- 522 Use of Liquid Semen for Vaginal Artificial Insemination in Hair Sheep.** S. Wildeus, Virginia State University
- 523 Evaluation of the Health Promoting Effects of Moringa Olifera in Goats.** M. Worku, North Carolina A&T State University

- 524 **Genetic Marker Assisted Selection for Foot-Rot Disease Resistance in Sheep Flocks.**
T. Wuliji, Lincoln University
- 525 **Effects of Trans-10, CIS-12 Conjugated Linoleic Acid Dietary Supplementation on Fat Content and Fatty Acid Profile of Goat Colostrum Milk.** S. S. Zeng, Langston University

Food Safety, Nutrition and Health

- 526 **Level of Acculturation and Body Weight Status of Chinese Immigrants in Kentucky.**
C. Butler, Kentucky State University
- 527 **Aqueous Extract of Roselle Hibiscus Calyces on Food-Borne Bacteria.**
K. L. Chin, Southern University
- 528 **Developing a Community Garden at Tennessee State University.**
A. Clardy, Tennessee State University
- 529 **Survival of Non-Pathogenic *Escherichia coli* And *Escherichia coli* O157:H7 in Delmarva Field Plots Amended with Poultry Litter and Dairy Manure.**
C. Cotton, University of Maryland Eastern Shore
- 530 **Potential of Social Media to Influence Nutrition Information in Rural Areas.**
P. E. Faulkner, North Carolina A&T State University
- 531 **Barriers to Sustainable Food Systems: Do Food System Performance Measures Matter?**
R. J. Fricano, Alabama A&M University
- 532 **Enhancing Acid Tolerance of *Lactobacillus* spp. by Adaptive Evolution During Acid Stress.**
D. A. Gad El-Rab, North Carolina A&T State University
- 533 **Consumer Acceptability and Physicochemical Properties of Oatbran and Flaxseed-Enhanced Goat Patties.** J. Gager, Southern University
- 534 **Snacks Promote Higher Intake Micronutrients in University Students.**
Y. H. Gao-Balch, University of Arkansas at Pine Bluff
- 535 **Effect of Caffeine on Survival and Growth of *Escherichia coli* O157:H7.**
R. Gyawali, North Carolina A&T State University
- 536 **Identifying Carotinoids in Chinese Cabbage.** B. Huang, University of Arkansas at Pine Bluff
- 537 **Development of Food Protection and Defense Educational Materials and Workshops for Middle, High School and Undergraduate Students.**
S. A. Ibrahim, North Carolina A&T State University
- 538 **Use of Copper and Ascorbic Acid Alone or in Combination With Organic Acids to Inactivate *Escherichia coli* O157:H7 and *Salmonella* sp. on Fresh Leafy Greens.**
S. A. Ibrahim, North Carolina A&T State University
- 539 **Obesity Trends in Pregnant Women in South Carolina Affecting Health Outcomes for Mothers and Infants.** R. Idris, South Carolina State University
- 540 **Anti-Diabetic and Antioxidant Potential of Orange and Purple Fleshed Sweetpotatoes (*Ipomoea batatas* L.) Using Different Methods.** S. Islam, University of Arkansas at Pine Bluff

- 541 **Effect of Chitosan and Hydroxypropyl Methylcellulose-Based Edible Coatings on Microbiological Quality of Fresh-Cut Sweet Potatoes Under Modified Atmosphere Packaging.** S. Jongrattananon, University of Arkansas at Pine Bluff
- 542 **Visualization Method on Hypothesis Tests in Repeated Measure Experiments.** Y. S. Jung, Prairie View A&M University
- 543 **Water Stress Responsive Leaf Proteins Showing Potential Interactions in Drought Tolerant Peanut.** R. Katam, Florida A&M University
- 544 **Antioxidant Activity and Simultaneous Determination of Vitamin E and Cholesterol in Rice Bran Added Goat Meat Products.** M. Khachatryan, Southern University
- 545 **Optimization of Multiplex Real-Time PCR Assay for Detection and Quantification of *Vibrio* spp. and Total Bacteria.** J. Y. Kim, Delaware State University
- 546 ***Salmonella* Population Rebound and its Prevention on Spray-Washed and Non-Washed Jalapeño Peppers and Roma Tomatoes in Humid Storage.** C. Kim, Virginia State University
- 547 **Effects of Conventional and Ultra-High Temperature Pasteurization Processing on Volatile Profiles of Goat Milk.** J. H. Lee, Fort Valley State University
- 548 **Results of a Short Nutrition Education Program in Increasing Dairy Products in Lactose Intolerant College Students.** M. A. Lihono, University of Arkansas at Pine Bluff
- 549 **Effects of Housing System on Production and Quality of Eggs.** F. Malekian, Southern University
- 550 **Effect of Hydrothermal Processing on Antioxidant Contents and Capacities in Pigmented Rice (*Oryza sativa* L.).** B. Min, University of Maryland Eastern Shore
- 551 **Youth Active and Media Savvy (YAMS) 2012 Summer camp Sessions: Preliminary Findings.** V. Oates, Tennessee State University
- 552 **Reduction of Alpha-Glucosidase Activity by Chardonnay, Tinta Cao, and Cabernet Franc Grape Pomace Extracted Using Water and Fermented at Different Brix Levels.** J. Parry, Virginia State University
- 553 **Rheological Behavior of Select Dairy Products.** E. Risch, Prairie View A&M University
- 554 **Combating Childhood Obesity with Caregivers as Change Agents (CCOCCA) “Product Development Phase”.** J. J. Snowden, Southern University
- 555 **Ecological Approach to Examine Dietary Habits of Rural African American Families.** M. Williams-Wheeler, North Carolina A&T State University
- 556 **Development of Core Laboratory to Enhance Scientists Productivity at Cooperative Agricultural Research Center.** S. Woldesenbet, Prairie View A&M University
- 557 **Economic and Behavioral Factors that Influence Sustainable Consumer Practices within the Home Among African American Adults.** P. Young, Alabama A&M University

Family, Youth, Community and Economic Development

- 558 Agricultural Outreach Program: Student Awareness Through Participation.** B. M. Green*, G. S. Shorter, and C. P. Cotton, University of Maryland Eastern Shore
- 559 Assessing Students' Importance Rankings of the Dietary Guidelines for Americans.** P. E. McLean-Meyinsse, Southern University
- 560 Dissemination of Research and Extension Information Related to the Kentucky State University Research and Demonstration Farm.** E. Reed, Kentucky State University
- 561 Strategies to Improve Farm and Business Efficiency Through Integrated Communication.** B. O. Udoh, Southern University
- 562 Variables that Effect Perinatal Outcomes Among Low-Income African American Women: a Mixed Methodology.** J. R. Wheat, University of Arkansas at Pine Bluff
- 562A Chemical Protective Gloves for Pesticide Handlers.** A. Shaw, University of MD Eastern Shore

Plant Health and Production and Plant Products

- 563 Development of a Semi-Artificial Rearing System for the Granulate Ambrosia Beetle.** K. M. Adesso, Tennessee State University
- 564 The Effects of Salinity on *Phytophthora ramorum* Viability and Infectivity.** D. Collins, Alcorn State University
- 565 The Effects of Two Slow-Release Fertilizers on Fruit Growth, Development and Weight of Twelve Pepper Varieties.** S. Crudup, Tennessee State University
- 566 Comparative Leaf Growth and Yield Response of Collards to Nutrient Solution Withholding or Concentration Increase during Hydroponic Culture.** J. N. Egilla, Lincoln University
- 567 Survey of Stink Bug Species Found in Organically Grown Primocane-Fruiting Blackberry Plantings in Central Kentucky.** K. L. Friley, Kentucky State University
- 568 *in vitro* Anticancer Effect of Unique Plant Extracts in Cancer Cells.** G. Hacisalihoglu, Florida A&M University
- 569 Survey of the Invasive Rice Stem Stink Bug *Tibraca limbativentris* and *Oebalus* spp. (Hemiptera: Pentatomidae) in Rice Fields in the Dominican Republic.** R. L. Hix, Florida A&M University
- 570 Differences in Phenolic Content and Antioxidant Capacity among Spicebush (*Lindera benzoin* L.) Populations.** H. Kobayashi, Kentucky State University
- 571 Comparison of the Mode of Action to Downy Mildew Disease After *Plasmopara viticola* Infection Between Resistant and Susceptible Grapevines.** J. Lu, Florida A&M University
- 572 An Efficient Micropropagation System for Alexandrian Laurel.** Z. Lu, North Carolina A&T State University
- 573 Evaluation of the Fertilizer Value of a Legume Cover Crop on Sweetpotato Yield.** S. Ntamatungiro, University of Arkansas at Pine Bluff

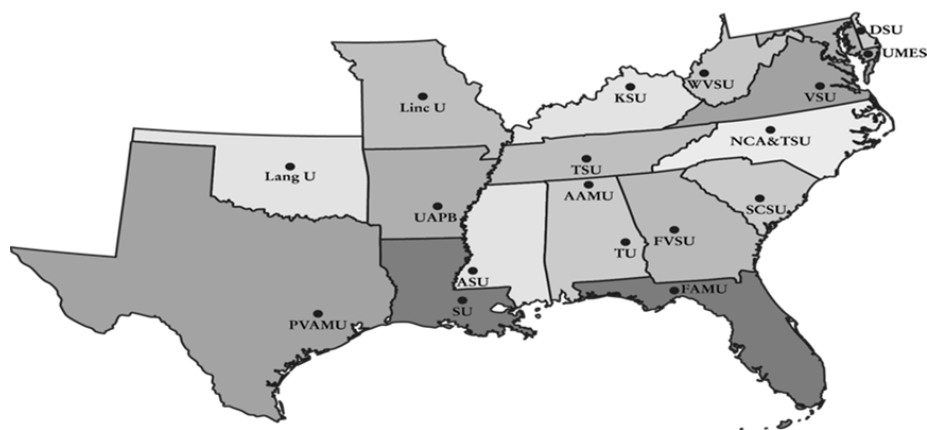
- 574 **High Tunnel, Early Spring Production of Five Varieties of Tomato Using Three Different Trellising Systems.** R. A. Ogutu, Delaware State University
- 575 **Inheritance of Powdery Mildew Resistance and Screening for Resistance Markers in *Cornus florida*.** L. P. Parikh, Tennessee State University
- 576 **FamO28-22-5: A Selection for Premium Red Muscadine Wine in Florida.** Z. Ren, Florida A&M University
- 577 **Techniques Necessary to Validate Molecular Markers for Breeding Programs.** R. L. Turner, West Virginia State University
- 578 **Comparative Evaluation of Selected Vegetable Yields in Raised Bed Culture.** G. Umar, Florida A&M University
- 579 **Breeding Barriers in Seedless Muscadine Grape Breeding.** X. Xu, Florida A&M University
- 580 ***in vitro* Shoot Regeneration and Genetic Stability Evaluation of Oriental Lily (*Lilium orientalis*) Using ISSR Markers.** G. Yang, North Carolina A&T State University
- 581 **Antioxidant Capacity of Eight Large-seeded Soybean Breeding Lines in Virginia.** B. Zhang, Virginia State University

Renewable Energy, Natural Resources, and Environment

- 582 **Evaluating the Impacts of Hydrologic Processes on the Water Quality in Goodwater Creek Watershed in Missouri.** O. M. Al-Qudah, Lincoln University
- 583 **Establishing an 1890s Land Grant Universities Water Center.** A. Atalay, Virginia State University
- 584 **Molecular Characterization of Green Microalgal Isolates from Missouri in Prospective of Biodiesel Production and Culture Collection.** B. Balakrishnan, Lincoln University
- 585 **Solar Powered Anaerobic Digester for Biogas Production from Agricultural Residues.** S. Barizuddin, Lincoln University
- 586 **Enhancing Biodegradation of Pesticides Using Biofilter Materials.** B. Chu, Lincoln University
- 587 **Evaluating the Effectiveness of a Swine Waste Treatment System on the UAPB Farm.** W. Columbus, University of Arkansas at Pine Bluff
- 588 **Efficiency of Selected Genetically Diverse Plant Species in the Phytoremediation of Manure Enriched Soils.** R. B. Dadson, University of Maryland Eastern Shore
- 589 **Identification of *Escherichia coli* DNA Marker for Tracking Sewage Pollution in Water.** D. Deng, Lincoln University
- 590 **Watershed Academy for County Agents in Tennessee.** S. O. Dennis, Tennessee State University
- 591 **Dye-Sensitized Solar Cell.** M. Dweik, Lincoln University
- 592 **Growth Kinetics of *Spirulina platensis* Cultivated in Different Media at Different Air Flow Rates.** H. El-Mashad, Lincoln University

- 593 **Farmers' Willingness to Grow Energy Crops for Cellulosic Biofuel Production.**
H. Gedikoglu, Lincoln University
- 594 **Biomass and Sweet Sorghums Maintain High Yields Under Low-inputs.**
H. P. Singh, Fort Valley State University
- 595 **Characterization of Dissolved Organic Nitrogen Using X-Ray Photon Spectroscopy and Nuclear Magnetic Resonance.** B. Hua, Lincoln University
- 596 **Improving the Understanding of Floodplain Biogeochemical Processes in a Central U.S. Urbanizing Watershed.** A. Ikem, Lincoln University
- 597 **i-Tree Ecosystem Analysis City of Mandeville, Urban Forest Effects and Values, Louisiana.**
T. N. Legiandeny, Southern University
- 598 **The Effect of Quality of Parks on Neighboring Property Values.**
A. B. Lorenzo, Florida A&M University
- 599 **Effect of Moisture Content on Thermal Properties of Selected Biomass Grinds.**
A. K. Mahapatra, Fort Valley State University
- 600 **Effects of Tillage and Cover Cropping on Soil Water Properties.**
M. L. McGraw, North Carolina A&T State University
- 601 **Predicting Soil Erosion on a Cultivated Field in Northern Florida: Using GIS and the USLE.**
D. Nemours, Florida A & M University
- 602 **Species Composition and Net CO₂ Exchange Rate at Harvard Forest, Harvard University.**
N. V. Nkongolo, Lincoln University
- 603 **Educating Future Textile and Apparel Industry Professionals on Sustainable Textile Disposal and Recycling Practices.** J. Oh, Delaware State University
- 604 **Aquatic insect Assemblages of Ephemeral Ponds in the Apalachicola National Forest.**
A. K. Rasmussen, Florida A&M University
- 605 **Endophytic Bacterial and Fungal Communities in Black Cohosh, *Actaea racemosa*.**
S. Ren, Virginia State University
- 606 **Assessing Soil Bacterial Community Composition and Structure Across Wetland, Transition, and Upland Ecosystem Types in Macon County, Alabama.**
R. Shange, Tuskegee University
- 607 **Anomalous Levels of Heavy Metal Concentrations in Miller County Streams, Missouri.** S. Tesfaye, Lincoln University
- 608 **Pyrolysis of Municipal Solid Waste into Bio-Oil.**
L. Wang, North Carolina A&T State University

Abstracts of Oral Presentations



1

Effects of Continuous or Rotational Grazing Schemes on Performance, Parasite Burden, and Reproductive Measurements by Yearling Katahdin Ewes Grazing Tall Fescue in Late Spring Through Summer. E. A. Backes*, J. D. Caldwell, B. C. Shanks, K. R. Ness, A. N. V. Stewart, L. S. Wilbers, C. A. Clifford-Rathert, A. K. Wurst, and H. A. Swartz, Cooperative Research Programs, Lincoln University, Jefferson City, MO 65101; and D. L. Kreider, and M. L. Looper, University of Arkansas, Fayetteville, AR 72701.

Rotational grazing has grown in popularity in recent years. However, this management practice has not been well evaluated in Katahdin hair sheep grazing toxic tall fescue [*Lolium arundinaceum* (Schreb.) Darbysh; E+]. The objective of our study was to evaluate performance, parasite burden, and reproductive measurements of yearling Katahdin ewes grazing E+ pastures in late spring through summer using either continuous or rotational grazing schemes. Over two consecutive years, a total of 50 yearling Katahdin ewes (53 ± 1.41 kg initial body weight; 3.3 ± 0.09 initial BCS) were stratified by body weight and allocated randomly to one of ten, 0.4-ha pastures representing two treatments: 1) Continuous (C; five replications); or 2) 4-cell rotation (4R; five replications). Body weight at beginning and end of breeding, breeding and final ADG, final body weight, and total gain did not differ ($P \geq 0.20$) across treatments. Start breeding BCS tended ($P = 0.10$) to be greater from C vs. 4R. End breeding and final BCS, and beginning, end of breeding, and final FAMACHA[®] scores did not differ ($P \geq 0.12$) across treatments. Lambing rates and frequency of multiple births ($P \leq 0.04$) were greater from 4R than C. Number of lambs/ewe exposed did not differ ($P = 0.14$) across treatments. Therefore, rotationally grazing yearling Katahdin ewes on E+ pastures in late spring through summer may not improve performance, parasite burden, or number of lambs/ewe exposed, but may increase lambing rates and frequency of multiple births.

2

Evaluation of Sericea Lespedeza (*Lespedeza cuneata*) Pellets for Control of Coccidia and Gastrointestinal Nematodes in Weaned Goats. T. Barker*, and D. S. Kommuru, Agricultural Research Station, Fort Valley State University, Fort Valley, GA 31030; J. E. Miller, Department of Pathobiological Sciences, School of Veterinary Medicine, Louisiana State University, Baton Rouge, LA 70803; J. M. Burke, USDA/ARS/DBSFR, Booneville, AR 72927; J. A. Mosjidis, Department of Agronomy and Soils, Auburn University, Auburn, AL 36849; and N. Kamisetti, T. Vines, and T. H. Terrill, Agricultural Research Station, Fort Valley State University, Fort Valley, GA 31030.

Coccidiosis can be a devastating disease in goats, particularly for young, recently-weaned kids, causing diarrhea, dehydration, and even death. Feeding dried sericea lespedeza (SL; *Lespedeza cuneata*) to young goats has been reported to reduce the effects of gastrointestinal nematodes (GIN), but there have been no reports of the effects of feeding this forage on coccidia in goats. A confinement study was completed on 20 recently-weaned intact Spanish bucks to determine effects of SL pellets on established infections of both coccidia and GIN. The bucks were assigned to 1 of 3 treatment groups based upon coccidia oocysts per gram (OPG) of feces, and then fed 1 of 3 pelleted rations ad libitum; 90% SL leaf meal from leaves stored for 3 years (Treatment 1, $n = 7$) or < 6 months (Treatment 2, $n = 7$) or a commercial pellet (Control, $n = 6$). Fecal samples were taken from individual animals every 7 days for 28 days to determine OPG and GIN eggs per gram (EPG), and blood samples to determine packed cell volume (PCV). Within 7 days, both SL pellet diets significantly reduced ($P < 0.05$) OPG and EPG in goats compared with animals fed the control diet. The OPG and EPG remained lower ($P < 0.05$) in treatment than control animals until the end of the trial. There was no effect of diet on PCV values throughout the experiment. Dried, pelleted SL has excellent potential as a natural remedy for coccidia and GIN infection in weaned goats.

3

Assessing the Effects of the Interaction between Progesterone and IGF-1 on the Survival of Transferred Embryos. J. Copeland*, M. C. Mason, and E. J. Cuadra, Department of Agriculture, Alcorn State University, Alcorn State, MS 39096; and J. Larson, Department of Animal and Dairy Sciences, Mississippi State University, Starkville, MS 39759.

Sixty-two recipient Crossbred Angus cows were previously synchronized for estrus and were assigned at random to four treatments to assess the effects of progesterone supplementation (exogenous and endogenous), and its correlation with IGF-1 on the survival of transferred embryos in cattle. On day seven after exhibiting estrus, all cows received embryos. In contrast with the control group ($n = 16$), animals in

the CIDR-group (n = 16) had a CIDR additionally inserted, animals in the hCG group (n = 15) received 1000 IU of hCG, and animals in the GnRH group (n = 15) received 100 µg of GnRH on that same day. Body weights were recorded at the beginning of the project. Blood samples for progesterone and IGF-1 analysis were taken from all cows immediately before the transfer of embryos (day 0), day 7, and immediately after the removal of CIDR's (day 14). Pregnancy diagnosis was performed by rectal palpation 60 days after insertion of the embryos. There were few significant differences ($P < 0.05$) between pregnant and non-pregnant animals regarding IGF-1, except on days 0 to 7 in which were present significant increases in progesterone in the non-pregnant cows ($P > 0.05$). Plasma progesterone concentrations on days 0 to 7 were significantly different ($P > 0.05$) between treatment groups, between pregnant and non-pregnant cows, as well as between pregnant and non-pregnant cows within the control, CIDR, GnRH, and hCG treatment groups. Further studies are required to evaluate the effects of progesterone on the release of proteins of maternal/fetal origin associated with the survival of transferred embryos.

4

Inclusion of Oat in a Sow's Diet May Help Prevent Post Weaning Diarrhea in Piglets. T. Daniels*, Department of Agribusiness, Applied Economics and Agriscience Education; L. Williams, Department of Family Consumer Sciences; and R. C. Minor, Department of Animal Sciences, North Carolina Agricultural and Technical State University, Greensboro, NC 27411.

Post weaning diarrhea (PWD) is a major gastrointestinal disease caused by stress, pathogenic intestinal bacteria and immature immune responses. It is a leading cause of mortality in piglets during the first 2 weeks of weaning. Antibiotic growth promoters (AGP) are used to combat PWD, but there is public concern surrounding AGP use. We are interested in finding natural alternatives to AGP that prevent PWD. Studies have shown that inclusion of probiotics and prebiotics in the maternal diet during gestation and lactation can promote health in offspring. Therefore, we designed a study to evaluate whether feeding yeast culture (a probiotic) and oat (a prebiotic) to sows during the last 30 days of gestation and during lactation would lead to decreased incidences of diarrhea in weaned piglets. Twenty-eight sows were fed one of four diets: (1) control, (2) control + YC (5g/kg), (3) control + oat (15%), (4) control + YC + oat, during the last 30 days of gestation and lactation. On days 0, 7, and 14 post-weaning, fecal samples from eighty piglets were collected, cultured to assess the presence of beneficial and pathogenic coliform bacteria and scored for diarrhea. Although we detected no significant changes in the beneficial and pathogenic bacteria levels between diets, we report that piglets born of sows that consumed oat had decreased incidence of diarrhea, suggesting that oat feed administered to sows may positively influence intestinal health in piglets.

5

The Effect of Yeast Culture and Oat Feed Supplementation on Probiotic and Immunoglobulin Levels in Porcine Milk. B. Donovan*, R. Gyawali, and S. Ibrahim, Department of Family and Consumer Sciences; and R. C. Minor, Department of Animal Sciences, North Carolina Agricultural and Technical State University, Greensboro, NC 27411.

The stress of early weaning, coupled with an immature immune system, contributes to the development of post-weaning diarrhea (PWD), a condition that is associated with an imbalance of gut microflora and intestinal inflammation. Currently, producers combat this problem through use of sub-therapeutic antibiotic growth promoters (AGP). However, the use of AGP is thought to be associated with the rise in antibiotic resistant pathogenic bacteria. Our lab seeks to identify alternatives to antibiotic growth promoters that promote health. Studies have shown that inclusion of probiotics and prebiotics in the maternal diets during gestation and lactation can promote the health of their offspring. We designed an experiment whereby twenty-eight sows were fed one of four diets: (1) control, (2) control + YC (5g/kg), (3) control + oat (15%), (4) control + YC + oat, during the last 30 days of gestation and lactation. Since beneficial bacteria (probiotics) and immunoglobulins present in milk/colostrum are important for contributing to good intestinal health of suckling young, we compared the levels of bifidobacterium and lactobacillus as well as immunoglobulins present. Plate counts on collected milk samples from sows on the oat supplemented diet had significantly higher levels (compared to diets 1 and 4) of bifidobacterium spp., but not lactobacillus spp. Diet had no significant effect on the IgG levels in early milk/colostrum. Our preliminary analysis suggest that oat supplemented diets may lead to improved intestinal health of piglets due to increased levels of the probiotic bifidobacterium.

6

The Effects of Taurine Supplementation in Largemouth Bass (*Micropterus salmoides*) Diets on Growth Performance and Survival. C. A. Frederick*, S. D. Coyle, J. H. Tidwell, and R. M. Durborow, College of Agriculture, Food Science, and Sustainable Systems, Kentucky State University, Frankfort, KY 40601.

Some fish benefit from supplementation of taurine in diets where fish meal has been significantly reduced or eliminated. The effect of taurine supplementation in largemouth bass (*Micropterus salmoides*) has not yet been evaluated. The present study was conducted to evaluate the supplementation of taurine in diets for juvenile largemouth bass. Twenty-five juvenile largemouth bass (19.3 g) were randomly stocked each into twelve 231-L glass aquaria connected to a recirculation system. Each tank was randomly assigned one of four dietary treatments with three replicates per treatment. Diets 1 (control) and 2 contained 30% fish meal and 40% soybean meal while diets 3 and 4 contained 40% soybean meal and fish meal was replaced with varying levels of meat-and-bone meal and blood meal. Diets 2 and 4 included 2% taurine in the total diet. At harvest, there were no significant differences between treatments in terms of survival and growth. Feed conversion ratios (FCR) were best in fish fed diet 2 compared to other diets. FCRs for fish fed diets 1 and 3 were not significantly different from each other but were better than FCRs for fish fed diet 4. Survival, although not significantly different, was 5-8% lower in fish fed diets HFM and NFM-T, which appears to have affected statistical differences in FCR. Based on these data, it appears that a diet where fish meal was completely replaced by meat-and-bone meal and blood meal and containing only 0.02% taurine resulted in satisfactory growth of largemouth bass.

7

Quantification of C-kit Ligand and C-kit Receptor mRNA in the Goat (*Capra hircus*) Testis.

T. Hebb*, A. Reyes-Ordóñez, and O. Bolden-Tiller, Department of Agricultural and Environmental Science, Tuskegee University, Tuskegee, AL 36088.

Oxygen and the lack thereof have been suggested to influence gene expression and cell behavior. In the testis, the oxygen availability is suggested to be a factor in spermatogenesis. The seminiferous epithelium, which is the microenvironment where germ cells develop, has been shown to have low oxygen levels (hypoxia). In response to hypoxic environments, hypoxia inducible factors (HIFs) are elicited by the cell as an adaptive mechanism and activate a host of cell survival genes, some of which are thought to play specific roles in germ cell development. HIF-1 α , one of the three known HIFs, is suggested to target c-kit ligand which in conjunction with its receptor c-kit is responsible for adhesion, proliferation, migration, and apoptosis of sperm cells. The c-kit ligand and c-kit receptor system has not been described in male goats. The objective of this study was to characterize c-kit ligand and c-kit receptor mRNA expression in the goat testis. Testes from adult, pre-pubertal and neonatal goats were harvested and total RNA reverse transcribed into cDNA and amplified by PCR. Amplicons for c-kit ligand and c-kit receptor, obtained by conventional PCR, were visualized by agarose gel electrophoresis. Quantitative PCR showed c-kit ligand and c-kit receptor expression in adult, neonatal, and pre pubertal goat testis; however, no significant difference was detected in expression among the groups. These data suggest that c-kit ligand and c-kit receptor system expression under naturally hypoxic conditions may have an important role in spermatogenesis in male goats, thus, further research is required.

8

Production Comparison of All-Male and Mixed-Sex Freshwater Prawns *Macrobrachium rosenbergii* in Ponds. Z. Kupchinsky*, S. D. Coyle, L. A. Bright, C. Shultz, C. Upstrom, and J. H. Tidwell, College of Agriculture, Food Science, and Sustainable Systems, Kentucky State University, Frankfort, KY 40601.

The giant Malaysian prawn (*Macrobrachium rosenbergii*) is an important commercial species on several continents. This species has attributes attractive for aquaculture production including rapid growth, use of relatively low dietary protein levels, ability to be cultured inland away from the coast, and high ratings in terms of environmental sustainability. However, compared to marine shrimp species, freshwater prawns have a relatively low production densities (kg/ha) and large size variation at harvest. Both of these are affected by complex social and interactions within and between sexes. Recently technologies have been developed to produce all male juveniles on a commercial scale. The present study was conducted to compare the production and population characteristics of monosex-male prawns with a normal mixed-sex population. Juvenile prawns from each group were stocked into 0.04 ha ponds at an individual weight of 0.37 g, at 60,000 juveniles per hectare. All ponds had artificial substrate added in a vertical orientation.

Each treatment (mono-sex male and mixed-sex) was replicated in three ponds. Prawns were fed a commercial sinking pellet (32% protein) once daily at a standardized rate. Dissolved oxygen, temperature, and pH were monitored twice daily. After 105 culture days prawns were harvested, bulk weighed, counted, and a sample of 500 individuals per pond were individually weighted and morphotyped. At harvest, survival of mixed-sex prawns was significantly greater than all males, while average weight of the all-male prawns was greater than mixed-sex prawns. These data indicate that all-male prawns show potential to improve pond production of the freshwater prawn.

9

Analysis of the Impact of Production Style on Porcine Airway Morphology and Proteome Dynamics.

C. J. McClendon*, Departments of Animal Sciences and Energy and Environmental Systems; S. H. Oh, and J. T. Waterman, Animal Sciences Department, North Carolina Agricultural and Technical State University, Greensboro, NC 27411.

North Carolina is the second leading state in pig and pork production in the United States. Many swine farmers converted from outdoor to indoor production styles to produce greater amounts of pork. Of the two main types of swine production operations found in North Carolina, confinement housing is typically implicated for its impact on human respiratory health. A vast body of literature exists that reports the deleterious effects of reduced air quality in swine confinement facilities (SCF) on the respiratory health of humans; however, few studies report effects on swine airways. This work investigated the distinct differences in airway epithelia of pigs reared indoors compared to those reared outdoors. Body weight and airway lumen diameter were measured, and proteomic analysis was performed by homogenizing approximately one gram of airway lumen epithelial tissue. Protein concentration was determined using the Bradford assay, and equal amounts of proteomes were separated using two-dimensional (2D) gel electrophoresis. Gel-based-LC/MS proteomics was utilized to identify distinct proteins in tissue samples. Pro-inflammatory proteins such as COX-2, iNOS and HSP-70 were identified as well as antioxidant HO-1 was present within the porcine airway tissue samples *in vivo*. Statistical analyses, including one- and two-way analysis of variance (ANOVA) with p -value ≤ 0.05 , were employed to evaluate significant differences among means followed by Bonferroni post-test corrections. In conclusion, animals reared indoors have distinct airway morphology and proteomic profiles compared to those reared outdoors, which may, in part, explain their ability to live within confinement houses without any apparent complications.

10

Molecular and Genetic Basis of Drug Resistance in *Haemonchus contortus* in Goats. M. McHugh*, and W. Witola, Department of Agricultural and Environmental Sciences, Tuskegee University, Tuskegee, AL 36088.

The widespread emergence of drug resistant *Haemonchus contortus* parasites has created a major constraint to the goat industry. This is due to the absence of vaccines and the intensive use of anthelmintics, namely imidazothiazoles, benzimidazoles and macrocyclic lactones. Despite the increasing importance, the molecular and genetic mechanisms underlying drug resistance are still poorly understood. Hence, elucidating drug resistance mechanisms at molecular and genetic level would be crucial in the design of new drugs to circumvent resistance, and in identification of new drug targets. The objective of this study was to identify differentially expressed genes in drug resistant versus drug susceptible *H. contortus*. Two groups of goats were infected with a drug susceptible strain of *H. contortus*. One group was untreated and the other was, over a period of 25 weeks, treated with sub-therapeutic doses (0.050 mg/kg body weight) of moxidectin to induce drug resistance. Goats were sacrificed post-infection followed by immediate isolation of adult parasites. RNA was extracted and subjected to gene expression differential display analysis to identify genes that were differentially expressed between the drug-treated and untreated group. We found that a gene, Hc-NIM-1, was highly expressed in parasites that were resistant to moxidectin than in those that were susceptible. These findings suggest that Hc-NIM-1 plays a role in induction of parasite resistance to moxidectin. Thus, further studies to elucidate the association of Hc-NIM-1 with parasite resistance to moxidectin are warranted.

11

Postmortem Cell Survival Pattern of Goat Skin Tissues Stored in Refrigerator at 4°C. C. Okonkwo*, X. Ma, and M. Singh, Animal Science Division, Fort Valley State University, Fort Valley, GA 31030.

The aim of this study was to evaluate the limits of cell survival in goat skin tissues stored in refrigerator after the animal's death. To achieve this aim, goat ear skin was procured from our university slaughter house immediately after the animal slaughter and stored in the laboratory at 4°C in a refrigerator. Ten small sized (2-3 mm²) skin pieces (explants) were then cultured in two 60 mm dishes for each time point in DMEM media supplemented with 10% fetal bovine serum. The cells were cultured on day 0, 3, 7, 10, 13, 16, 20, 23, 27, 30, 33, 37 and 40. The dishes were observed every day for explant dislodging and any explant found floating after day 3 was removed. Similarly any dish found contaminated with bacteria or fungus was removed from the study as soon as discovered. Each explant was observed under inverted microscope and any explant exhibiting growth of more than 50 cells around it on day 10-12 of culture was considered positive. We observed appearance of fibroblast-like cells within 4-7 days of culture. Our results exhibited growth of fibroblast cells on explants of all the time points except day 37 and 40. However, since the dishes of day 37 and day 40 were contaminated within first 4 days and were removed from the study, we cannot exclude the possibility of cell survival beyond 33 days. Experiments to test the cell survival limits beyond 33 days are underway.

12

Recovery of Total Aerobic Bacteria in Grass Samples from Small Flocks in Delaware. A. F. Shelton*, and B. A. McCrea, Department of Agriculture and Natural Resources, Delaware State University, Dover, DE 19901.

The number of small flocks kept in Delaware is steadily growing with the majority consisting of backyard chickens kept for egg production. This movement toward small flocks responds to the consumer interest in alternatively managed poultry such as pastured egg production. Recent research indicates that grass samples from alternatively managed poultry yielded bacterial recovery greater than that of samples from commercial conditions. This study assessed the level of aerobic bacteria in the grass from areas in which backyard poultry were allowed to range (backyard) with that of areas in which they were not permitted to range (front yard). Five small poultry flocks in Delaware were tested once in each of the four seasons for one year. Three randomly selected grass samples were collected in both the front and back yards. Each grass sample was clipped using sterilized scissors and placed in separate plastic bags. Samples were stomached and serially diluted prior to plating on 3M Petrifilm Aerobic Count Plates (APC). There were significant differences in the level of APC recovered among the five farms. Farms with greater than 20 birds were found to have lower APC levels than that of farms with smaller flocks. Season had no effect on APC recovery.

13

Investigating the Effect of *Moringa oleifera* on Lymphocytes: A Mouse Model. D. Smith*, Department of Family and Consumer Sciences; S. Hurley, and R. C. Minor, Department of Animal Sciences, North Carolina Agricultural and Technical State University, Greensboro, NC 27411.

The public is increasingly concerned with the overuse of antibiotics in livestock production and its perceived association with problem of antibiotic-resistant bacteria. The long-term goal of our lab is to find practical and effective solutions that promote the health of feed and fiber animals by enhancing immunity. *Moringa oleifera* Lam is a tree, native to the tropics and sub-tropics of Asia and Africa that is exceptionally rich in vitamins, minerals and antioxidants known to modulate immunity. A preliminary experiment suggested that mice that consumed tea prepared from dried *Moringa* leaves for 7 days had increased levels of lymphocytes in the blood. Therefore, we sought to evaluate the effect of *Moringa* on lymphocyte function. Mice were divided into two groups; a control group that received water and an experimental group given tea made from *Moringa* leaves for 14 days. We report that weight gain and consumption of water and tea between the control and experimental groups was similar. Flow cytometric analysis of blood, spleens and lymph nodes collected on day 14 showed no differences in the percentages of lymphocytes both B-cells and T-cells (CD4+ and CD8+) between the groups. However, we found that splenocytes isolated from the experimental group, stimulated with T-cell specific stimuli (anti-CD3 and anti-CD28) but not a B-cell specific activator (LPS), had decreased proliferation as compared to control. This data suggests that *Moringa* may have a modulating affect on the function of T-cells but not B-cells.

14

Aquaculture Potential of Paddlefish, *Polyodon spathula*, in Intensive Systems. A. Squadrito*, R. Cuevas-Urbe, and S. D. Mims, College of Agriculture, Food Science, and Sustainable Systems, Kentucky State University, Frankfort, KY 40601.

Since 2003 there has been a marked decline in domestic freshwater aquaculture production. This can be attributed to the fact that 60% of fish consumed in the United States is imported. With their boneless and mild white meat as well as their caviar production, paddlefish, *Polyodon spathula*, shows great potential in becoming a major player in domestic aquaculture production. However, new intensive pond production methods of paddlefish are needed in order to achieve higher marketable yields. The goal of this study was to evaluate the intensive pond production of paddlefish in one growing season in Kentucky. Phase II paddlefish (215 ± 50 g) were stocked for single batch growout in April 2011 into eight 0.04-ha ponds at 14,820 fish/ha. The fish were fed once a day at 3% body weight using a 5.5-mm 32% protein extruded catfish pellet. The target market size was 0.85 kg, which would provide two 113 g (4 oz.) filets with a baseline market size of 0.65 kg. Results from the October 2011 harvest indicated that approximately 40% of the total population was able to achieve market size after one growing season. Feed conversion ratios during this study were unusually high at 5:1. This could be due to shortened floatation time of the pellets because of an inferior extruded diet used in this study. Data from this study confirm that sufficient numbers of marketable paddlefish can be achieved at the end of one growing season.

15

The Effects of Ocean Acidification on the Occurrence of Otolith Deformities in the mummichog (*Fundulus heteroclitus*). A. T. Stoneman*, S. L. Smith, and G. Ozbay, Delaware State University, Dover, DE 19901.

By the year 2100, it is projected that atmospheric CO₂ concentrations will rise to approximately 1000 ppm. As a result, oceanic pH levels are expected to drop 0.5 units, increasing ocean acidification. Studies have shown the ocean acidification has negatively affected marine calcifying organisms due to changes in the calcium carbonate (CaCO₃) system. Otoliths are an important structure in fish that act as an “earbone” aiding the fish in its sense of sound, balance, and acceleration. The otolith is a calcified structure that is generally composed of aragonite, a form of CaCO₃, and therefore it is thought that it may be susceptible to the effects of ocean acidification. Observations of otoliths in mummichog larvae that were grown under three pCO₂ concentrations: the present atmospheric level of 380 ppm (control); the year 2100 projected level of 1000 ppm, and 2500 ppm, show that in the elevated pCO₂ concentrations, the aragonite crystalline structure of some of the otoliths were deformed. Deformities in otoliths may affect the functioning of the inner ear because otolith function is determined by size, shape, and density. Studies quantifying the observed deformities are currently ongoing.

16

The Effectiveness of an Herbal Dewormer in Reducing Gastrointestinal Nematode Infections in Meat Goat Kids. D. A. Sutherland*, D. J. O’Brien, and J. Scott, Department of Agriculture and Natural Resources, Delaware State University, Dover, DE 19901; and N. C. Whitley, North Carolina A&T State University, Greensboro, NC 27411.

Worldwide reports of drug resistance in small ruminant gastrointestinal nematodes have led producers to seek alternative parasite control strategies such as the use of natural herbal products. Therefore, twenty naturally infected Kiko crossbred meat goat kids approximately 141 ± 0.2 days of age and weighing 18 ± 0.9 kg were used to determine the effectiveness of a commercially available herbal dewormer on body weight (BW), packed cell volume (PCV) and fecal egg counts (FEC). Kids were placed in individual 1.2 m x 1.2 m pens on solid concrete floors and randomly assigned to treatments of water (n = 11) or 2.5 g of Hoeggar’s Natural Wormer once every week after an initial treatment of twice a day for three consecutive days (n = 9). All treatment groups received a 15% CP pelleted meat goat feed fed at approximately 3% of their BW daily. BW, blood and fecal samples were collected weekly for 35 d. Blood PCV were measured using microhematocrit tube centrifugation, while FEC were determined using the Modified McMaster’s technique with a sensitivity of 50 epg. Kid BW and PCV were not influenced by treatment, day or a treatment by day interaction effect. In addition, FEC were not influenced by treatment but there was a significant day effect with day 0 FEC being similar to day 14, but both were significantly higher than on other days measured. In conclusion, under the conditions of this study, Hoeggar’s Natural Wormer was not effective in controlling internal parasites in Kiko crossbred kids.

17

Susceptibility of the Small Hive Beetle (*Aethina tumida* Murray) to Fungal Pathogens and New Generations of Insecticides. S. Wheeler*, and L. H. B. Kanga, College of Agriculture and Food Sciences, Florida A&M University, Tallahassee, FL 32307.

The small hive beetle (SHB), *Aethina tumida*, an invasive species from sub-Saharan Africa, entered the United States through Florida in 1998 and has become a serious pest of honey bee. This destructive insect has already invaded more than 30 states, and threatens the honey bee industry in southern US. The chemicals currently used for control of SHB are not effective and leave residues in honey products. This study was designed to identify unknown fungal pathogens from dead SHB, assess the susceptibility of SHB to new generations of insecticides and develop a sustainable and environmentally friendly alternative control strategy for SHB. Dead SHB were collected from several commercial apiaries in Florida; they were surface-sterilized and plated in Petri dishes containing Sabouraud Maltose Agar, and incubated for 3-10 days to investigate the recovery of primary causal agents. The unknown fungi from dead SHB were identified using DNA fingerprinting techniques and isolates of the two most pathogenic fungi were tested against SHB in spray tower, soil-based bioassays and in field trials. Adult vial test method was used to assess the toxicity of new generations of insecticides to SHB. Data indicated that SHB was 3.4-fold more susceptible to the neonicotinoid Acetamiprid than Coumaphos, which is currently available for in-hive treatments. Small hive beetle was also highly susceptible to the fungal isolates tested in the field experiments. Thus, the integration of fungal pathogens and new generations of insecticides offered new and environmental sound avenues for successful control of SHB in honey bee colonies.

18

Performance and Behavior by Katahdin Lambs Weaned Using Either Fenceline or Traditional Weaning Methods in the Morning or Afternoon. T. H. Bruemmer*, J. D. Caldwell, B. C. Shanks, E. A. Backes, K. R. Ness, A. N. V. Stewart, R. A. Boeckmann, R. I. DeOrnellis, E. C. Boeckmann, A. K. Wurst, C. A. Clifford-Rathert, and J. J. Markway, Department of Agriculture and Environmental Sciences and Cooperative Research Programs, Lincoln University, Jefferson City, MO 65101.

The weaning process is stressful on livestock; however, alternatives to traditional weaning methods and times may improve performance and reduce the negative effects associated with weaning. The objective of our research project was to determine the effects of weaning method and time of day on lamb performance and behavior. Katahdin ewe and ram lambs ($n = 93$) were stratified within litter, body weight, sex, and age of their dam, and assigned randomly to 1 of 8 groups, 2 weeks prior to weaning. Groups were then allocated randomly to treatments consisting of 1) Fenceline AM (2 replications); 2) Fenceline PM (2 replications); 3) Traditional AM (2 replications); or 4) Traditional PM (2 replications). Weaning weight, 14-day post-weaning weight, ADG, and total gain did not differ ($P \geq 0.39$) across treatments. Percentage of lambs vocalizing tended ($P = 0.09$) to be greater from fenceline compared with traditional. A weaning method by weaning time tendency ($P = 0.06$) was observed for percentage of lambs standing. Weaning in the afternoon increased the percentage of lambs standing by 14 percentage units (87% vs. 73%) from fenceline PM compared with fenceline AM, but the percentage of lambs standing decreased by 14 percentage units (96% vs. 82%) when comparing traditional AM with traditional PM. Percentage of lambs walking rapidly or running did not differ ($P \geq 0.31$) across treatments. Therefore, time of day lambs are weaned or the method in which they are weaned may not influence performance, but may have minimal effects on lamb behavior.

19

Quantification of C-MYC and NKX3.1 in the *Capra hircus* Testis. L. N. Clark*, A. Reyes, A. Knox, and O. Bolden-Tiller, Department of Agricultural and Environmental Sciences, Tuskegee University, Tuskegee, AL 36088.

The goat (*Capra hircus*) industry is one of the fastest growing segments of livestock production in the United States, which is a reflection of the changing demographics. Nonetheless, the development of efficient goat breeding stock remains in its infancy. Germ cell transplantation has the potential to rapidly propagate superior genetics; however, in order for this technique to be widely adapted, it must first be optimized. This requires an understanding of the molecular mechanisms associated with spermatogenesis, which is closely associated with testosterone. The objective of this study was to characterize the mRNA expression of testosterone-regulated genes, c-Myc and NKx3.1, in the goat testis. Polymerase Chain Reaction (PCR) was used to determine the mRNA expression of both genes in the goat testis (adult, pre-

pubertal and neonatal). Conventional PCR revealed the presence of c-Myc and NKx3.1 in the testis. Quantitative PCR results for NKx3.1 were inconclusive; however, c-Myc mRNA was significantly higher in the neonatal group compared to the pre-pubertal and adult groups. Our findings suggest that these testosterone-regulated genes may play a key role in early spermatogenesis and testicular development.

20

Antioxidants Reduce Swine Housing Dust-Mediated Stress and Toxicity in Porcine Tracheobronchial Epithelial Cells. C. L. Gerald*, C. N. McPherson, T. C. McDaniels, and J. T. Waterman, Department of Animal Sciences, North Carolina Agricultural and Technical State University, Greensboro, NC 27411.

The United States is the third leading pork producer in the world, and North Carolina ranks second nationally for pork production. The confinement management style is widely used due to quick finishing and market readiness rates. However, these facilities harbor dust that typically contains skin cells, gases, feces, bacteria, endotoxin, and particulate matter. Ongoing work from our laboratory has shown that styles of hog production cause differential modulation of porcine airway protein expression, and that swine confinement facility (SCF) dust induces oxidative stress in porcine airway cells *in vitro*. In this study, the effects of a known synthetic antioxidant, N-Acetyl Cysteine (NAC) and a potential dietary supplement, *Hibiscus sabdariffa* (sorrel), were tested to evaluate their ability to reduce oxidative stress in porcine tracheobronchial epithelial (PTBE) cells. It was hypothesized that NAC and sorrel would reduce oxidant levels in PTBE cells exposed to 1% SCF dust extract *in vitro*. Cellular stress response assays included detection of reactive oxygen and nitrogen species (RONS) generation, cell membrane integrity and intracellular esterase activity. We also evaluated inflammation via immunodetection of key modulators and their products (e.g., COX-2, PGE₂ and iNOS, NO). Analysis of variance was utilized to evaluate differences among means. Oxidative stress, cytotoxicity and inflammation in PTBE cells exposed to SCF dust were significantly reduced (p-value ≤ 0.05) when cells were pretreated with NAC or sorrel. Taken together, these findings indicate that feed supplements containing antioxidants such as sorrel may reduce underlying oxidative stress caused by exposure to SCF dust and improve respiratory health in hogs.

21

Effects of Dietary Carbohydrate: Lipid Ratios on Liver, Visceral, and Gonadal Somatic Indexes in Northern Bluegill *Lepomis macrochirus macrochirus*. B. D. Hayes*, J. E. Wetzel, and E. S. Musick, Department of Agriculture and Environmental Sciences, Lincoln University of Missouri, Jefferson City, MO 65102.

The sunfish family is being increasingly valued in food-fish markets. Aquafeed formulations needed to produce larger bluegill have not been developed or investigated for the effects of carbohydrate inclusion level as needed for energy, pellet integrity and buoyancy. The use of carbohydrates is almost unavoidable if plant based feedstuffs are used. Herein, we explore the inclusion rate of carbohydrate as dextrin using isonitrogenous/isocaloric diets fed to fingerling northern bluegill *Lepomis macrochirus macrochirus*. Twenty-four experimental groups of bluegill (n=12/group) were randomly assigned one of 6 diets. Diets were formulated to be 38% crude protein and 343 kcal/100 g. Dextrin inclusion rates were 0, 4.5, 9.0, 13.5, 18.0, and 22.5% of diet on dry weight basis with lipid and cellulose varied to conserve energy density. Components held constant relative to each other included menhaden fish meal, wheat meal, vitamin premix, mineral premix, ascorbic acid, carboxymethylcellulose, and choline-Cl. Feeding trial (duration 16-weeks) started with fish of a mean weight of 21.7 g fed to apparent satiation three times daily 6 days a week, except when measured at two-week intervals. Water quality was maintained suitable for aquaculture. At the end of trial, fish were euthanized, measured, dissected for visceral components, and sampled for fillet muscle. Results indicated mean final weight was not affected when carbohydrate was exchanged for lipid in diets. Liver somatic index was the only observed difference with respect to the viscera make up (P < 0.05). Proximate analysis of muscle tissue and liver histology will be reported.

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Development of a Two-Step Multiplex Real-Time PCR for the Rapid Detection of *Vibrio anguillarum* from Sea Water. M. E. Hickey*, Department of Human Ecology, College of Agriculture and Related Sciences, Delaware State University, Dover, DE 19901 and Department of Biology, Wesley College, Dover, DE 19901; and J. L. Lee, Department of Human Ecology, College of Agriculture and Related Sciences, Delaware State University, Dover, DE 19901.

Formerly classified under the genus *Listonella*, gram-negative-*Vibrio anguillarum* is an aggressive, halophilic bacterial pathogen most commonly originating from sea water. Due to its viability in high concentrations of salt and its violent nature, *V. anguillarum* presence in salt water fisheries and aquaculture facilities serves as a global problem. When present, *V. anguillarum* causes immense hemorrhaging of the body and skin of the infected organism that eventually leads to death; collectively recognized as the disease *Vibriosis*. Aquaculture facilities face substantial economic losses. The present study developed a new real-time polymerase chain reaction (PCR) protocol to rapidly detect *V. anguillarum* presence in seawater. In order to reduce PCR time, specific primers targeting genes *vah1*, *empA*, and *rpoN* of *V. anguillarum*-DNA were amplified in multiplex reaction and the extension step of PCR was eliminated. Primer concentration, denaturation time, as well as annealing time and temperature of DNA amplicons were optimized, significantly reducing PCR duration. Previous methods of detection have taken as long as three hours while the two-step protocol set forth by this study detects *V. anguillarum* presence in ninety minutes.

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Effect of Incubation Time and Level of Fungus Myceliated Grain Supplemented Diet on Growth and Health of Broiler Chickens. V. Hines*, W. Willis, Department of Animal Sciences; O. S. Isikhuemhen, and S. L. Ibrahim, Family and Consumer Sciences; F. Anikes, Department of Natural Resources and Environmental Sciences; J. Jackson, and S. L. Hurley, Department of Animal Sciences, North Carolina Agricultural and State University, Greensboro, NC 27411.

This study was carried out to evaluate the effects of different incubation time and level of inclusion of four combined mushrooms via fungus myceliated grain (FMG) in diets of broiler chickens. The nine different dietary treatments were as follows: 1) Control-No-FMG; 2) 5% FMG-14 d; 3) 10% FMG-14 d; 4) 5% FMG-28 d; 10% FMG-28 d; 6) 5% FMG-42 d; 7) 10% FMG-42 d, 8) 5% FMG-56 d; and 9) 10% FMG-56 d. Each diet was fed to 3 replicate pens of 10 chicks each in floor pens for 49 days. The 270 day of hatch straight-run chicks were subjected to a four-way combination mixture of Shiitake, Cordyceps, Reishi, and Oyster incubated for 14, 28, 42, or 56 days. Live weights, *Eimeria* oocyst count, bifidobacteria, mortality, feed consumption and blood differential, immunoglobulin (IgA) were evaluated at 49 days of age. Body weight results showed that all experimental treatments were significantly ($P \leq 0.05$) different from treatment 1 (Control) for male broilers, but did not differ with the females. Fecal oocyst count showed all experimental treatment did not differ significantly ($P < 0.05$) from treatment 1 (Control) except for treatment 2. Bifidobacteria counts were highest in treatment 4 ($8.07^{10^{10}}$) when compared to the treatment 1 control ($7.69^{10^{10}}$) at week 5. Some hematological analysis values showed some elevation as the incubation time increased along with the antibody (IgA) titer. The results from this study suggest that the incubation time and level does not adversely affect performance traits of broiler chickens as percent protein decline over incubation time in the FMG.

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Housing and Feeding Effects on the Growth and Nematode Loads in Kids under Mixed-Species Grazing System. A. Jackson*, R. Marshall, L. Gray, and S. Gebrelul, Southern University Agricultural Research and Extension Center, Baton Rouge, LA 70813.

Fifty kids that were born and weaned under the mixed-species system were assigned to confinement vs. semi-confinement housings and 13% or 16% crude protein (CP) levels. Following an adjustment period of 2 weeks, initial measurements of body weight (BW), body condition scores (BCS), (1 = thin, 5 = fat) and FAMACHA scores (FS), (1 = red, healthy, 5 = white, anemic) were taken. These measurements were then taken every 14 days for 8 weeks. Data were analyzed using SAS MIXED procedure. Kids under confinement were 1.7 kg heavier than kids under semi-confinement housing. Male kids were 3.0 kg heavier than female kids. No differences in BCS or FS were observed due to housing. Level of CP in the diet had no effect on BW, BCS or FS. Kids from pastures that were grazed with cattle had higher BW (19.1 ± 0.4 vs. 17.9 ± 0.4 kg) and BCS (2.6 ± 0.05 vs. 2.4 ± 0.05), and lower FS (1.8 ± 0.1 vs. 2.4 ± 0.1) than kids that originated from goats-alone pastures. Kids that were confined and fed 16% CP were heavier than any other group. BW was positively correlated (0.48) to BCS but negatively correlated (-0.34) to FS. BCS and FS were negatively (-0.28) correlated. Results showed that kids raised under mixed-species system can be confined and fed for 8 weeks to achieve desirable market weights.

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Evaluation of the Effect of Probiotics on Gastrointestinal Parasite Levels in Goats. T. Martin*, K. B. Gyenai, and M. Tajkarimi, Joint School of Nanoscience and Nanoengineering, University of North Carolina at Greensboro, Greensboro NC 27401; and S. A. Ibrahim, and M. Worku, North Carolina Agricultural and Technical State University, Greensboro, NC 27411.

Immunostimulants can induce nonspecific resistance against parasites. The use of probiotics to control development of gastrointestinal parasites in goats may help to reduce the risks of infestation or complement the use of anthelmintics. In this study, we investigated the effect of probiotics on the levels of the gastrointestinal parasites *Coccidia* and *Haemonchus contortus* and on markers of infection. Six three-month-old male Boer-Spanish cross kid-goats were used in the study. A cocktail of probiotics including *Bifidobacterium longum*, *Bifidobacterium breve*, *Lactobacillus acidophilus*, *Lactobacillus reuteri* and *Lactobacillus rhamnosus*, was used. The animals in the treatment group were drenched daily with 10 ml of probiotics once a day, for a 4 week period, while a control group of three age-matched goats received sterile water. Body weight, fecal egg count, packed cell volume (PCV), FAMACHA score and white blood differential count (WBC) was determined once a week, for a 4 week period. There was no significant difference in WBC, PCV, body weight and FAMACHA score between the two different groups. However, *Haemonchus* and *Coccidia* eggs per gram feces increased significantly ($p < 0.05$) for goats drenched with probiotics by 100 to 150% and 100 to 400%, respectively. Our current finding is indicative that probiotics may impact gastrointestinal nematode levels. Further studies with more animals are needed to evaluate this effect. Other formulations and times of administration may shed light on strain-specific protection against parasites.

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Effects of Dietary Carbohydrate and Cellulose on Growth and Feed Conversion in Northern Bluegill *Lepomis macrochirus macrochirus*. E. S. Musick*, J. E. Wetzel, and B. D. Hayes, Department of Agriculture and Environmental Sciences and Cooperative Research Programs, Lincoln University of Missouri, Jefferson City, MO 65102.

Sunfish are valued for recreational fisheries and increasingly for food-fish markets. Aquafeed formulations needed to produce larger bluegill have not been investigated for the effects of carbohydrate inclusion as needed for energy, pellet integrity and buoyancy. Herein, we explore inclusion rate of carbohydrate using dextrin in diets for fingerling northern bluegill *Lepomis macrochirus macrochirus*, where cellulose is used to conserve protein / non-target nutrient density and where cellulose content is maintained constant. Twenty-four groups of bluegill ($n=12$ / group) were randomly assigned one of 8 formulations. Two sets of semi-practical diets were formulated to have one of four levels of dextrin at 0, 7, 14, and 21 g per non-cellulose components totaling 87.5 g of each set of diets. Cellulose in the second set was held constant varying the ratio of carbohydrate to all other nutrient components making diets neither isonitrogenous nor isocaloric. A 16-week feeding trial (initial weight =24.1 g) was applied. Water quality was maintained in range suitable for aquaculture. Fish were euthanized, measured, dissected for visceral components, and sampled for fillet muscle. Proximate composition analysis was made on muscle samples. Results indicate dextrin levels of 7 and 14 g were best regardless of cellulose inclusion rate. The diet with 21 g cellulose exhibited the poorest performance with respect to mass, percent weight increase, and feed conversion ratio while liver and visceral somatic indices were lower. Further research is needed to determine how carbohydrate can be exchanged for lipid under more controlled conditions using isonitrogenous and isocaloric formulations.

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Behavior and Performance by Fall Born Calves Weaned in the AM or PM Using Either Fenceline or Traditional Weaning Methods. K. R. Ness*, J. D. Caldwell, B. C. Shanks, A. N. V. Stewart, E. A. Backes, C. A. Clifford-Rathert, and A. K. Wurst, Lincoln University, Jefferson City, MO 65101; K. P. Coffey, D. S. Hubbell III, and J. D. Tucker, University of Arkansas, Fayetteville, AK 72701.

Using different weaning methods in conjunction with time of day calves are weaned may reduce the negative effects of separation from their dams and improve calf performance. The objective of our study was to determine the effects of time of day and weaning method on behavior and performance by fall-born calves. Crossbred fall-born calves ($n = 94$) were stratified by body weight, age, sex, and age of their dam and allocated randomly to 1 of 8 groups, 2 weeks prior to weaning. Groups were assigned to

treatments consisting of: 1) Fenceline AM (2 replications); 2) Fenceline PM (2 replications); 3) Traditional AM (2 replications); 4) Traditional PM (2 replications). Calves vocalized more ($P \leq 0.05$) from AM compared with PM and from traditional compared with fenceline weaned. Average daily gain and calf gain (14 days) was greater ($P < 0.05$) from PM compared with AM. Mineral offered was greater ($P < 0.05$) from traditional compared with fenceline, but average daily gain and calf gain tended ($P = 0.08$) to be greater from fenceline compared with traditional weaning. Therefore, weaning fall-born calves in the evening may be more desirable, resulting in less calves vocalizing and greater calf weight gains. Fenceline weaning may influence some performance measurements.

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Housing and Feeding Effects on the Carcass Yield and Quality Traits in Kids Under Mixed-Species Grazing System. L. Profit*, R. Marshall, L. Gray, and S. Gebrelul, Southern University Ag Center, Baton Rouge, LA 70813.

In a 2x2 factorial arrangement, 50 kids that were born and weaned under the mixed-species system were randomly assigned to confinement vs. semi-confinement housing and fed rations with 13% or 16% crude protein (CP) levels. After an adjustment period of 2 weeks, live weights (LW) and body condition scores (BCS), (1 = thin, 5 = fat) were taken every 14 d for 8 wk. At the end of the study, 24 male kids were humanely harvested and deboned for carcass study. Hot (HCW) and cold carcass weights (CCW), dressing percentages, cold carcass yield, live grades (LG), conference grade (CG), fat score, etc. were recorded. Ribs, shoulder, shank, leg, back, and neck were cut from each carcass, weighed and deboned to determine percent of lean meat (PLM) and weight of lean meat yield (WLM). Data were analyzed using SAS MIXED procedure and stepwise regression. No differences in carcass weights were observed due to housing effect or level of CP in the diet. BCS was the best predictor for PLM followed by LW and CG. LW was the best indicator for WLM followed by BCS, CG and LG. WLM yield was positively correlated with LW, HCW, BCS, CG, and LG. Similar relationships were observed for PLM. Ribs, legs, shoulder, shank, back and neck cuts represented 29.4%, 25.2%, 15.1%, 10.1%, 8.6% and 5.6% of the total carcass weight, respectively. Based on these results, one can feed a lower CP level without negative effects on carcass traits and lean meat yield.

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STAT-3 mRNA Expression in the Goat (*Capra hircus*) Testis. S. Thomas*, A. Reyes, and O. Bolden-Tiller Department of Environmental and Agricultural Sciences, Tuskegee University, Tuskegee, AL 36088.

High-throughput methods are needed to rapidly propagate superior goat genetics, as the demand for chevon in the United States continues to increase. The development and optimization of assisted reproductive technologies (ART) involving males is a viable avenue; however, the molecular mechanisms of testicular function and development must be better understood. It is well known that the success of sperm cell maturation, one of the primary functions of the testis, is tightly regulated and commonly associated with testosterone. Genes regulated by testosterone, such as Signal Transducer and Activator of Transcription 3 (STAT-3), a latent transcription factor, are reported to be involved in processes associated with differentiation of spermatogonial stem cells in rodents. We hypothesize that STAT-3 may have a positive effect on the enrichment of spermatogonial stem cells in goats. The objective of the current study was to quantify mRNA expression in the goat testis during three distinct stages of development, adult, pre-pubertal and neonatal, by using polymerase chain reaction (PCR). Reverse Transcription PCR revealed the presence of mRNA during all developmental stages and preliminary data suggest that Real-Time PCR will be a viable method for quantifying STAT-3 mRNA in the goat testis. Further research is needed to better understand the possible role of STAT-3 in the goat testis and its viability as a player in current and potential ART methodologies.

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Using Sagittal Otoliths to Examine Juvenile Delaware Bay Spot, *Leiostomus xanthurus*, and Summer Flounder, *Paralichthys dentatus*. A. Toure*, H. Dean, and S. Smith, Delaware State University, Dover, DE 19901.

The summer flounder, *Paralichthys dentatus*, and the spot, *Leiostomus xanthurus*, are seasonally migratory North Atlantic coastal fish that inhabit estuarine and coastal waters late spring through early fall, and move offshore to the continental shelf late fall through early spring. Summer flounder is a commercially and recreationally important fish found from Nova Scotia to Florida, but with highest

abundances in the Mid-Atlantic Bight. One of its prey species is spot, a short-lived forage fish, with a similar life history to summer flounder. We have collected juvenile summer flounder and spot at four sites in the Delaware Bay and have extracted their sagittal otoliths. Sagittal otoliths are metabolically stable inner ear bones present in teleost fish. Thin layers of aragonite are laid down in daily increments to form the otolith; therefore, 365 small increments constitute an annulus, similar to the rings of a tree. We are ageing collected fish using otolith microstructural techniques. In addition, when fish migrate through water bodies with varying salinities and temperatures, these differences are also recorded in the sagittal otolith matrix. Chemical information inherent in otoliths has been found in some instances to divulge more revealing information than genetic tags; hence, we are also examining the otolith microchemistry to determine if chemical differences due to spatial variability are recorded in the otoliths.

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Evaluation of Fetal Goat Serum as a Cheaper Alternative to Fetal Bovine Serum for Culturing Goat Cells. O. White*, X. Ma, and M. Singh, Animal Science Division, Fort Valley State University, Fort Valley, GA 31030.

Serum is an important component of a growth medium. Fetal bovine serum (FBS) is traditionally used in most of the mammalian cell culture experiments to enrich growth of cells *in vitro*. However, it is the most expensive component of the medium. The goal of this study was to evaluate if the fetal goat's serum (FGS) can be used as an alternative to culture mammalian cells. Fetal goat serum was prepared from fetal blood freely available at our university slaughterhouse. Goat skin fibroblast cell line GSF-289 which was developed in our lab earlier was used as a cell type to test the growth effect of serum. GSF-289 cells were cultured in DMEM media supplemented with 0%, 5%, 10%, 15%, 20% and 25% FGS and it was compared with FBS obtained from a commercial source. A 24 well microtiter plate format with 20,000 cells/well was used in duplicate for each serum concentration. The proliferation rate of cells with different serum supplementation was observed both qualitatively (under inverted microscope) and quantitatively (by counting total number of cells) after 3 days of cell culture. Our preliminary results indicated a comparable growth pattern of GSF-289 cells when cultured in DMEM media supplemented with FGS to that of FBS. These results demonstrate that FGS can be used as a cheap alternative to FBS reducing overall cost of culturing goat and possibly other mammalian cells.

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Introduction and Overview on Disaster Relief Supply Chain for Rural Communities. D. Agu*, and K. Feng, College of Business and Applied Professional Sciences, South Carolina State University, Orangeburg, SC 29117.

When natural or man-made disasters occur, it is very important for federal and local governments to distribute disaster relief supplies such as water, food, and medicine to persons affected by the in a timely manner to save their lives. Due to the unique characteristics of rural communities, such as more economically disadvantaged residents and scattered distribution of the residents, it is more challenging and more difficult to supply the relief goods to the rural communities in time. This research will briefly introduce a disaster relief supply chain and provide an overview on a disaster relief supply chain for rural communities.

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Do State Sponsored Labels Make Any Difference? The Case of "Georgia-Grown" Label. C. Allen*, M. Ibrahim, and J. Whitehead, Agricultural Research Station, Fort Valley State University, Fort Valley, GA 31030.

Interest in local foods has resulted in rapid growth in the use of "state grown" labels to promote marketing of agricultural food products. Almost all the states in the United States have their Departments of Agriculture promote food grown within their states using "state grown" attribute such as "Georgia Grown" and "Jersey Pride." The growth is said to be due to increasing consumer demand for healthier and safer food products and community development. Studies have shown that consumers generally support state labels. For example, in Georgia, the label "Georgia-grown" is visible on a number of food products in grocery stores. The objective of the study was to determine the characteristics that influence consumers' decision to purchase Georgia grown food products. The data for this study were secured through a survey conducted at the 2010 Georgia National Fair in Perry, Georgia. Randomly chosen prospective respondents were requested to complete the survey questionnaire and the collected data were analyzed using a logit model. Preliminary results of the study indicate that marital status and income level are the factors that

influence consumer willingness to pay for Georgia grown peaches. Also, the results show that consumers are willing to pay a minimum of 7 cents premium for Georgia grown peaches.

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Improving Agricultural Extension Service in Belize: an International Service Learning Experience.

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Belize extension service recognizes extension officers as “foot soldiers” of the Ministry of Agriculture. The role of an extension service is to assist farmers with useful, practical, and research-based information. This study explored the demand for agricultural extension services in Belize. The data was collected using a direct interview method based on a structured questionnaire that was pre-tested in Belize. The interview of 48 Belizean farmers was conducted in January 2012 in two key districts, including Cayo and Orange Walk. The descriptive statistics and frequency methods were used to analyze the data. The results indicated that 30% of Cayo farmers were willing to pay for extension service compared to 7% in Orange Walk. Most farmers were young (average age, 43) among Maya and Mestizo but older (average age, 54) among German farmers. The analysis of farm typology revealed that Belizean farmers can be classified as small (i.e., annual gross income less than \$5,000BZ), medium (i.e., gross income between \$5,000BZ and \$20,000BZ), and large farmers (i.e., gross income more than \$20,000BZ). A frequency distribution indicated that German (i.e., Mennonite) and Mestizo farmers, mainly large farmers, mostly produced grains (i.e., corn, beans, and sorghum), while Mayan farmers predominantly produced vegetables (i.e., tomatoes, cabbage, carrots, hot peppers, and sweet peppers). Most production constraints were limited acreage, water shortage, and limited access to markets. Most farmers were willing to learn new technology and improved production practices, while most extension educators needed additional professional training. Addressing these issues will improve agricultural extension service in Belize.

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Consumers’ Perception and Willingness to Buy Goat Meat. M. Cosby*, M. Ibrahim, and J. Whitehead, Agricultural Research Station, Fort Valley State University, Fort Valley, GA 31030.

In Georgia, like the rest of the U.S., goat meat consumers are mostly immigrants from traditional goat meat consuming nations. There is anecdotal evidence, however, that some native born Americans also consume goat meat and goat meat products. The U.S. goat meat market is very informal and segmented. On the supply side, domestic meat goat producers are mostly native born, and the majority do not consume goat meat. The U.S. has been a net importer of goat meat since 1991, with the bulk of the imports coming from Australia. It has been suggested that as immigrants become assimilated, they may change their consumption behavior, shifting their consumption away from goat meat to more traditional American meats. This study attempts to identify current goat meat consumers, as well as potential goat meat consumers in Georgia. Insights gained in this study will benefit meat goat producers and the meat goat industry, as well as researchers in Georgia. This paper reports descriptive statistics of the preliminary analysis of the survey conducted at 2011 Fort Valley State University Agriculture field day and also at the Georgia Sunbelt in Moultrie. Preliminary results indicate that income, age and gender were very important demographic factors that influence goat meat consumption.

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Impact of the Panama Canal Expansion on Corn Exports in the Southeastern Region of the United States. L. Curry*, and G. Ma, Department of Business Administration, South Carolina State University, Orangeburg, SC 29117.

Corn exports are very important to the U.S. economy. It accounts for more than 10% of all agricultural export value and contributes significantly to the U.S. agricultural trade balance. Approximately 50% of the U.S. corn export flows from major ports in the Southeastern U.S. to world leading importers in East Asia via the Panama Canal. The Panama Canal Expansion (PCE) project, scheduled for completion in 2014, will allow much larger container ships and other cargo vessels to easily reach East Asia from U.S. southeastern ports. This will definitely have a tremendous impact on U.S. corn exports, but the scale of this impact has not been investigated. This proposed research will focus on the impact of PCE on corn exports in the Southeastern U.S. and will assess the scale of this impact. We will examine overall corn industry, corn transportation and corn trade, while analyzing the impacts of PCE on corn exports in the Southeastern region of the United States.

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Is More Preferred to Less? M. Davis*, S. Ayers, E. Styles, B. Perry, R. Clark, and M. Nelson, Agricultural Research Station, Fort Valley State University, Fort Valley, GA 31030.

There is growing concern in the US regarding the role of portion size, high calorie density foods, and sweetened beverages on the obesity epidemic. New York City has proposed legislation that will prohibit the sale of any cup or bottle of sugary drink larger than 16 fluid ounces in restaurants, movie theaters and street carts. This ordinance implicitly assumes that consumers behave rationally and will prefer the drink that is available in larger quantities; hence, as predicted by economic theory consumers prefer more to less. The purpose of this study was to (1) test the economic theory that (rational) consumers prefer more to less and, (2) test whether limiting the size of regular soda and allowing free ranging on diet influence consumption and calorie intake from sodas. To fulfill the research objectives, Fort Valley State University students were asked to complete a short survey regarding beverage consumption habits and as a reward for completing the survey students were given the option of selecting a large or small Coke, Diet Coke or water. Results suggest that consumers are rational and select the larger beverage size as predicted by economic theory.

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Inhibition of the Growth of Food Borne Pathogen by Acetic Acid. K. Huckaby*, R. Morgan, N. Mohammed, and J. Stukes Department of Biological and Physical Sciences, South Carolina State University, Orangeburg, SC 29117.

Enhancing food quality and safety in the U.S. is a high priority especially in light of recent deaths and illnesses due to food borne pathogens. Furthermore, an increasing proportion of our foods are imported from other countries, and they are frequently modified. Developing an innovative approach to address food borne pathogens is necessary because recent U.S. estimates indicate that some 76 million illnesses and 5,000 deaths are attributed annually to food borne illness. *Campylobacter jejuni*, *E. coli* O157:H7, *Listeria monocytogenes*, and *Salmonella* spp. are among the leading food borne bacterial pathogens in the USA. Due to increased concerns about the side-effects of antibiotics, consumers and manufacturers are looking for alternatives. The objective of this research is to develop a cost-effective approach to control bacterial contamination in beef by using different percentage of acetic acid. *E. coli* was grown in 20 ml Tryptone Soy Broth (TSB) and incubated at 37°C for 24 hours. The optical density of the culture at 600 nm was adjusted to 0.116, and 0.5 ml of the culture was transferred in TSB medium containing 0%, 2%, 4%, 8%, and 16% of acetic acid, and the volume was adjusted to 10 ml in a snap cap tube. Triplicate incubations were carried out for each concentration and were incubated at 37°C for 24 hours; the OD was measured at 600 nm. The results found that about 98.9% of the growth of *E. coli* was inhibited by 2% acetic. The results indicated that acetic acid has antagonistic effects on food borne pathogen.

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Literature Review on Facility Location Optimization Models for a Disaster Relief Supply Chain. T. Isaac*, and K. Feng, College of Business and Applied Professional Sciences, South Carolina State University, Orangeburg, SC 29117.

When natural or man-made disasters occur, it is very important for federal and local governments to distribute the disaster relief supplies such as water, food, and medicine to the disaster-affected communities in a timely manner in order to save lives. To maximize the coverage of the affected people and to minimize the corresponding operational costs, it is crucial to select the optimal location of the supply facilities. This research will review the existing facility location of optimization models for a disaster relief supply chain.

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An Empirical Investigation of Factors Influencing University Students Body Mass Indices. D. J. Ross*, and P. E. McLean-Meyinsse, Southern University Agricultural Research and Extension Center, Southern University, Baton Rouge, LA 70813.

Research suggests that unless Americans dramatically reverse their sedentary lifestyles and eating habits, the obesity epidemic will bankrupt the U.S. healthcare system. Further, if the current trend continues this generation of children could be known as *Generation Sick* or *GenS*, and have shorter life spans than their parents. Obesity is now raising both economic and national security concerns because 27% of young adults aged 17 to 24 is currently too heavy to serve in the military. In Louisiana, 45% of 18-24-year-olds is

overweight or obese. Many in this age group are students; therefore, a university setting is a fertile ground to study students' attitudes and behaviors about diet and health issues. Thus, our study surveyed 441 university students and examined the role selected dietary recommendations, food label use, perceptions of overall health status, and demographic characteristics play in shaping students' body mass indices (BMIs). The data were analyzed by the *SPSS* software. The results suggest that BMIs are influenced by age, health perceptions, label use, and the dietary recommendations pertaining to fat, sodium, and body weight, but are invariant to academic ranks, gender, and physical activity. Label users, those who perceived themselves as being healthy, and who ranked maintaining a healthy weight as important, have lower BMIs. However, BMIs increased with age and students who ranked low-fat and low-sodium diets as being important. In summary, some students are using food labels and the *Dietary Guidelines* to control their weight; however, lower obesity levels will require participation by everyone.

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Feasibility of an Alpaca Fiber Herd in the Mid-Atlantic Region. M. J. Schofield*, and S. Wildeus, Agricultural Research Station, Virginia State University, Petersburg, VA 23806.

Alpaca fiber production is a new agricultural enterprise for much of the U.S. Historically alpacas have been marketed as 'lifestyle' animals and the aim has been primarily the sale of breeding stock. As the market for breeding stock has been stagnating, there has been increased emphasis on fiber production. Alpaca fiber is known to be one of the highest value animal fibers. Fiber yield and quality data was collected in a mature male research herd. Alpacas were managed under a rotational grazing system with limited supplementation and management inputs. Two years of fiber data from 16 intact males was used for analysis. Mean fiber diameter was 34 μm with a range of 25 to 42 μm . Total fleece was 2.5 kg with a range of 1.1 to 3.7 kg; weight of the most valuable fleece portion (saddle) was 0.8 kg with a range of 0.3 to 1.2 kg. The value of the fleece is a function of the yield and fineness. Based on average yield and fiber diameter of the animals here, the average fleece value would have been \$122, if a price of \$45/kg was assumed. Animal management will have a limited effect on both yield and diameter, so the genetic potential of an animal together with marketing will become the major factors in determining the profitability of an alpaca fiber herd. Keeping management costs to a minimum will improve economic feasibility of alpaca fiber production.

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Effectiveness of Export Assistance Programs in Reducing Export Barriers: Implications for South Carolina Small-Scale Agribusinesses. E. Uwimana*, and R. Singh, Department of Business Administration; O. Oyetayo, Department of Accounting, Agribusiness, and Economics, South Carolina State University, Orangeburg, SC 29117.

The study focuses on the awareness, use, and perceived effectiveness of export assistance programs offered by state and federal agencies. A survey of 120 small-scale agribusinesses located in South Carolina reaffirms previous findings that the awareness and usefulness of these programs depend on the level of internationalization of the firm and the characteristics of the decision-maker. A degree of internationalization was also shown to influence the variability in perceived barriers among decision-makers. Furthermore, the study highlights the need for managers to correctly match their requirements to the available assistance programs to increase potential benefit to the firm.

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The Antibacterial Effect of White, Red, and Yellow Onions on the Reduction of *Salmonella typhimurium*, *Listeria monocytogenes* and *Escherichia coli* O157:H7. S. Anderson*, R. Nicholson, C. Allen, D. Gardner, D. Hewitt, D. Kerr, and S. Woldesenbet, Cooperative Agricultural Research Center, Prairie View A&M University, Prairie View, TX 77446.

The reduction of food-borne pathogens has become both an economic, as well as a public health benefit, leading to increased safety for the consumers. Several food-borne pathogens have been associated with fresh produce. Consumers' interest in foods preserved with natural antimicrobial ingredients such as herbs, spices, and organic acids against food-borne pathogens and food spoilage microorganisms has significantly increased. The objective of this study was to determine the effect of fresh onions against *Salmonella typhimurium*, *Listeria monocytogenes*, and *Escherichia coli* O157:H7 stored at 7°C and 22°C. Red, white, and yellow onions were purchased from the local grocery store. Each onion type was blended in a food processor and was inoculated with *S. typhimurium*, *E. coli* O157:H7 and *L. monocytogenes*.

individually at low versus high concentration and incubated at 7°C and 22°C for 24, 48, 72, 96, and 168 hours. Samples were taken each day to test the viability of microorganisms. The sample's pH was measured on all tested dates. The results showed that the numbers of viable population of *S. typhimurium*, *E. coli* O157:H7 and *L. monocytogenes* in onions stored at 22°C was inhibited over a 24-hour storage period for the low concentration and a 48-hour storage period for the high concentration. Onions stored at 7°C showed less inhibitory effect compared to 22°C. The pH values for red, white, and yellow onions averaged between 5.22- 4.15 over the tested dates for 7°C and 22°C. These results showed the effect of onions as antimicrobial agents is not pH but temperature-dependent.

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Lentils, Green and Yellow Split-Peas (Sprouted and Non-sprouted), on Azoxymethane-Induced Colon Carcinogenesis. K. Busambwa*, R. M. Cebert, L. Dalrymple, J. Allen, J. Boateng, L. Shackelford, L. T. Walker, and M. Verghese, Department of Food and Animal Sciences, Alabama A&M University, Normal, AL 35762.

Lentils (*Lens culinaris*), green and yellow (*Pisum sativum*) split-peas, have been reported to provide health benefits against colon cancer due to the nutrients and non-nutrient phytochemicals present. The aim of this study was to investigate and to compare the chemo-preventive potential of sprouted and non-sprouted lentils (LS, LNS), green (GS, GNS) and yellow split-peas (YS, YNS), on AOM-induced colon cancer. Following a one-week acclimatization period, forty-two Fisher-344 male rats were randomly assigned to six groups (n = 6). Five groups were fed diets consisting of selected legumes (sprouted and non-sprouted), while the control group (C) was fed an AIN-93 growth diet. Colon tumors were induced by administration of AOM at 7 and 8 weeks of age. Rats were killed by CO₂ asphyxiation at 46 weeks of age. Results show lower incidence of tumors at 66.7% in GS compared to 100% in LNS and the C. Rats that were fed C had higher tumors/tumor-bearing-rat (TBR) ratio (4.33) compared to those seen in treatment groups (1.2-2). Glutathione-S-Transferase (GST) activity was significantly higher in sprouted legumes (8.55-14.04 $\mu\text{mol/min/ml}$) compared to non-sprouted legumes (4.53-5.67 $\mu\text{mol/min/ml}$). Glutathione concentration (GSH) ranged from a low of 636.34 μM in rats fed GNS to a high of 791.07 μM in rats fed YNS. Selected legumes (both sprouted and non-sprouted) were very effective in reducing incidence of AOM-induced colon tumors in Fisher-344 male rats (2.1-4.3 times) and may have implications in the prevention of chronic diseases such as colon cancer.

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Transverse Thin Cell Layer Culture of *Bacopa monnieri* (L.) Wettst and Optimization of *Agrobacterium tumefaciens*-Mediated Genetic Transformation. L. A. Croom*, and N. Joshee, Agricultural Research Station, Fort Valley State University, Fort Valley, GA 31030.

Bacopa monnieri is traditionally used as a brain tonic to enhance cognition and to treat asthma, spleen enlargement, rheumatism, leprosy, and eczema, as a diuretic cardiogenic. Anticancer properties have been attributed to *Bacopa* extracts possibly due to its inhibition of DNA replication in cancer cell lines in vitro. Bacoside compounds, present in *Bacopa*, aid in the repair of damaged neurons by enhancing kinase activity, neuronal synthesis, restoration of synaptic activity, and ultimately nerve impulse transmission. We will present research on in vitro micropropagation using transverse thin cell layer explants derived from leaf and internode tissues from in vitro-cultured mother plant stock. Mother stock was raised on Murashige and Skoog (MS) basal medium, and micropropagation experiments used MS medium supplemented with various concentrations and combination of cytokinins and auxins. As an explant, thin cell layers derived from leaf and internodal segments (0.3-0.5 mm thick) were used. An optimum shoot induction response was observed when 1.0 μM BAP was supplemented to MS medium. *Agrobacterium tumefaciens* (strain EHA105) harboring binary vector pq35SGR containing the neomycin phosphotransferase (nptII) and β -glucuronidase (GUS) fusion gene and an enhanced green fluorescent protein (EGFP) reporter gene were used to optimize the transformation process. Kanamycin at 30 mg L⁻¹ was used for selecting transformed shoots. A transformation efficiency of 91%, 75.6%, and 83.3% was recorded for the tTCL explants obtained from leaf and stem and traditional large explant, respectively. Further, antioxidant capacity measurement as Trolox equivalent antioxidant activity (TEAC assay) using ABTS [2, 2'-azino-bis (3-ethylbenzothiazoline-6-sulphonic acid)] decolorization assay was also conducted.

Determination of the Potential of Cocoa and Coffee on Tumor Formation and Effects on Selected Antioxidant Enzymes. L. Dalrymple*, J. Boateng, L. T. Walker, L. Shackelford, and M. Verghese, Department of Food and Animal Science, Alabama A&M University, Normal, AL 35762.

Epidemiological and *in vivo* studies have reported potential health benefits of both cocoa (*Theobroma cacao*) and coffee (*Coffea arabica*) in the possible treatment and prevention of chronic diseases such as cardiovascular disease, diabetes, and cancer. The aim was to investigate the anti-tumor potential of cocoa (CC) and coffee (CF) in Fisher 344 rats and to assess their effects on selected antioxidant enzymes. Thirteen groups of rats were assigned to American Institute of Nutrition (AIN) 93 G diets with CC and CF, at 2.5%, 5%, and 7.5%, respectively. CC and CF were also administered in liquid form at the same concentrations (decoction). All rats received Azoxymethane (AOM) injections (16 mg/kg of body weight) subcutaneously at 7 and 8 weeks of age to induce carcinogenic tumors; at 45 weeks of age rats were killed by CO₂ euthanasia. Activities of antioxidant enzymes (Superoxide Dismutase (SOD), Glutathione Peroxidase (GPx), and Catalase (CAT) were significantly higher in treatment groups compared to control (C). Rats that were fed 7.5% CF (meal and decoction, respectively) had the lowest tumor incidence (25%) compared to rats fed C (100%). Tumors-per-tumor bearing ratios (TBR) were lowest in rats fed 7.5% of coffee decoction (1%) compared to C (4.25%). Rats fed a 7.5% CF meal had the smallest tumor size (0.56mm) among the treatment groups than rats fed C (1.98mm). These findings suggested antioxidant compounds present in cocoa and coffee may have the potential to reduce the incidence of tumor formation by increasing endogenous antioxidant activities. Cocoa and coffee may offer a chemo-preventive potential when consumed in the diet.

Susceptibility of the Chicken Egg, Whole and Parts to *Salmonella*. J. East*, and V. G. Stanley, Cooperative Agricultural Research Center, Prairie View A&M University, Prairie View, TX 77446.

Chicken eggs are the most widely consumed animal product worldwide. They are being used in various ways from straight consumption to pastries. However, chicken eggs are associated with the foodborne pathogen, *Salmonella typhimurium*. The objective of the research was to determine which area of the egg was the least susceptible. Eggs were separated into the following control groups: the whole egg, albumen only, yolk, and the shell membrane and were kept at room temperature. Each area was placed into a stomacher for 60 seconds for emulsifying and then inoculated with *Salmonella typhimurium* (10⁹ log/cfu), serially diluted, plated, and inoculated at 37°C for 24 hours. The results show that the yolk was the most susceptible part with the albumen providing the greatest resistance to the bacteria, followed by the shell with the membrane intact. The whole egg, despite the presence of the albumen, had less resistance compared to albumen alone. In conclusion, the chicken egg intact with all the parts was highly susceptible to *Salmonella typhimurium*.

Cactus Moth (*Cactoblastis cactorum*) and the Potential Expansion of its Host Range. A. Galette*, College of Agriculture and Food Sciences, Florida A&M University, Tallahassee, FL 32307; and S. Hight, USDA-ARS, CMAVE, Tallahassee, FL 32308.

Cactoblastis cactorum, commonly known as the Cactus Moth, is native to Argentina, Paraguay, Uruguay, and Southern Brazil. It eventually reached the Southeastern United States and was first detected in Florida in 1989. *Cactoblastis cactorum* entered Florida through importation of Prickly Pear, *Opuntia*, from the Dominican Republic. *Cactoblastis* is currently moving along both the Gulf and Atlantic Coasts at a rate of 100 miles per year with a constant increase in the rate of colonization along the Gulf Coast. As it spreads, it endangers many cactus species, including cactus for human consumption, and threatens many ecosystems. Thus, it is necessary to collect information of potential hosts of the Cactus moth to better understand and to predict the spread of this invasive alien pest. This study was conducted to determine whether or not the host range of *Cactoblastis cactorum* and *Melitara prodenialis* would expand in the event that an alternative food source became available. In this study, Prickly Pear and Pitahaya, or Dragonfruit (*Hylocereus*), were both set up in individual cages and separated by whole plants and cut stems. Egg sticks of each moth were laid on fresh, healthy pads and remained undisturbed so that natural burrowing could occur. Five days later, once the feeding was completed and cocoons were spun; pupae were collected and were weighed. A random numbers-chart was used for an unbiased assignment of emerged cactus moths

within a mating cage. The cage comprised of three males to one female, along with a piece of *Opuntia* cacti for egg-laying. After the female died, the cage was examined, and egg sticks were collected and counted. They were then observed throughout maturity to record the numbers of hatched, un-hatched, and undeveloped eggs. Here we report the results on the (a) development of *C. cactorum* and *M. prodenialis* on Prickly Pear and (b) their growth and productivity on Dragonfruit.

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Comparison of Textural Characteristics of Goat Milk Yogurts Supplemented with Different Concentrations of Two Selected Gums. B. Gupta*, Y. W. Park, and J. Oglesby-Jones, Agricultural Research Station, Fort Valley State University, Fort Valley, GA 31030; and S. A. Hayek, R. Gyawali, and S. Ibrahim, Department of Family and Consumer Science, North Carolina A&T State University, Greensboro, NC 27411.

Textural properties are important for sensory quality and consumer acceptability of yogurts. Our previous study indicated that xanthan and locust bean were the best choice of gums to improve textural quality of goat yogurt. The present study was conducted to determine optimum levels of the addition of the two gums in enhancing rheological quality of goat yogurts. Experimental yogurts were manufactured after additions of 0.2%, 0.3%, and 0.5% of the gums (w/v) to goat milk produced at the Georgia Small Ruminant Research & Extension Center, Fort Valley State University, Fort Valley, GA, and stored for 0, 2, and 4 weeks in a 4°C refrigerator. Textural characteristics of all treated yogurts were determined using a texture analyzer (Model TA.XT2i, Texture Technology Corp., Scarsdale, NY). Viscosity of yogurts was measured by firmness (g force) and consistency; adhesiveness or stickiness was measured by cohesiveness (g force) and index of viscosity. Firmness and consistency for yogurts made using all three concentrations of the two gums were generally higher than those of control samples except in a few cases. This indicated that xanthan and locust bean fortifications had improved the textural qualities of the goat yogurt products. Addition of 0.5% locust bean showed the highest firmness, and 0.2% of xanthan resulted in the highest consistency in goat milk yogurt among all treatments. Viscosity, cohesiveness, and adhesiveness of 0.3% and 0.5% of added locust bean showed higher and more consistent values than the other groups. The 0.2 % of xanthan and 0.5% of locust bean supplementations improved textural quality of goat yogurts.

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Assessment of the Consumer Food and Physical Activity Environment in the Alabama Black Belt Using GIS. R. Gyawu*, and A. C. Bovell-Benjamin, Department of Food and Nutritional Sciences; and J. Quansah, and S. Fall, Department of Agriculture and Environmental Sciences, Tuskegee University, Tuskegee, AL 36088.

The prevalence of cancer among industrialized and developing countries is increasing. According to the World Cancer Research Fund International, the estimated cases of cancer are 12.7 million around the world, and this number is expected to increase to 21 million by 2030. Worldwide, the United States of America ranks seventh with 300 out of every 100,000 persons developing cancer annually. Among the ethnic groups in America, African Americans have the highest prevalence and the lowest survival rates for cancer. The World Cancer Research Institute and the American Cancer Research International estimated that about 30-40% of cancer can be prevented through appropriate diet, physical activity, and appropriate body weight. The purpose of this study was to investigate whether selected Alabama Black Belt counties have adequate opportunities for healthy food and physical activity choices. The USDA Thrifty Market Basket Food Checklist and an observational questionnaire were utilized to audit the retail food outlets (RFOs); ArcGIS software was used to geocode proximity and accessibility data on the RFOs and physical activity outlets. Analysis of variance (ANOVA) was used to assess overall differences of availability by store type. Within store types, a paired sample *t*-test was used to assess the differences between the total number of fruit and vegetable displayed versus the total number of energy-dense snack food displayed. Data obtained were categorized into store types and the number of stores per neighborhood and population per store. Their means will be determined.

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Investigating Total Aerobic Bacteria and *Vibrionacea* Densities in the Eastern Oyster, *Crassostrea virginica*, Cultured in the Lewes-Rehoboth Canal in Delaware. K. Hannum*, and G. Ozbay, Department of Agriculture and Natural Resources, Delaware State University, Dover, DE 19901.

This study assessed relationships between environmental parameters and the total aerobic bacteria and *Vibrionaceae* densities in eastern oysters (*Crassostrea virginica*) growing in the Lewes-Rehoboth Canal in Delaware. Oysters were placed in aquaculture trays and were submerged in the canal at two sites. One was proximate to a municipal waste water treatment plant discharge, and one control site was away from the discharge. Oysters were sampled from both these sites on a weekly basis and used for determining approximate bacterial densities in the oyster tissue. Water quality was also measured weekly for both sites. Oyster tissue that was diluted and was homogenized was spread onto tryptic soy agar plates and allowed to incubate at 37°C for 18-24 hours for the growth of bacterial colonies. All colonies were counted and were used to determine the number of total aerobic bacteria per gram of oyster tissue. *Vibrionaceae* was detected in oysters via the COPP assay, which identifies bacterial colonies that exhibit strong peptidase activity. At each site, the total aerobic bacteria and *Vibrionaceae* counts were highest during July and August, gradually decreased during September and October, and plummeted towards the conclusion of the study. The total aerobic bacteria and *Vibrionaceae* were also consistently lower for the treatment site, possibly indicating an effect of the discharge on bacterial density or the health of oysters inhabiting the area.

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Surface Decontamination of Goat Skin and Carcasses Using Innovative Pre-Slaughter Spray-Washing. C. Harris*, A. K. Mahapatra, G. Kannan, J. H. Lee, and B. Kouakou, Agricultural Research Station, Fort Valley State University, Fort Valley, GA 31030.

Pre-slaughter spray-washing of animals that reduces fecal contamination of skins/hides may reduce microbial contamination on carcass surfaces during slaughter and processing. Several researchers have evaluated pre-slaughter spray-washing methods to decontaminate animal carcasses. A study was carried out to investigate the efficacy of pre-slaughter spray-washing using tap water, salt water, electrolyzed water, and ozonized water on skin and carcass bacterial counts in goats. Forty meat goats were slaughtered in two groups on 2 different days. Goats were randomly allotted to one of five treatments (four 1-min spray-wash treatments or no wash). Blood and skin swab samples were collected from control and used to treat goats before and after the spray-washing. Bacterial counts on carcasses immediately after dressing were also recorded. Loin chops were used to determine the effects of treatment on quality characteristics of goat meat. Instrumental color values, Warner-Bratzler shear force, and cooking loss were determined. The results indicated that the bacterial load on goat carcasses can be reduced by innovative pre-slaughter spray-washing without significantly impacting the meat quality. This low cost technology can potentially improve processing operation methods in small meat plants and enhance meat product safety.

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Use of Ultraviolet Light for Inactivation of Foodborne Microorganisms: a Review. A. L. Hill*, A. K. Mahapatra, and G. Kannan, Agricultural Research Station, Fort Valley State University, Fort Valley, GA 31030.

Ultraviolet (UV) light has been used for the disinfection of drinking water and wastewater systems to inactivate potential waterborne microorganisms for many years. In recent years, research in food safety has focused on non-thermal processing alternatives for foods. As a non-thermal alternative to traditional thermal processing, UV light has the potential to be used for pasteurization of juices and beverages, for controlling microbial contamination on meats, and as a means for shelf-life extension of fresh produce. It is a novel bactericidal alternative because it does not undesirably affect the color, flavor, odor, or taste of foods. This study includes a comprehensive review of the background, applications, and efficacy of UV light inactivation of microorganisms in foods. The advantages and limitations of UV light, compared with other methods of minimal processing, will be discussed; issues of concern and its future perspectives will be highlighted.

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Pilot-Testing a Nutrition and Physical Activity Education Program for Cancer Prevention Among African American Children in the Alabama Black Belt. N. Houston*, and A. C. Bovell-Benjamin, Department of Food and Nutritional Sciences, Tuskegee University, Tuskegee AL 36088.

Cancer education that is culturally sensitive, readily accessible, and literacy appropriate has been associated with reduction of cancer risks. The objective of this study was to develop and to pilot-test a nutrition and physical activity education curriculum for African American third graders in selected counties of the Alabama Black Belt. The curriculum, which addressed cancer risk factors, was tailored to third

graders, as they are ideal for interventions, which address lifestyle dietary and physical activity-factors associated with cancer. The curriculum was developed based on several theoretical models including the Motivational Model and the Kolb Experimental Teaching Model. The curriculum included sixteen, 30-minute lessons to be taught over a six-week period. The pilot study, which was conducted over two weeks, included nine third graders and their parents; the research setting was Macon County at the St. Joseph's R.C. School. Approval to conduct the study was received from the Tuskegee University Human Participants' Review Committee, and students were given a nutrition and physical activity pre and post-test. Results indicated that a third of participants were overweight/ obese. The mean weight of the third graders was 39.2 kg, and the mean height was 139.7 cm. The mean Body Mass Index (BMI) was 19.8%. Based on pre and post-test scores, the participants' knowledge of nutrition and physical activity increased by 15.2% after an education intervention. Information for modification of the curriculum was also collected. The project will be implemented in four counties in the Alabama Black Belt for six weeks.

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Airborne Transport of *Staphylococcus* and Heterotrophic Bacteria to Tomato Plants Downwind of Mechanical Clean-Out of Litter From a Poultry House. M. James*, F. M. Hashem, C. P. Cotton, and L. Marsh, Department of Agriculture, Food, and Resource Sciences, University of Maryland Eastern Shore, Princess Anne, MD 21854; and P. Millner, USDA-ARS, Beltsville, MD 20705.

Uncertainties persist concerning set-back distances needed to avoid microbial contamination of fresh produce by bioaerosols from farm operations in nearby fields, particularly those involving manure handling. We investigated airborne release-transport-deposition of *Staphylococcus* during mechanical handling of poultry litter (PL). Bacterial concentrations in air were determined at 10, 50, 100, 400, and 600 feet downwind from the bioaerosol release point, RP (bucket-loader drop of PL into manure spreader). *Staphylococcus* and heterotrophic bacteria in the air were collected using 6-stage Andersen impactors with Petri plates containing Baird Parker agar (BPA) and glass Biosamplers (impingers) containing buffered-saline. Deposition of airborne bacteria onto leaves of tomato plants 10 and 50-feet and of soybeans 100-, 400-, and 600-feet downwind of the RP was determined by plating leaf sample dilutions and by direct leaf imprints onto BPA. Selected colonies (80) of presumptive *Staphylococcus* were confirmed by standard biochemical tests. Andersen samplers at 10 and 50-feet from the RP yielded 1.6×10^4 and 8.7×10^3 cfu *Staphylococcus*/m³, respectively. Biosamplers at these two locations averaged 2.56×10^7 and 2.50×10^4 cfu of *Staphylococcus*/m³, respectively. All tomato-leaf imprints tested positive for *S. aureus* or *S. epidermis*, and their density on leaves averaged 71.3 and 49.6 cfu/gdw at 10 and 50-feet downwind from the RP, respectively, compared to none detected on unexposed plants. Furthermore, heterotrophic bacteria on leaves averaged 93.7 and 31.3 cfu/gdw at 10- and 50-feet, respectively. This study suggested that *Staphylococcus* can be a useful marker for bioaerosol studies involving poultry litter with only trace populations of *E. coli* or *Salmonella*.

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Isolation of DNase and Protease-Producing Bacteria on Catfish Spoilage. G. Accumanno*, and J. Lee, Department of Human Ecology, Delaware State University, Dover, DE 19901.

Fish spoilage is a pertinent concern to the average consumer and producer. The purpose of the study was to show the effects of DNase and protease-producing bacteria on catfish spoilage. Three catfish were acquired from an aquaculture facility, and one was purchased from local retail. The methods used included stomaching the cut-up fish sample with a saline solution. The resulting sample was plated on Methyl green, Milk agar, and TSA plates. The plates were incubated for 3 days and then enumerated. The total bacteria count, DNase count, and protease count were recorded. The first catfish reached the stationary phase in 3 weeks at log 10 CFU/g and then proceeded into the death phase. When the plates were examined, no DNase production was found. Many protease-producing bacteria were found in the first trial. Data from the second skinless catfish and from the third catfish with skin showed similar results; it reached a stationary phase in 24 days at log 10 CFU/g. Some DNase-producing bacteria were found initially, while protease-producing bacteria were found at increasing levels throughout the entire trial. The fourth catfish reached the stationary phase in 15 days at log 10 CFU/g. DNase and protease were found at increasing levels throughout the entire trial.

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Application of Organic Acid and Refrigeration in Eliminating *Salmonella enterica* on Cantaloupes. J. Adsit*, A. Lee, N. Kashanian, M. Bower, C. Kim, and S. Pao, Agricultural Research Station, Virginia State University, Petersburg, VA 23806.

Foodborne illnesses pose a large threat to consumers throughout the world. Numerous outbreaks associated with *Salmonella* on cantaloupes have been reported. Previous research has shown that *Salmonella* population rebound on produce can be prevented with uninterrupted cold storage. The purpose of this study was to investigate the application of acetic acid and refrigeration in the prevention of *Salmonella* population rebound and further elimination on cantaloupe surfaces. Cantaloupes inoculated with a multi-strain *Salmonella* were treated either once, twice, or three times with 5% acetic acid in intervals of 20 minutes between applications. The cantaloupes were then stored at 4 or 22°C for 20-24 hours before *Salmonella* enumeration. Initial data shows that *Salmonella* population on cantaloupes stored at 22°C increased by 0.1-log for a single acid application and decreased by 0.7-log for double and by 1.2-log for triple applications. For cantaloupes stored at 4°C, *Salmonella* population reductions were observed by 1.4, 1.7, and 3.2-log for single, double, and triple applications, respectively. The results showed that a combination of acetic acid and refrigeration was effective in reducing *Salmonella* population on cantaloupes. This easily adaptable practice may be utilized by consumers for safer food consumption.

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Utilizing Kitchen Steamers to Inactivate *Salmonella* and *Listeria* on Whole Cantaloupe Melons. M. Bower*, J. Barnwell, J. Dickriede, R. Duque, N. Kashanian, C. Kim, and S. Pao, Agricultural Research Station, Virginia State University, Petersburg, VA 23806.

Contaminated cantaloupes have caused numerous foodborne-illness outbreaks in recent years. Previous research has shown that heat treatment can be utilized for reducing microbial contaminants on fruit surfaces. However, no study has evaluated the use of kitchen steamers for inactivating foodborne pathogens on cantaloupes. The purpose of this study was to test the antimicrobial efficacy and energy efficiency of three models of electrical kitchen steamers in eliminating artificially inoculated *Salmonella enterica* and *Listeria monocytogenes* on cantaloupe surfaces. Fresh cantaloupes were spot-inoculated with a multi-strain *Salmonella* or *Listeria* cocktail and stored at 4 or 22°C for a day before treatments. After steaming the melons for ≤80 seconds, the remaining pathogens were detected using Xylose Lysine Dextrose Agar for *Salmonella* and Modified Oxford Agar for *Listeria*, as well as an Enzyme Linked Immunoassay with confirmation by API biochemical identification kits. Steamed melons reached ≥5.0-log reduction of inoculated pathogens within 40 to 70 seconds. The results showed that electrical kitchen steamers are effective for sanitizing cantaloupes by consumers. The difference in energy consumption among the three tested models was significant ($P < 0.05$). Thus, an efficient steamer can be relevant for both food safety and energy conservation.

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Minority Students' Perception of Genetically Modified Food Product Risks: Evidence from Georgia. J. Bright*, M. Ibrahim, and J. Whitehead, Agricultural Research Station, Fort Valley State University, Fort Valley, GA 31030.

Food biotechnology has resulted in a variety of products with nutritional, environmental, and other economic benefits. Although such benefits are manifest, there is still some skepticism associated with genetically modified (GM) animals that may be destined for human consumption. This study explores college students' perception of risks associated with GM foods. We examined students' perceptions of risk of GM foods in general in the context of introducing transgenic meats in the market. Preliminary results show that a student's opinion about transgenic animals destined for human consumption, student classification, food label reading, and awareness of the science of cloning and transgenics appear to influence their perception of the risk associated with GM foods. Respondents were randomly approached and asked for their voluntary participation in the survey. The survey elicited information on knowledge about transgenesis, whether students read labels when shopping, risk perception, and trust in scientists, the federal government and biotechnology industry experts doing what is right from society perspectives. The study contributes towards a better understanding of consumer acceptance of food biotechnology by identifying the factors that drive students' willingness to consume GM food products. It will also be useful

for policy-makers and the biotech industry in developing appropriate private and public strategies, as well as policies relating to food biotechnology.

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A Case Study to Examine the Impact of Tomatoes, a High Acid Food, on a Dialysis Patient with Hypertension and Diabetes. K. L. Chibanguza*, and B. R. Phills, Center for Viticulture and Small Fruit Research, Florida A&M University, Tallahassee, FL 32317.

One of the critical concerns of dialysis patients is the type and the quantity of foods consumed daily. Many dialysis nutritionists spend considerable time evaluating nutritional charts of dialysis patients and discussing with them various dietary problems from laboratory results. Patients whose dialysis resulted from hypertension coupled with diabetes are at a greater risk of negatively impacting their overall health by consuming improper foodstuff. High consumption of foods high in acids and other nutrients must be eaten in moderation and generally at a certain level of maturity. This is a multi-phase study with Phase 1 being reported here. For this phase, the tomato, '*Lycopersicon esculentum*' (Better Boy), was used as an example of a high acid fruit that many dialysis patients desire to eat with their vegetables and salads as an excellent source of desirable nutrients. In this study, we measured total phosphorus, potassium, carbohydrate, protein, amino acid, and invertase-enzyme content present in the Better Boy (*Lycopersicon esculentum*) tomato at different maturity stages. The aim was to demonstrate if the tomato is a suitable nutritive choice; if not, what nutritional concerns should the patient bear in mind. Four tomatoes of varying size, shape, color, and maturity were used in the analyses. Results confirmed that tomatoes are not a suitable dietary choice for a dialysis patient because of high levels of phosphorus and potassium even though other nutrients were desirable. Further studies and methods on how to nutritionally combat these concerns deserve further study in subsequent phases.

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Human Health-Related Constituents in Fenugreek Seeds and Sprouts. C. Davis*, S. N. Narina, and H. L. Bhardwaj, Agricultural Research Station, Virginia State University, Petersburg, VA 23806.

Consumption of Fenugreek (*Trigonella foenum-graecum* L.) is beneficial for management of diabetes, heart disease, and renal problems. Even though resistant starch (RS) is known to improve human insulin sensitivity, no information about RS content of fenugreek seeds and sprouts is available. We have determined resistant-starch contents in seeds and sprouts of ten fenugreek lines using 50 mg of tissue separately by adding diluted AMG and pancreatic alpha amylase, followed by incubating them in a shaking water bath at 37°C for 16 hours to hydrolyze it to D-glucose. The RS content of each sample was measured as absorbance at 510 nm in terms of D-glucose using glucose-oxidase/oxidase re-agent against a re-agent blank using a spectrophotometer. The seed and sprout samples showed significant variations for RS and hydrolyzed starch (HS) components of total starch (TS). Significant variation existed among RS contents in sprouts but not in seeds. The HS and TS contents of the sprouts (22.6 and 20%, respectively) were found to be significantly higher as compared to seeds (6.03 and 11.6%, respectively). Line 41 had the highest content of RS (7.1%) and the lowest content of HS (3.4%) in seeds; whereas, sprouts contained 1.5 and 16.8% of RS and HS, respectively. Several lines with high contents of RS were observed to contain low contents of amylase. The percent amylase content was higher in sprouts (1.24%) as compared to seeds (1%) in Line 41. We identified Line 41 as suitable for healthy human consumption and for future studies.

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Storage Practices and Microbiological Contamination of Home Refrigerated Foods. A. Frederick*, F. C. Chen, S. L. Godwin, and R. Stone, Department of Family and Consumer Sciences, Tennessee State University, Nashville, TN 37209.

Refrigerators can harbor pathogenic bacteria that pose a potential for food contamination. Studies have shown that consumers often failed to follow the recommended guidelines for proper storage of refrigerated foods at home. However, the relation of improper refrigeration practices and microbiological contamination of refrigerated foods has not been fully assessed. Using a combination of microbiological tests and in-home observations and surveys, this study quantified the risk of mishandling and cross-contamination of refrigerated foods. The objectives included the following: (1) to identify risk factors for cross-contamination by investigating storage practices of refrigerated foods, and (2) to determine the likelihood and mechanisms of cross-contamination. In-home interviews and observations were conducted in sixty-five homes in Nashville, Tennessee. A total of 325 samples were collected for participants'

refrigerators during home visits. Swab samples were from shelf surfaces in the refrigerators and food samples (including home-prepared foods, leftovers, and opened packages of ready-to-eat foods) were collected from the participants' refrigerators. Microbiological analyses were performed, and molecular fingerprints of *Staphylococcus aureus* and *Bacillus cereus* were studied using Pulsed Field Gel Electrophoresis. The results indicated poor sanitation and prolonged storage of leftovers in the refrigerators. A significant amount of food samples contained high levels of *Staphylococcus aureus* and *Bacillus cereus*; both are a potential source for food-borne illness. In some cases, contamination could be traced to the refrigerator's surfaces. The needs for developing effective intervention strategies to improve consumers' refrigeration practices were identified.

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Molecular Structure and Physicochemical Properties of Starches in Virginia-Grown Corn, Potato, and Mungbean. C. Grizzard*, Y. Xu, S. S. Narina, E. N. Sismour, and H. L. Bhardwaj, Agricultural Research Station, Virginia State University, Petersburg, VA 23806.

Starch is the most abundant storage reserve carbohydrate. It plays the most important role in the human diet and accounts for 60–70% of total dietary energy intake. Corn, potato, and legumes are starch-rich crops with starch accounting for up to 70% of total solids in kernels, tubers, and seeds. Composition and properties of starch vary among the cultivars, environmental factors, and agronomic practices. Currently, there is no information regarding the compositions and properties of starches from Virginia-grown corn, potato, and mungbean. The objectives of this study were to evaluate the compositions and the properties of starches extracted from selected Virginia-grown corn, potato, and mungbean varieties. All starches were characterized by low protein, fat and ash, and high carbohydrate, which indicated the high purity of the starches for further evaluation. It was found that resistant-starch contents in the extracted starches were determined by not only amylose content but also the size and structure of starch granules, as well. Virginia-grown corn, potato, and mungbean starches had similar amylose content and molecular weight distribution of amylopectin as those crops reported earlier and grown at other locations. Compared to corn and mungbean starches, potato starches had a lower gelatinization temperature.

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Sex, Stress, and Inflammation in a Murine Model of Ulcerative Colitis. D. Hampton*, and K. Cromwell, Clinical Lab Sciences Program; I. Tigner, D. Campbell, D. Grant, F. Chestnut, O. Mitchell, and D. Freeman, Department of Biology, College of Arts, and Sciences; T. Purdie Jr., Department of Chemical Engineering, College; J. McNeilly, Department of Agricultural and Environmental Sciences, and A. D. Alexander, College of Agricultural and Environmental Sciences, Tuskegee University, Tuskegee, AL 36088.

One of the most compelling sources of stress is the desire of animals to procreate. The sex/mating ritual is an aggressive, sometimes violent act that causes stress in mice as characterized by a number of behavioral and physical symptoms. IL-10 is an interleukin that inhibits inflammatory cytokine production by macrophages. IL-10 knock-out (KO) mice are unable to cope with stressors, are hypersensitive to inflammation, and may exhibit altered responses to sex-related stressors. 129 SvEv wild-type mice were raised in shoebox cages. Half of the animals had previously been used in mating pairs (experienced), and the other half was naïve (virgin) mice. We then introduced the singly-housed mice to singly-housed mice of the opposite sex. Initially, mice were confined so that the other mice of the opposite sex could see, could smell, and could touch but not copulate with the mice. After this introduction, the mice were paired and were observed for one hour. Data collected included the number of attempts at mating, the number of copulations, and the behavioral and physical changes. We observed that the old experienced male mice were more aggressive than the young naïve male mice. We also observed that the WT mice showed more responses to the stressors used than the IL-10 KO mice. There is a significant role for IL-10 in sexual stress response. There is also a relationship between age, previous sexual experience, and sexual stress.

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Identification of *Trypanosoma cruzi* in *Anasa tristis*, the Common Squash Bug. D. Herbert*, H. Sleets, S. Cooks, M. McHugh, M. Scott, and A. D. Alexander, Environment and Nutrition Sciences; P. Gorrell, Jr., Department of Chemical Engineering; D. Thomas, College of Veterinary Medicine, Nursing, and Allied Health; and A. D. Alexander and M. Graham, College of Veterinary Medicine, Nursing, and Allied Health, Tuskegee University, Tuskegee, AL 36088.

The American squash bug, *Anasa tristis*, is striking in resemblance to the triatomine bug, the vector for the parasite, *Trypanosoma cruzi*. *T. cruzi* is the causative agent for Chagas Disease, which is also known as American Trypanosomiasis. Chagas Disease, once considered a tropical disease endemic to Central and South America, is now increasing in prevalence in the Southeastern US. We sought to determine if the squash bug could be a novel vector for *T. cruzi* transmission. If the squash bugs can be vectors of *T. cruzi* like its distant cousin, the triatomine bug, it may pose a significant public health threat to humans especially those intimately involved in cucurbit production. To determine if the squash bugs harbor *T. cruzi*, we grew three varieties of squash, which include yellow straight, yellow crook-neck and zucchini. These were transplanted to an experimental plot on the field and grown using a black or white plasticulture system with accompanying drip lines. Squash bugs were manually collected from individual squash plants and placed in 95% ethanol after being collected in individual containers. Specimens were identified by an entomologist and were stored at 4°C after lower abdomen removal. Samples were then shipped overnight to Zoologix, a company that specializes in *T. cruzi* identification via Molecular techniques. Several of the squash bug samples were positive for *T. cruzi*. More research into the mechanism by which this occurred is currently underway.

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Alternative and Traditional Marketing Strategies for Peppers. L. C. Hughes*, and A. E. Clardy, College of Agriculture, Human, and Natural Sciences, Tennessee State University, Nashville, TN 37209.

New, small, and limited resource producers are constantly seeking new specialty and niche crops to supplement their incomes with the rise in consumers preparing their own meals and seeking health-conscious alternatives for additives to meals and flavoring to various prepared dishes. Many people are using peppers as addition to meats, salads, pasta, and other vegetables. Fresh peppers are an excellent alternative but have a short shelf and refrigerator-life unless frozen. Therefore, we explored various ways fresh peppers could reach consumers before the end of their shelf life while still providing the producer additional income. Post-harvesting alternatives include canning, freezing, and pre-slice frozen peppers. We explored alternative strategies where peppers could be marketed and sold to the general public and compared these ways to traditional marketing strategies.

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Differential Expression of miRNA Across the Grafted Tissues Collected From Heterografts Involving Different Genera of Cucurbitaceae Family. A. Almeida*, L. Dalton, and U. K. Reddy, Gus R. Douglass Institute & Department of Biology, West Virginia State University, Institute, WV 25112.

Grafting is a commonly used horticultural technique that involves insertion of a shoot (scion) of one plant into the shoot of the other plant (rootstock) so that the two tissues merge, and establish together to survive rest of the life cycle. The current research is to compare regulation changes of microRNAs across the reciprocal grafts in contrast to their non-grafted counterparts involving various species. miR156, miR164, miR166, cuc_nov_7, cuc_sr_1, cuc_sr_4, cuc_sr_5 and cuc_sr_6 were selected. The scion leaf tissues of the grafted WM (watermelon)-JOL (Jack O' Lantern cultivar of pumpkin) showed significant up regulation with respect to miR164, cuc_sr_6, and cuc-sr-1. Significant down regulation was noted in the case of cuc-nov-7. The reciprocal graft, JOL-WM scion tissue showed significant up-regulation in miR164 and down regulation in cuc_sr_6 when compared to the non-grafted WM. Scion tissue of LAG (Maces variety of *Lagenaria*-MEL (Melon) exhibited significant up regulation with miR156, miR164, miR166, cuc_sr_6, cuc_nov-7, cuc-sr-4 and cuc-sr-5 when compared to non-grafted MEL. Between the WM and LAG, all the microRNAs had higher abundance of expression in the matured tissues of LAG than in the WM. Upon grafting, LAG as scion did not show any significant change for any of the microRNA, whereas WM leaf and stem had shown several folds up regulation for all the microRNAs except in cuc-sr-4 and cuc-sr-5. Another important observation is in WM scion, all the microRNAs in fruit tissues down regulated consistently. Our study clearly showed that miR156, miR164, miR166, cuc-nov-7, cuc-sr-1, cuc-sr-6 clearly moved from the rootstock LAG to scion WM in varying degrees.

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Gene Expression Across Ploidy Levels of Watermelon. R. Cantrell*, A. Almeida, P. Nimmakayala, and U. K. Reddy, Gus R. Douglass Institute & Department of Biology, West Virginia State University, Institute, WV 25112.

Seedless watermelons are the preferred type for the US consumers and currently 95% of watermelons are seedless. We used vegetative and fruit tissues of diploid and its isogenic tetraploid for genome wide transcriptome analysis and identified genes that are up and down regulated differentially among the diploid and tetraploid watermelon types. RNAseq resolved transcriptome differences between CLD1 (Charleston diploid), CLT1 (isogenic tetraploid Charleston) and a non-isogenic diploid (Crimson sweet). Further our small RNA library sequencing contained about 5 million small RNA reads for each of the diploid and tetraploid lines and sequence analysis indicated that the identification of 147 miRNA homologs belonging to 27 conserved miRNA families in diploid and tetraploid libraries. We noted expression abundance using the deep sequencing data and validated expression levels using the qRT PCR and Northern blots. miR 156 and miR164 showed higher expression in the diploid watermelon and *Arabidopsis* diploid ecotypes when compared with their tetraploid counterparts. Contrastingly, miR168-1 and miR166 expressed more in tetraploid lines than the diploids exactly in the same pattern in both the *Arabidopsis* and watermelon suggesting that these miRNAs regulate differentially across the ploidy levels in plants.

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Potentials for Beneficial Use of Fly Ash as a Growth Media in Production of Agriculture Crops.

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More than 40% of the electricity generated in the United States comes from burning coal, and the nation is third in the world behind only India and China in the production of this form of energy. Although there is increasing global focus on renewable forms of energy, coal will continue to play significant roles in the overall energy mix of many nations. In fact, the US sits on 2/3 of world's coal reserves accordingly, the material is the cheapest form of energy in the country. Use of coal has been declining over the past decade mostly because of adverse environmental impacts of the production and use of coal. Burning coal to generate electricity produces enormous amounts of coal combustion wastes (CCWs) that must be disposed of carefully in order to avoid human and ecological exposures to toxic chemicals present in some coal wastes. It is known that some CCWs particularly the fraction called fly ash (FA), contains elements that can also support plant growth. In an attempt to explore various ways to use FA, this project will determine the effect of the material on tomato (Better Bush) and Pepper Sweet (Rainbow Blend) when plants are grown in soils containing different proportions of FA with or without specified organic amendments. Experiments will examine growth, fruit production, and uptake of specified elements by plants. Mass balance of elements in plant and growth substrates will be determined by ICP analysis.

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Selected Insecticides for Soil Insect Control in Sweetpotato. S. A. Francis*, J. O. Garner, and O. M. Njue, Department of Agriculture, University of Arkansas at Pine Bluff, Pine Bluff, AR 71601.

Sweetpotato field experiments were conducted in the Parika Backlands area, East Essequibo, Guyana. The objective was to evaluate selected insecticides for control of soil insects. The experimental design was a randomized complete block with four replicates. Treatments were insecticides Lorsban, Imidan, and Penncap. These treatments were compared with and a local termiticide, Flip, which was included in the experiment. Each treatment was applied prior to planting and incorporated into the soil. After harvest, roots from each treatment plot were evaluated for insect feeding damage. Efficacy was evaluated by counting marketable roots with insect feeding scars and converting this number to a percent damage value. The least damage to the harvested sweetpotatoes occurred in plots treated with Flip and Lorsban. There was no significant difference in plots treated with Imidan and Penncap. Sweetpotatoes from these plots had the most insect feeding damage.

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Leafhoppers (Hemiptera: Cicadellidae) Associated with New Blackberry Plantings in Central Kentucky: Preliminary Results. J. J. Haak*, J. D. Sedlacek, K. L. Friley, K. W. Pomper, J. D. Lowe, and S. B. Crabtree, College of Agriculture, Food Science, and Sustainable Systems, Kentucky State University, Frankfort, KY 40601.

Many hemipteran insects cause damage to blackberry and raspberry plantings. Leafhoppers (Hemiptera: Cicadellidae) are insect pests of organic blackberries and raspberries in Kentucky and the surrounding region. Potato leafhoppers and other leafhopper species cause damage directly by feeding on

blackberry and raspberry foliage causing distorted growth at shoot tips, leaf margin curling, and yellowing. Recently, a study examining regional suitability of newly released primocane fruiting blackberries and raspberries for production by Kentucky's small farmers was initiated at Kentucky State University. A component of this study was to identify leafhopper species and quantify their abundance in these varieties. Thirty-one 15 cm X 15 cm yellow sticky traps were deployed on six sites in seven different raspberry and blackberry varieties grown in Fayette, Franklin and Shelby Counties, Kentucky. Traps were deployed and replaced weekly from July through September. Traps were returned to the laboratory where leafhoppers were identified and enumerated using a dissecting microscope. A total of 15,703 leafhoppers were counted and tentatively identified in 24 species or species groups in the first two weeks of this study. Only four species accounted for 94% of the total number of leafhoppers captured. *Agallia constricta* represented 71%, *Cuerna costalis* 9.9%, *Graphocephala coccinea* 8%, and *Draeculacephala* spp. 5% of the total number caught, respectively. These species will be discussed within the contexts of their life histories.

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Nitrogen Use Efficiency (NUE) Through Sensor-Based Algorithms and On-the-go Application.

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Management of the soil nitrogen cycle is of critical importance to the health of entire ecosystems. Excessive application of Nitrogen (N) fertilizers and the subsequent nutrient enrichment of waterways may be responsible for eutrophication in marine, estuarine, and riverine systems. Presently, worldwide nitrogen-use-efficiency (NUE) is said to be less than 50%. The remainder of the N is left to enrich the atmosphere as well as ground and surface water, with potentially serious negative impacts. Proper and efficient management of N application both minimize pollution of groundwater and optimize profits for producers. Proper assessment of within-field crop variability is critical for improvement of NUE. With appropriate design of sensor and sprayer combination on tractor booms the sensing, calculation of sensor-based nitrogen application rates, and nitrogen fertilizer spraying can be implemented on-the-go with microprocessor-based sensing and actuation. Critical to this process is the creation of N-application algorithms. To develop such algorithms, field studies are undertaken to determine optimum N application rates. The initial year of this project (2012) was centered on corn (*Zea mays* L.) grown under two water conditions (irrigated and non-irrigated). The experimental layout is a split plot design with irrigation as the main plot and N application levels as the sub-plot with 4 replications. Five fixed N fertilizer levels were used (0, 60, 120, 180, and 240 lbs/acre). Each plot was hand harvested and weighed to calculate an equivalent yield in bushels per acre. Significant effects of both nitrogen and irrigation were observed.

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Crop Pollen Effects on the Ovipositional Rate of Western Flower Thrips on Tropical Soda Apple.

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Over the past 40 years, *Frankliniella occidentalis*, western flower thrips (WFT), have become one of the most prevalent pests of agricultural and horticultural crops. The pest status of this insect is due to their habit of thigmotactic behavior, high reproductive rate, haplodiploid reproduction, vectoring plant pathogens and the ability to fly long distances on wind currents. Flight often happens on the leading winds of thunderstorms giving the insect a wide range of travel over a short period of time. As this pest insect has spread, so too has the tospovirus Tomato spotted wilt virus (TSWV), which is transmitted by WFT and is devastating to agricultural and horticultural crops. TSWV has been found experimentally in invasive tropical soda apple (TSA) plants, which means the plant may serve as a reservoir for this virus. The feeding and ovipositional role of TSA in the life cycle of WFT is unknown, however, and this information is important for agricultural and horticultural crop growers. This study investigates the effect that crop pollens and TSA pollen on the attractiveness of TSA for oviposition by using tomato and pepper plants for controls. Pepper has been found to be an acceptable reproductive plant host and tomato is a moderately acceptable reproductive plant host. If WFT will utilize the TSA plant as a reproductive plant host, which is required for the acquisition and transmission of the disease to solanaceous crop plants, this finding will indicate that the potential of this plant in the transmission of TSWV is present and therefore requires further control measures. Our results indicated that plant pollens increased the attractiveness of the TSA for oviposition, but overall, the WFT were more likely to oviposit in pepper and tomato leaves, with or without

pollens being added. We also found that oviposition on TSA occurred near the leaf edges rather than centrally on the leaf disc unlike that on tomato and pepper.

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Mulching Effects on the Production of Late Season, Organic *Solanum melongena* Under Drip Irrigation. S. Kennedy*, G. Vijayan, and D. Pitchay, Department of Agricultural Sciences, College of Agriculture, Human and Natural Sciences, Tennessee State University, Nashville, TN 37209.

Mulching is Critical for establishing favorable soil temperature and moisture, and controlling weeds. Therefore, mulching has become a standard practice in field crop production, more so in organic vegetable and fruit production. Types of mulching used by growers, result in varying outcomes. Black colored plastic mulch is typically used during spring months and white colored during the summer planting season. A study was conducted to investigate the effects of various mulching types on a late season organic production of eggplant under a drip irrigation system. The field study was conducted at Tennessee State University Experimental Station. Experiment with five different mulch treatments, which include 1) thick white porous plastic, 2) thin white non-porous plastic, 3) thin black non-porous plastic, 4) pine straw mulch, and 5) no mulch were used to cover the raised 4 x 25 ft. bed dimension. Eight-week old eggplant seedlings were planted on Aug 10, 2012. The eggplants were fertigated with fish emulsion through a drip line as needed. The soil surface temperature was monitored using an infrared thermometer. The non-porous black plastic mulch surface temperature was significantly higher than the rest. The bed with thick white porous plastic mulch was totally free from weeds followed by the beds with the white and black non-porous plastic. The bed with pine straw mulch had manageable weed growth. The eggplant fruit yield was significantly higher in plants grown under the thick white porous plastic mulch and pine straw mulch. There was a significant reduction of eggplant yield in plants grown with no mulch. Soil moisture levels and the eggplant fruit elemental content were also significantly different among the various types of mulches.

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Application of Trichoderma, Vesicular-Arbuscular Mycorrhizae, and *Azospirillum* Influenced the Growth and Development of Jamaican Scotch Bonnet Pepper. L. Lee*, F. Buabeng, C. Cotton, F. Hashem, and R. Dadson, Department of Agriculture, Food and Resource Sciences, University of Maryland Eastern Shore, Princess Anne, MD 21853.

Jamaican Scotch Bonnet peppers, which exhibit inherent quality attributes such as flavor and pungency, could become a potential niche market for small farmers on the Delmarva Peninsula. However, they are highly susceptible to numerous soil-borne pathogens that may significantly affect yield. Some beneficial microorganisms, which are known for their symbiotic functions, can reduce plant diseases, enhance disease resistance, and improve plant nutrient availability. This study was conducted to examine the effect of Trichoderma, Vesicular-Arbuscular Mycorrhizae (VAM), and *Azospirillum* applications on growth and development of the crop as well as the incidence of fungal diseases under greenhouse conditions. Seeds were planted in 72-celled trays filled with promix and placed in a growth chamber until seeds germinated. Seedlings were placed in a greenhouse for 8 weeks where two seedlings were transplanted in single 10 1/8 inch pots containing a 3:1 soil/promix growing medium. Treatments were applied at the time of transplanting. The experiment was a randomized complete design consisting of seven treatments with four replications. Plant heights were measured and liquid fertilizer was applied every 2 weeks after transplanting. Shoots and roots were measured and oven dried at 70°C for 72 h. The vegetative, flowering, and fruiting stages of development were analyzed. Results indicate that for the vegetative and fruiting stages, there were no significant differences among treatments; however, for the flowering stage there was a significant difference in shoot dry weight ($p \leq 0.01$). Trichoderma + VAM treatment significantly increased shoot dry weight. No disease incidence was observed in any of the treatments.

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Comparison of Hay and Polyethylene Mulch Effects on Soil Properties and Organic Produce Yield and Quality. J. Nelson*, M. Bomford, C. Wang, J. Cambron, A. Silvernail, L. Huang, and M. Ward, College of Agriculture, Food Science, and Sustainable Systems, Kentucky State University, Frankfort, KY 40601.

Organic farms often use plastic or plant-based mulches to reduce weed pressure, improve crop yield, retain soil moisture, and influence soil temperature. Plastic mulch represents a petroleum-based input that does not further the national organic standards' stated goals of promoting resource cycling and improving soil quality. Studies were carried out on certified organic land at the Kentucky State Research and Demonstration Farm in 2011 and 2012 to compare the effects of hay and plastic mulches on soil temperature, soil moisture, organic matter content, fruit antioxidant content and yield of heirloom tomatoes (*Lycopersicon esculentum* L.) and watermelon (*Citrullus lanatus* Thunb.). Transplants were placed into raised beds in June of 2011 and 2012, respectively. Beds were either left bare or mulched with black plastic, silver plastic, or hay. Soil temperature was monitored hourly and soil moisture was measured weekly until the final harvest. Subsamples of marketable watermelons were harvested for nutrient and antioxidant analysis. Hay mulch moderated diurnal temperature flux, relative to other treatments, over the course of both seasons. Soil moisture content was greater under all mulches than in bare plots. Yield was higher in plots mulched with hay than in bare plots in both years. Mulch type had no effect on the marketable proportion of the harvest. Soil organic matter content increased in beds mulched with hay. Antioxidant content was highest in watermelons grown without mulch. Replacing plastic mulch with hay on organic farms has potential to further the goals of organic agriculture without compromising yield.

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Phylogenetic Analysis of Bioenergy Crops Using Cellulose Synthase Genes. J. Davis*, Y. Zhao, C. S. Prakash, and G. He, Department of Agricultural and Environmental Sciences, Tuskegee University, Tuskegee, AL 36088.

Energy from biomass represents the most renewable, greener and sustainable means to reduce our reliance on petroleum. The grass *Miscanthus* spp. is an attractive source of bioenergy feedstock because of its huge biomass output, fast growth rate, ability to grow on marginal lands and a wide range of soil types, low input requirements and C4 photosynthetic pathway. Using sugarcane gene markers as heterologous primers, we are amplifying the cellulose synthase gene using polymerase chain reaction (PCR) in various *Miscanthus* genotypes. Variation in the sequences of this gene in *Miscanthus* and related species is being studied along with a phylogenetic analysis to understand the evolution of this important gene. Genome Wide Association Mapping (GWAS) will be performed to estimate the linkage of DNA markers to key bioenergy traits. This study is a part of our long-term goal to develop fast growing, highly productive and eco-friendly clones of this grass.

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Use of Hydroponics to Study Basil Plant Growth and Development: a Precollege RATLR Project. X. Faust*¹, B. R. Phills², G. Umar², and C Magee³, ¹School of Architecture, ²Center for Viticulture and Small Fruit Research, and ³Biological and Agricultural System Engineering, College of Agriculture and Food Sciences, Florida A&M University, Tallahassee, FL 32317.

A major requirement of RATLR Precollege student participants is to complete and present a mini research or extension project as part of their experiential learning. With an interest in architectural design, and having been placed with a horticulturist as a faculty mentor, we selected a topic of mutual interest to explore how the two disciplines could be combined to stimulate my interest and experiential learning in plant science. To this end, we selected hydroponics as a means to test my designing skills and imagination. We also selected Basil '*Ocimum basilicum*' as a fast growing plant that could produce edible foliage in a short period of time. A three-tier gravity flow system was used to evaluate plants grown from seed. A balanced liquid fertilizer mixture in a 30-gallon tank was used as the growth media. Three weeks after establishment, plants had a healthy root and foliage system. The initial study lasted for a period of four weeks, which was the duration of the RATLR program, but is continuing with different hydroponic systems and plant modifications. This project clearly proved that it is possible to grow basil and by example, many other food crops of economic importance without harming or depleting the environment. The project also convinced me that there is a place in agriculture for someone who is interested in architectural design and yet able to establish a professionally rewarding career in agriculture and take advantage of both fields study during undergraduate matriculation.

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Biochar Effects on Soybean Growth and Soil Properties. M. R. Bayan, and B. King*, Department of Agriculture and Environmental Sciences, Lincoln University, Jefferson City, MO 65101.

The United States is a main producer of soybean (*Glycine max*). Many products used daily are derived from soybeans, including industrial and edible products. It is important that the quality of soil used to grow soybeans and other crops is sustained. In this study, biochar is used as a soil amendment. Biochar is a carbon-rich by-product of bioenergy production. It is produced when biomass feedstocks are exposed to thermal energy (normally exceeding 400°C) in an oxygen depleted environment. Although the effects of biochar on soil physical, chemical, and biological properties have not been well documented, it has been reported that biochar enhances soil fertility and quality. The objectives of this study include: 1) to determine whether biochar as a soil amendment might enhance soybean growth, 2) to study the effects of biochar on the soil physical, chemical, and biological properties, 3) and to study how biochar affects the activity of select soil enzymes. It was hypothesized that biochar would affect soybean growth, physical, chemical and biological properties in the soil, in turn affecting the microbial population and enzymes involved in nutrient cycling. In a greenhouse experiment, significant increase in soybean yield growing on an Entisol was observed when biochar produced from miscanthus and switchgrass was incorporated into soil at the rate of 2% by weight. Biochar reduced soil enzyme activities initially but activities increased over the course of study. Continued research is needed to understand the full effects of biochar on soybean growth, soil properties, and the environment.

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Germplasm Screening for High Acetogenin Activity in Pawpaw Twig and Fruit Tissues.

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The North American pawpaw [*Asimina triloba* (L.) Dunal] is a native tree fruit in the eastern United States and is in the early stages of commercial production. This plant contains annonaceous acetogenins in the twigs, ripe fruit, seeds, roots, and bark tissues which display antitumor, pesticidal, antimalarial, antiviral, and antimicrobial effects, suggesting many potentially useful applications. However, commercial development of these compounds, based on twig extracts, has been problematic due to limited availability of biomass for extraction. Fruit would be a major biomass source for acetogenin extraction; however, 5 to 8 years are required for a tree to mature and produce fruit. Early detection of high acetogenin fruit selections would shorten the pawpaw breeding cycle for developing new selections for acetogenin extraction by the KSU breeding program. The objectives of this study were to determine if there is a correlation between acetogenin activity in ripe fruit and twig tissues and to identify high fruit acetogenin selections. Twigs and fruit were collected from trees of pawpaw varieties and advanced selections (Mitchell, Overleese, NC-1, Susquehanna, Zimmerman, Wells, Wabash, Sunflower, G4-25, Hi4-1, Hi7-5, and additional advanced selections) that vary from high to low in fruit acetogenin activity. Two and one-half grams of dried twig tissue or ten grams of frozen fruit pulp were extracted with 95% ethanol and the brine shrimp test (BST) was employed to assess acetogenin activity in extracts. Linear relationships were examined between fruit and twig tissues and new high-acetogenin germplasm identified.

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Screening of Viruses Infecting Sweetpotato in Arkansas. J. Montgomery*, S. K. Ponniah, O. Njue, and M. Manoharan, Department of Agriculture, University of Arkansas at Pine Bluff, Pine Bluff, AR 71601.

Viral diseases are one of the most important diseases affecting sweetpotato production causing significant damage to yield. There are several viruses infecting sweetpotato but chief among them are the potyviruses Sweetpotato feathery mottle virus (SPFMV), Sweet potato virus G (SPVG), Ipomoea vein mosaic virus (IVMV); the crinivirus Sweet potato chlorotic stunt virus (SPCSV), and the begomovirus Sweetpotato leaf curl virus (SPLCV). In Arkansas, sweetpotato production has been steadily growing with a 20% increase in acreage (from 3,000 acres to 3,600 acres) between 2009 and 2011. However, information on the nature of viruses infecting sweetpotato in Arkansas is lacking. We have collected sweetpotato leaf samples at multiple locations from different counties of Arkansas such as Jefferson, Ashley, Lee, Cross, Chicot, Monroe and Lonoke to characterize and quantify the level of viral infection. Genomic DNA, total RNA and proteins were isolated and PCR, Real-time PCR and NCM-ELISA are being conducted for the presence of SPFMV, SPVG, IVMV, SPCSV, and SPLCV in sweetpotato.

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High Frequency Plant Regeneration from Axillary Shoot in *Moringa oleifera*. A. Norris*, and S. K. Dhir, Center for Biotechnology, Department of Plant Science, Fort Valley State University, Fort Valley, GA 31030.

Moringa oleifera Lam., commonly known as the drumstick, has potential as a commercial medicinal and nutritional supplement. The present investigations were initiated to develop rapid *in vitro* plant regeneration protocol from axillary shoot and via somatic embryogenesis. Axillary shoot growth was induced by supplementing Murashige and Skoog's (MS) medium with cytokinins. Of the three cytokinins tested, namely benzylaminopurine (BAP), kinetin (KN), and thidiazuron (TDZ), BAP at 2.5 μ M was found to be optimal in inducing bud break, producing an average of 12-18 axillary shoots per explants after 4 weeks. Through routine subculturing of nodal sections explanted from *in vitro* shoot cultures on a similar shoot induction medium, a high multiplication rate was established. The *in vitro* proliferated and elongated shoots were transferred individually onto a root induction medium containing 0.5 μ M indole-3-butyric acid (IBA), and within 4 weeks roots were produced. Fast growing white embryogenic callus were also established from leaf segments of *in vitro* raised plants on MS medium supplemented with 4.52 μ M 2,4-D and 11.09 μ M BAP. The highest induction frequencies of somatic embryos were obtained on MS medium containing 13.31 μ M BAP and 3% sucrose with an average of 28 embryos per gram of callus. The continuous production of *Moringa* regenerated plants via somatic embryogenesis could be used as a possible micropropagation system and plant transformation.

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Pepper Fruit Shape Analysis Using Morphometric and Morphology Attributes Implemented in Tomato Analyzer Software Program. J. Poe*, Z. Perry, V. L. Abburi, and P. Nimmakayala, Gus R. Douglass Institute & Department of Biology, West Virginia State University, Institute, WV 25112.

Measuring fruit shape, length and diameter is routine practice in horticultural evaluation of various vegetable crops. Tomato Analyzer (TA) is an automatic software program that was originally developed for measuring 37 different attributes related to two-dimensional shape tomato fruits. We used this software to characterize 96 different cultivars of American peppers. Many of the attributes, such as angles at the distal and proximal ends of the fruit and areas of indentation, are difficult to quantify manually. The attributes were organized in ten categories within the software: Basic Measurement, Fruit Shape Index, Blockiness, Homogeneity, Proximal Fruit End Shape, Distal Fruit End Shape, Asymmetry, Internal Eccentricity, Latitudinal Section and Morphometrics. We noted that TA is an effective tool for identifying and confirming pepper fruit shape variation, as well as performing in-depth analyses of the effect of key fruit shape genes on fruit morphology. Currently, we are subjecting 37 fruit attributes for QTL analysis using large sets of SNPs (Single Nucleotide polymorphisms).

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Citrus Leafminer, *Phyllocnistis citrella* Stainton (Lepidoptera: Phyllocnistinae), and its IPM on Young Citrus Plants. J. Richardson*¹, M. Haseeb¹, and B. R. Phills², ¹Center for Biological Control, and ²Center for Viticulture and Small Fruit Research, College of Agriculture and Food Sciences, Florida A&M University, Tallahassee, FL 32317.

Citrus leafminer, *Phyllocnistis citrella* Stainton (Lepidoptera: Phyllocnistinae), is a serious invasive pest of citrus plants, especially young plants (<5 years). Adult moths are 4 mm wide. The species has white and silvery scale appearance on the front wings, with several black and tan markings. In addition, it has a black spot on each wing tip. We started growing new citrus plants (var. Matsuma) in Spring 2009. Citrus leafminers were monitored and their population in the beginning two years was found low (<20%). In 2011 and 2012 population density grew and showed highest infestation (70-80%) in October and November. We have used Imidacloprid (1.47% active ingredient) drench 2011 and 2012 to manage this pest. Leafminer's biocontrol agents and possible control measures in North Florida are being investigated.

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Isolation of Lignocellulolytic Microorganisms with Implications for Biofuels. P. Gorrell, Jr.*, Department of Chemical Engineering; and A. D. Alexander, Department of Agricultural and Environmental Sciences, College of Agriculture, Environment and Nutrition Sciences, Tuskegee University, Tuskegee, AL 36088.

The search for new sources of alternative energy has increasingly become a priority in the last decade, causing the U.S. to make a dramatic change from the complete reliance on petroleum of the 1970s and 1980s, to being able to utilize supplementary sources as energy. The escalating prices of oil and its limited supply have provided an additional imperative to scientists concerned with the production of alternative fuels. Biofuel is a type of renewable energy that is derived from the bioremediation of biomass components, which can then be used as an energy source. The majority of biomass used to produce biofuels comes from crop production and post-harvest residue. In this experiment we sought to identify and characterize lignocellulolytic microorganisms capable of the bioconversion of plant biomass to fuel. The two most recalcitrant substances in the plant biomass are lignin and cellulose. These are also the most abundant components of post-harvest residue. Our approach was to isolate microorganisms from biomass sources (wood shavings, sugar cane husks, etc.) where lignocellulolytic organisms might exist. These organisms were then cultured on minimal salts media containing only lignin or cellulose as carbon sources. The isolated organisms were then verified as capable of degrading lignin and cellulose, as well as characterized based on carbon source usage, enzymatic activities and genetic profiles. We report here the isolation of lignocellulolytic organisms with the potential for biofuels application.

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Nutrient Modulation and Feeding Strategy Influenced Biomass and Lipid Yield in *Scenedesmus* sp.

J. Haslag*, S. Palanisami, and K. Lee, Center for Bioenergy, Cooperative Research, Lincoln University, Jefferson City, MO 65101; and P. Nam, Department of Chemistry, Missouri University of Science and Technology, Rolla, MO 65401.

Large-scale microalgal cultivation is now receiving much attention as a promising renewable source of biomass for biodiesel production. The commercial success of these large-scale ventures depends on producing a large biomass with high lipid content. Modulation in nutrient supply/availability is a kind of stress, which makes the cells alter their physiology. Our investigation involves finding possible ways to increase the biomass as well lipid content. Our test species *Scenedesmus* sp. is already proven for its survival capability and dominance throughout all seasons and flue gas chemical entities. After several attempts, the outdoor medium has been standardized as commercial fertilizers (20 mg/L nitrate). Continuous culture with feeding every three days in circular open pond (1000 gallons) with flue gas (from coal fired power plant) sparging is the experimental setup; four different conditions were maintained (i) Every 3 days feeding 20mg/L nitrate [N] concentration, (ii) Keeping the biomass of day 0 as a reference, according to the percentage of biomass increase, 20 mg/L N will be fed, (iii) Same as condition (ii), but every three days that 20 mg will be decreased 3 mg/L gradually with every feeding, until at the time of sixth feeding the concentration of nitrate would reach zero, and (iv) Same as condition (ii), but unlike condition (iii), once the culture reaches the stationary phase, feeding will be stopped suddenly. Growth estimated in terms of optical density, ash free dry weight, whole cell protein and pigment, and the stress responses monitored in terms of stress stabilizing enzymes.

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Plant Regeneration and Genetic Transformation in *Arundo donax* Using Particle Bombardment. M.

Melvin*, and S. K. Dhir, Center for Biotechnology, Department of Plant Science, Fort Valley State University, Fort Valley, GA 31030.

Giant reed (*Arundo donax* L.) is a tall, erect, non-food, warm-season, woody perennial crop plant that has received considerable attention as a potential dedicated biofuel and bioproduct feedstock. Genetic improvement of giant reed is needed for better cellulosic ethanol production, especially to improve cellulose-to-lignin ratios. Cell suspension cultures offer an *in vitro* system for mutant selection, mass propagation, gene transfer and cell biology. Toward this end, cell suspension cultures were initiated from embryogenic callus on MS medium supplemented with 2.0 mg/L of 2, 4-D, using immature inflorescence and root segments from *in vitro*-raised *A. donax* plants. Cultures have been established and characterized with different cell type morphologies: sandy, fine milky and ultrafine. Through regular sub-culturing of embryogenic suspension cells and calli on MS media with various concentrations of 2, 4-D (0.5-2.5 mg/L), 3% sucrose and 0.4% gelrite, different developmental stages of embryos, including torpedo and cotyledonary stages, were observed, and these were later germinated into plantlets. Embryogenic calli were bombarded with 1.0 μ m gold particles coated with a plasmid DNA vector containing GFP and NPTII genes fused to a 35S constitutive gene promoter. The GFP cultures were observed under UV/blue light.

Maximum gene expression was observed 24 hours after culture (approximately 600 spots/ bombardment). The effect of different parameters, such as types of tissues, distance and varying pressures on stable expression of GFP in embryogenic callus tissues will be discussed.

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Testing Alternative Sweetpotato Varieties for Potential Bioenergy and Nutraceutical Yield on Organic Land in Kentucky. J. Cambron, S. Stephens*, M. Bomford, C. Wang, A. Silvernail, R. Ward, and L. Huang, College of Agriculture, Food Science, and Sustainable Systems, Kentucky State University, Frankfort, KY 40601.

Sweetpotato (*Ipomoea batatas*) shows potential as a bioenergy feedstock crop and a source of valuable nutraceutical phytochemicals. It is drought tolerant and performs well under low-nitrogen conditions, making it well-suited to low input and organic production systems. Its tubers produce greater dry matter yield than most horticultural crops and are rich in carbohydrates and health-promoting phytochemicals, including vitamin A, β -carotene, and a range of anthocyanins and phenolics with high antioxidant activity. In 2011 and 2012 we grew several specialty varieties of sweetpotato on organic land to compare carbohydrate and anthocyanin yield. Two of the varieties, CX-1 and 7-21, are experimental varieties bred as biofuel feedstock crops, which have not been previously grown in Kentucky. A third variety, Stokes Purple, is a purple-fleshed sweetpotato bred for high anthocyanin content. These alternative varieties were compared with two common food varieties, Beauregard and Hernandez. CX-1 produced the largest tubers, with the highest dry matter content and carbohydrate yield. Hernandez produced the lowest yield. Stokes Purple produced the smallest tubers, but had a similar yield to the standard food varieties, and the highest anthocyanin yield among the varieties tested. We propose a system in which anthocyanins and other valuable phytochemicals are extracted from stillage after ethanol fuel production from carbohydrates.

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Effect of Antibiotic on Ethanol Yield from Sweet Sorghum. J. Beckwith*, J. Cambron, and M. Bomford, College of Agriculture, Food Science, and Sustainable Systems, Kentucky State University, Frankfort, KY 40601.

Sweet sorghum (*Sorghum bicolor*) is a drought tolerant annual grass, which grows well under low N conditions, and is well adapted to much of the USA. It is commonly grown for its sugar-rich sap, which can be processed into syrup or ethanol, and for the grain, which can be used for human or animal food. Juice extracted from sweet sorghum stalks contains 15-20% sugar, making it an excellent substrate for yeasts and bacteria that carry out ethanol fermentation and lactic acid fermentation, respectively. Since yeast and bacteria compete for the same sugar source, bacterially-mediated lactic acid fermentation can inhibit the yeast-mediated ethanol fermentation necessary for ethanol fuel production. Selective antibiotics can be used to kill these bacteria, which may give yeast a competitive advantage, and increase ethanol output. To test this hypothesis, brewers' yeast (*Saccharomyces cerevisiae*) was added to replicated flasks of sweet sorghum juice at 0.28 g L^{-1} without antibiotic, or with low (21 ppb) or high (42 ppb) levels of the antibiotic ampicillin trihydrate. Ethanol concentration after three days of fermentation was highest in the high antibiotic treatment, and lowest in the untreated flasks. We conclude that the antibiotic ampicillin trihydrate can increase ethanol production from sweet sorghum juice by inhibiting lactic acid fermentation.

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Potential for Sweet Sorghum Bagasse as a Feedstock for On-Farm Power Generation through Gasification. N. Cook*, M. Bomford, J. Cambron, and A. Silvernail, College of Agriculture, Food Science, and Sustainable Systems, Kentucky State University, Frankfort, KY 40601.

Sweet sorghum (*Sorghum bicolor*) is commonly grown for its sugar-rich sap, which can be processed into syrup or ethanol, and for the grain, which can be used for human or animal food. Bagasse, the fibrous material that remains after extraction of the sap, shows potential as a feedstock for thermal gasification to generate heat, power, or electricity. Thermal gasification converts the lignin, hemicellulose, and cellulose in the bagasse into a volatile mixture of hydrogen, carbon monoxide, and methane gasses, which can fuel an internal combustion engine. Our objective was to explore the potential for sweet sorghum bagasse to be converted into feedstock for a small gasifier and generator, capable of producing up to 10 kW of electricity from approximately 12 kg of dry biomass per hour. The ideal fuel for the gasifier is compact pellets or blocks of biomass, between 1 and 5 cm in any dimension, with moisture content below 30%. The raw bagasse had a moisture content of up to 60%, and consisted of strands up to 3 m in length. We

experimented with several low-input methods of chopping, drying and pelletization, and recorded labor and energy inputs for each. Our results can be applied by sweet sorghum growers needing low input pre-processing methods for waste bagasse destined for on-farm gasification.

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Mycorrhizal Relations in Sweet Sorghum (*Sorghum bicolor*). A. Leach*, A. Atalay, and B. Whitehead, Agricultural Research Station, Virginia State University, Petersburg, VA 23806.

Sorghum has world-wide importance because of its significance in food, feed and energy production. Mycorrhizal relations in sorghum help in adaptation to harsh environments such as high salt and drought conditions. We examined the natural tolerance of sorghum for salt and observed the formation of endomycorrhizae in the roots. Five varieties of sorghum (Keller, M81E, Della, Dale, and Dk28E) were grown in a greenhouse using soil and Hogland's solution as media. Salt levels ranged from 0 to 180 mM NaCl that were added during watering periods. After two months of growth, sorghum roots were rinsed with tap water to remove adhering soil particles. Roots were cut to 1 inch in length and placed in a petri-dish containing 2% acetic acid solution. Staining was done by initially blanching the roots in 10% KOH solution for 3 minutes followed by rinsing with deionized water for 30 seconds. Cleaned roots were placed in a 30 mL beaker containing 5% Parker® red ink in acetic acid solution and boiled for 3 minutes. The excess red ink was removed by washing the roots with deionized water. Four pieces of root were placed on a microscope slide where they were gently crushed with the slide cover, sealed and labeled. Such prepared slides were observed under a Hitachi® microscope at 2000-4000 µm magnification and pictures were taken. Results indicated that sorghum growth was enhanced with increasing salt level, and mycorrhizae formed in all five varieties tested.

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Vermiculture of Poultry Waste and Paper for Sustainable Agriculture. E. L. Goodman*, L. E. Marsh, and B. D. Smith, Department of Agriculture, Food and Resource Sciences, University of Maryland Eastern Shore, Princess Anne, MD 21853.

Sustainable agriculture is an important sector of farming and, according to many, includes sound environmental practices and responsible use of resources. Among some of these resources are readily available waste materials such as poultry compost, which need to be effectively used to provide nutrients for crops. This study investigated the ability of Red Wiggler worms (*Eisenia fetida*) to digest or compost these substrates through a process called vermiculture. The objective was to identify the ratio of compost to paper that resulted in the best and most abundant worm castings, which could ultimately be used as plant fertilizer. Wiggler worms were incubated with seven different ratios of shredded office paper and chicken litter over 30 days. There was no vermicomposting in poultry litter at 5 or a greater percent. Conversely, using 100% paper as substrate allowed the worms to survive but not perform optimally. Results also confirmed that tomato (*Lycopersicon esculentum*) plants treated with a compost tea from the paper-derived worm castings had a significantly higher leaf count than those grown in water. This study suggests that vermiculture is a reasonable and reliable way of removing waste with added benefits through its byproducts. In response to the findings of the study, the implications are that the worms, for optimal culture, may require an environment of mixed substrates with various nutritional sources rather than one substrate alone. Based on the high salt content of poultry litter, future studies should be done with leached poultry compost.

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Impact of Soil Amendments on Antioxidant and Trace-Element Content of Bell Pepper and Melon Fruits at Harvest. M. Johnson*, and G. F. Antonious, College of Agriculture, Food Science, and Sustainable Systems, Division of Environmental Studies, Kentucky State University, Frankfort, KY 40601.

Composting and land application of sewage sludge are increasingly popular ways for using organic waste and decreasing the amount of municipal waste being diverted into landfills. However, the mobility of trace elements from soil amended with sewage sludge into the food chain and their subsequent bioaccumulation in edible plants has increased the attention they received as major environmental pollutants. The objectives of this study were to: i) quantify the concentration of seven trace-elements (Cd, Cr, Mo, Cu, Zn, Pb, and Ni) in bell pepper and melon fruits grown in soil amended with sewage sludge (SS), yard waste (YW) compost, and native soil; ii) quantify the concentrations of ascorbic acid and phenols in bell pepper and melon fruits grown in soil amended with SS, YW, and native soil; and iii) study

the impact of soil amendments on the antioxidant content of bell pepper and melon fruits. Analysis of bell pepper revealed higher concentrations of Ni and Cu in fruits grown in soil amended with SS. There was no significant difference in ascorbic acid content of bell pepper and melon fruits among soil treatments. Phenols concentrations in bell pepper and melon fruits indicated a significantly higher concentration in plants grown in soil amended with YW and SS. Overall concentrations of Ni, Cd, Pb, and Zn in melon fruits were significantly greater ($P < 0.05$) than pepper fruits. No significant differences were found in Cr, Cu, and Mo concentrations between pepper and melon fruits at harvest time.

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Complexation of Aluminum by Nitrogen-Containing Ligands. H. M. Cavender*, and G. Sklute, Department of Chemistry and Gus R. Douglass Institute, West Virginia State University, Institute, WV 25112.

Aluminum toxicity is a major problem in large areas of the US east of the Mississippi River, including WV. In acidic soil ($\text{pH} < 5.0$), the increased solubility of aluminum in water damages DNA and inhibits plant root growth. The goal of the proposed research is to develop a rational design of ligands that can selectively chelate the aluminum. Nitrogen-containing ligands are important ligands in the coordination chemistry of aluminum (Al) and other main group metals. Macrocyclic-ligands with nitrogen donor atoms were investigated due to their higher kinetic and thermodynamic stability over their non-cyclic counterparts. This study utilizes *Molecular Mechanics* Merck Molecular Force Field (MMFF) calculations to investigate ideal macrocyclic cavity size dimensions, shape and topology of Al^{3+} ion, substituent effects with addition of pendant arms, number and arrangement of nitrogen atoms, and the effect of conformational flexibility/rigidity on stability of nitrogen-ligand Al complex. The first family of compounds investigated was the triazacrown macrocycles. 1,4,7-triazonane was found to be the most ideal with no change in bond length, however, it did distort the coordination geometry about the Al ion by an average of 15° . The next family of compounds that were investigated was the tetraazacycloalkanes that contain four nitrogen donor atoms in the ring. 2-(1,4,7,10-tetraazacyclododecan-1-yl)ethanamine was selected from this group due to the increased stability of complexation to (Al) by the addition of the pendant arm. Synthetic routes have already been determined for 2-(1,4,7,10-tetraazacyclododecan-1-yl)ethanamine, and it is currently being synthesized.

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Nitrogen Cycling in a Pine Forest Ecosystem in Response to Fertilizer Application. A. Faison*, School of Agriculture and Human Ecology, Virginia State University, Petersburg, VA 23806; J. Raymond, and T. Fox, Department of Forest Resources and Environmental Conservation, Virginia Polytechnic Institute and State University, Blacksburg, VA 24061; and L. K. Rutto, Agricultural Research Station, Virginia State University, Petersburg, VA 23806.

The objective and rationale of this ongoing project is to further the understanding of nitrogen (N) cycling in loblolly pine plantations across southeast United States after fertilization. We determined the fate of N in fertilizers in mid-rotation loblolly pine using stable isotopes (^{15}N) and also compared N cycling among conventional and enhanced efficiency fertilizers (EEF's). Data were collected from a subset of this project in Blacksburg, VA. There were 5 plots per site with similar stand dynamics. The general plot characteristics were as follows: tree age ranged from 5-19 years, the number of trees per plot was 4 to 16, the height varied from 9 to 61 feet, and diameter of breast height (DBH) varied from 1.8-10.6 in. Fertilizers used were urea, polymer coated urea, (N-(n-butyl)) thiophosphoric acid triamide (NBPT)+Urea, coated urea fertilizer (CUF)+NBPT and a non-fertilized control. Application periods in 2011 were on 6 sites in late winter and another 6 sites in mid-summer. In 2012, all 12 sites were applied in late winter. The results showed increased foliar N concentration in most fertilized plots across the entire growing season with foliage recording the highest $^{15}\text{N}\%$ in after-summer and winter application (although treatments are variable). Also, data from microcosm experiments show that EEFs reduce initial N loss in winter application.

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Genetic Diversity in Six Pawpaw Patches from Franklin County, Kentucky as Revealed by SSR Markers. D. Davidson*, J. D. Lowe, K. W. Pomper, and S. B. Crabtree, College of Agriculture, Food Science, and Sustainable Systems, Kentucky State University, Frankfort, KY 40601.

Pawpaw [*Asimina triloba* (L.) Dunal] is a tree-fruit that is a native understory tree in the eastern region of the United States that is in the early stages of commercial production. Kentucky State University (KSU) in Frankfort, Kentucky is the site for the USDA National Clonal Germplasm Repository for pawpaw (*Asimina*) species, containing over 2000 accessions from 17 different states. Research priorities for the repository include assessment of genetic diversity and collection of unique pawpaw genotypes. The objective of this study is to evaluate the genetic diversity in six pawpaw patches from three locations (Cove Spring Park, Salato Wildlife Center, and Elkhorn Creek) in Franklin County, Kentucky. DNA was extracted using the DNAMITE Plant Kit from leaf samples collected from trees in each population. Primers B3, B103, and G119 labeled with FAM were used to amplify SSR products, and products were separated with a 3130 Applied Biosystems capillary electrophoresis system. Genetic relationships among the pawpaw patches were examined using the software program Power Marker. The SSR markers generated showed significant genetic variation among the pawpaw patches and variation within the patches. A number of unique genotypes in the populations should be sampled and incorporated into the KSU germplasm collection.

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The Effects of Synthetic Dyes on People and their Environment. S. M. Pearsall*, Department of Human Ecology, Delaware State University, Dover, DE 19901.

The majority of our clothing today uses synthetic fabrics and dyeing processes that have negative effects on our environment and us. Some of these negative effects include disease and death. This can be changed by encouraging manufacturers to be eco-friendly, wearing more natural and/or organic clothing, and becoming more aware and cautious about our clothing choices. These small steps could change our lives forever, as well as the world we live in. Climate change and increased waste has caused our environment to be in crisis; we as a people need to come together to discover ways to alleviate this problem. Recycling is an obvious step that needs to be taken, but there is a way we can go deeper to where clothing first begins—the fibers and the processing they go through, such as synthetic dyeing. This present study is to understand college students' attitudes and behaviors toward environmental clothing practices. We surveyed college students the ages of 18 to 25. They reported environmental attitudes and clothing disposing behaviors. This limitation was chosen because this age group has the most buying power; therefore, they are affecting us the most in this aspect. This will determine whether or not circumventing the synthetic dyeing process is possible.

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UV-B and UV-A Radiation Ten-Year Trends in Different Latitude Regions of the United States and Relativity to Skin Cancer in Humans. M. Wang*, Y. Qi, and V. Ferchaud, Urban Forestry Program, Southern University and A&M College, Baton Rouge, LA 70813.

Depletion of stratospheric ozone, mainly due to man-made pollutants, such as chlorofluorocarbons and other halogenated ozone-depleting substances, has resulted in increased solar UV-B (280-315 nm) and UV-A (315-400 nm) radiation at different latitudes in both the Southern and Northern hemispheres. The continuous increase in UV radiation through the earth's stratosphere has affected environmental conditions and living organisms with many impacts. The enhanced UV-B levels could lead to damage to human health, causing increases in skin cancer rate and other related diseases. Our goal is to discover how UV-B and UV-A levels have changed in recent years in high and low latitudes in the United States, and how the UV temporal (time) and spatial (latitude) changes affect human skin cancer rate. This study is based on the ten-year UV radiation data from 2002-2011 retrieved from the United States Department of Agriculture Ultraviolet-B Monitoring and Research Program, which encompasses 37 climatological sites with each equipped with a set of standardized UV and visible solar radiation measurement instrumentations. Several sites in the low and high latitudes are chosen and the ten-year UV-B and UV-A radiation trends are developed and correlated with skin cancer rates disclosed by the United States Environmental Protection Agency and other sources. This information will provide some vital statistics to the scientific community and general public for better understanding of the UV impacts on human health.

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Understanding the Potential Impact of Carbon Emission Policies on Catfish, Crawfish and Baitfish Farming in the United States. O. L. Chen*, K. Gosh, and M. M. Dey, Aquaculture/Fisheries Center, University of Arkansas at Pine Bluff, Pine Bluff, AR 71601.

Recently, a globally coordinated carbon charge of US\$25 per ton of carbon dioxide (CO₂) emission has been proposed in the G20 meeting. There was no fixed tool recommended but the main concern raised was the likely effects of carbon charge on various industries and economic groups. It is essential to understand how carbon charges affect different industries and also different segments of the value chain of the same industry. Therefore, we conducted several simulations under alternative scenarios covering increases in i) carbon-based inputs prices and ii) carbon sequestration efficiency, and analyzed the possible impacts of carbon emission policy on catfish, crawfish and baitfish farming in the southern U.S.A. The baseline model developed consists of producer, consumer and trade cores, net carbon balance equation, and model identities and market clearing conditions. The model solves by equating aggregate demand for and supply of the species studied with adjustment in prices, subject to satisfying model identities and non-negativity restrictions. Our results show that carbon emission policy has the potential to affect the aquaculture industries negatively. The negative effects may be mitigated with an increase in practices that favor net carbon sequestration. Aquaculture farming has the potential to improve carbon sequestration and to reduce the adverse effects of carbon change. Hence, critical attention is needed particularly in designing/developing the carbon emission policy/tool to assure benefit/cost is being internalized fairly.

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Comparison of Carbon Dioxide Flux within Three Different Urban Wetland Types in the Blackwater Conservation Area. C. Chappell*, and A. Johnson, Urban Forestry Program, Southern University Agricultural Research and Extension Center, Southern University, Baton Rouge, LA 70813.

Global climate change is one of the greatest threats to our environment with the potential to have widespread negative effects on ecological systems, human health and socioeconomic sectors. In an effort to combat global climate change by reducing greenhouse gases, wetlands must be considered. Wetlands make up a very large carbon pool because of their ability to trap atmospheric CO₂; however urbanization has greatly reduced the number of urban wetlands. The goal of this study was to understand carbon dioxide soil efflux of three different wetland types and determine the relationship between soil temperature, soil moisture, bulk density, pH and ambient air temperature to soil efflux for each wetland type. The study site consisted of three types of wetlands located in a highly urbanized landscape in Louisiana's East Baton Rouge Parish. The wetlands are classified as bottomland hardwood, shrub/scrub and upland. The study was conducted over a twenty-week period using the Li-Cor 8100 "closed chamber" method to measure soil carbon dioxide flux. The findings show that the bottomland wetland efflux was significantly higher than the shrub/scrub and upland wetland. The bulk density of the bottomland was significantly lower than the other two wetland types across strata. The soil temperature was also significantly lower in the bottomland wetland area compared to the upland and shrub/scrub areas. The study showed that a better understanding of soil carbon dioxide flux in urban wetlands can contribute to the mitigation of atmospheric CO₂ through land development practices that consider different wetland types.

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Carbon Mineralization Dynamics in a Biochar-Soil System. K. L. Hatakka*, and Y. P. Hsieh, Center for Water and Air Quality, College of Agriculture and Food Sciences, Florida Agriculture and Mechanical University, Tallahassee, FL 32307.

Intensive agricultural practices and deforestation have caused severe soil degradation threatening the future of our food production systems. In addition, anthropogenic greenhouse gas emissions are a major factor driving climate change, further compromising our ability to provide food, fiber and fuel for a growing population. As we strive to create sustainable food production systems, we must address these issues. Biochar, a byproduct of biomass pyrolysis, is a tool that has the potential to combat some of these environmental issues. For example, biochar, when used as a soil amendment, increases the soil carbon content and may provide a solution for long-term carbon sequestration in soils. However, more research into the dynamics of carbon mineralization is needed to confirm these claims. In this study, we compared the soil respiration rates of a cultivated soil and forest soil with the following four treatments: no biochar, 1% and 3% biochar applications, and the matching amount of original feedstock. By using biochar made from a C-4 plant, switchgrass (*Panicum virgatum*), we quantified the relative proportions of mineralized biochar carbon and native soil organic carbon based on the distinct carbon isotopic signatures of the biochar and soil organic matter. Our initial results show that biochar carbon is degraded very slowly and the native soil organic matter is conserved. This suggests that biochar technology may be an effective means to sequester carbon in soils.

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Design and Evaluation of a Spectrally Optimized Algal Photobioreactor for Carbon and Nitrogen Capture from Fossil Fuel Efflux. X. Henry*, Department of Food Science & Technology; A. Nagchaudhuri, Department of Engineering & Aviation Sciences; and M. Mitra, Department of Natural Sciences, University of Maryland Eastern Shore, Princess Anne, MD 21853.

Due to increasing energy demands, fossil fuel combustion has grown significantly over the last 150 years. Concomitantly, the biosphere's atmospheric component has undergone drastic alterations attributed largely to anthropogenic releases of greenhouse gases (GHG's) and combustive aerosols. CO₂ and NO_x have received much attention due to their abilities to alter rainfall chemistry, augment atmospheric fertilization and decrease albedo. As such, capturing these damaging compounds is now a priority. One promising approach is via microalgae grown in tandem with processes liberating these nutrients since many are essential in autotrophic metabolism. Initially, culturing was largely undertaken in open raceway ponds (ORP's). Unfortunately, these systems were plagued by high evaporation and contamination rates. Closed photobioreactors (PBR's) are now favored because of increased environmental control, but inefficiencies in heat dissipation and light penetration still persist. These shortcomings clearly indicate a need for optimizations to increase algal biomass, and therefore the nutrient capturing and capabilities of these systems. This research therefore tested the hypothesis that spectral filtering, PBR design and energy source can increase efficiency and remediation. To accomplish this, low cost optical filters were first evaluated for their effects on biomass and culture temperature of *Chlamydomonas reinhardtii*. Based on these initial tests, a PBR powered by photovoltaic cells was fabricated and fertilized by flue from a steam boiler. This system was then evaluated for its effects on efflux nutrient concentrations versus non-PBR cycles. Initial indications have revealed that both filtering and the novel PBR decreased efflux nutrients and culture temperature.

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Genome Structure and Protein Expression for Cellulosic Activities of a New Bacterial Strain. H. Li*, S. Zhou, T. Johnson, and K. P. Vercruyse, College of Agriculture, Human and Natural Sciences, Tennessee State University, Nashville, TN 37209.

This study aims to develop new and highly efficient hydrolytic organism or enzymes for breaking down cellulosic materials. A bacterial strain with putative cellulosic activity was isolated; the colony produced a strong yellowish halo on Congo red stained cellulose containing M9 minimal plate. Gram-staining and endospore staining were performed to characterize this bacterial strain. Genome DNA of this bacterial strain was sequenced using the pair-end next-generation sequencing method. Contigs were assembled with Velvet in Galaxy to generate the whole genome DNA sequence. A protein database was constructed using the genome DNA sequence database. To determine extracellular enzymes, the bacterium was growing in a broth containing M9 minimal medium supplemented with soluble CMC (Carboxymethyl cellulose sodium salt). Proteins precipitated from the growth broth were identified to putative endoglucanase A (Cellulase A), endo-beta-1, 4-xylanase, pectate lyase, cellulase, glycoside hydrolase, etc. For further cellulosic activity analysis, bacterial stock was inoculated into a basic broth supplemented with soluble CMC. Gel size exclusion chromatography analysis confirmed that CMC was degraded by the bacteria. Evaluation of the bacterial activities in degrading insoluble CMC and natural biomass materials is in progress.

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Microalgae Grown on Swine Wastewater as a Biofuel Feedstock. R. Hasan*, B. Zhang, L. Wang, and A. Shahbazi, Biological Engineering Program, Department of Natural Resources and Environmental Design, North Carolina Agricultural and Technical State University, Greensboro, NC 27411.

Microalgae can be used to produce biofuels and clean wastewater and air. Microalgae can reduce nitrate, phosphate and organic matter in wastewater, and capture CO₂ in air. It is also a promising feedstock for biofuel production. The oil yield of some algal strains is 1,000-4,000 gallons of oil/acre/yr, whereas soybeans and other oil crops can only generate 48 gallons of oil/acre/yr approximately. As an energy crop, microalgae do not compete with grain crops for limited arable lands because it can grow in water. Swine wastewater could be a suitable medium to grow microalgae. The objective of this research is to optimize the growth conditions and determine growth kinetics of selected microalgal strains to assimilate nutrients in wastewater for swine wastewater treatment and bioenergy production. *Chlorella vulgaris* and *Chlamydomonas reinhardtii* were cultured in the swine wastewater for 15 days under different culture

conditions to evaluate the growth rate, the effectiveness of wastewater treatment, and lipid productivity. *C. vulgaris* were found to have higher growth rate but lower lipid productivity than *C. reinhardtii*. The phosphorus removal ratios of *C. vulgaris* and *C. reinhardtii* were 47% and 60%, respectively. The nitrogen removal ratios were 10% and 35%, respectively. The growth kinetics will be determined and the growth conditions will be further optimized.

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Effect of Time of Harvest on Sweet Sorghum Biomass Yield and Juice Storage Properties. G. J. Whitehead*, A. K. Mahapatra, M. Latimore, Jr., and B. P. Singh, Agricultural Research Station, Fort Valley State University, Fort Valley, GA 31030; and D. D. Bellmer, Biosystems and Agricultural Engineering, Oklahoma State University, Stillwater, OK 74078.

Sweet sorghum (*Sorghum bicolor* L. Moench) has great potential to be used as a renewable energy crop. In this study, three common varieties of sweet sorghum (Dale, M81, Theis) were planted at the Fort Valley State University farm. Stalks were hand harvested and pressed using a small-scale roller press at three different times (85, 99, and 113 days after planting). The mass, height, diameter, and number of leaves of individual plants and the moisture content were measured. The sugar content of the juice was also measured, which revealed that Dale had the highest sugar content followed by Theis, and then M81. Juices were stored at room temperature and 4°C for two weeks after pressing, and the pH, °Brix, and Oxidation Reduction Potential (ORP) were monitored during the time period. Over the two-week period, the pH of the non-refrigerated juice steadily decreased in all three varieties. The °Brix remained relatively constant, only slightly decreasing in Theis. There was no discernible pattern seen in the ORP. The decrease in pH of refrigerated juice was considerably lower than non-refrigerated juice, and there was no change in °Brix, but as with the non-refrigerated juice, no discernible pattern was observed in the ORP. Fermentation studies are underway to test the effect of different types of yeast, addition of nutrient salts, and the effect of delayed yeast inoculation on ethanol yield. Sweet sorghum has enormous potential as a bioenergy feedstock and efforts should be made for the development of effective strategies to retain the properties of juice during processing, transportation and storage.

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Performance of Seashore Mallow (*Kosteletzkya virginica*) on Managed Agricultural Land. A. Forde*, O. U. Onokpise, C. Luiome, and B. G. Brown, College of Agriculture and Food Sciences, Florida A&M University, Tallahassee, FL 32307.

Woody crop species are now part of the solution to the growing energy need across the world. The use of Halophytes has been considered lately and shows potential for the production of biodiesel. Halophytes are salt-tolerant plants grown in wastelands and deserts and irrigated with saline or sea water. Fuels such as biodiesel can be produced from biomass ranging from animal waste to wood chips. The advantage of developing biofuel from halophytes as opposed to other types of biomass is that saltwater plants are not dependent on fresh water, which is increasingly in short supply, and can instead be irrigated using plentiful sea water supplies. In this study we examined the performance of *Kosteletzkya virginica* on land not native to their growth and development. Plantlets were purchased from Sunlight Gardens and were planted on the Florida A&M University Research Farm located in Quincy, FL. Field plot was laid out in 10 rows with each row containing 50 plants divided into 5 replications. Plant performances were observed and data collected on their survival, growth and flowering rates. Results indicated that these plants were capable of performing on non-native soil for halophytes. After the first year of growth, 50% of the number of plants survived. Survival rate of these plants was 75 in the second year; and in the third year, survival rate was 95% for those plants that survived in the second year. Results also indicate that there is a soil plant relationship. *K. virginica* showed potential as an alternative aviation fuel source and can be grown both on regular soil type and saline growing conditions. This is perhaps the first report of seashore mallow's performance as it relates to growth on regular soil. Halophytes could be considered as a sustainable source for biomass/biodiesel production.

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Effect of Cover Crop Rhizosphere Soil on Phosphorus Solubilization from Phosphate Rocks. M. J. Shitindi*, K. Kpomblekou-A, R. Ankumah, and C. K. Bonsi, Department of Agricultural and Environmental Sciences, Tuskegee University, Tuskegee, AL 36088.

Cover crops are grown to protect soil against wind and water erosion and/or to increase nitrogen and carbon inputs into soil following biomass incorporation. Roots of these cover crops release low-molecular-weight organic acids (LMWOAs) that are produced in soil as microbial metabolites or plant exudates from dead or living cells. Several countries in Africa dispose of phosphate rock (PR) deposits that could be used in agriculture to increase food production but phosphorus in those PRs is not water soluble. The LMWOAs contain various functional groups that may play a significant role in PR dissolution through complexation reactions. Little information, however, is available about the potential of LMWOAs in releasing P from PRs. The objective of the study is to evaluate the effect of rhizosphere soil of various cover crops on P release from PRs. Eight winter cover crop species (four grasses and four legumes) were planted in a greenhouse on a Marvyn sandy loam (fine, siliceous, thermic, typic Paleudult) soil for 60 days. Following harvest, 10 g (OD) of the rhizosphere soil of each cover crop was collected in a French square bottle and incubated with 200 mg P kg⁻¹ soil or triple super phosphate (control) at 25±1°C for 30 days. At incubation end, the inorganic P released was extracted with deionized water, filtered (< 45-µm) and analyzed by using a heteropoly blue colorimetric method after neutralization with 5 N NaOH using *p*-nitrophenol as an indicator. Results showed that LMWOAs could play a significant role in P release from PR.

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Decomposition Rates of Legume Winter Cover Crops Under Three Kill Methods and Resulting Soil Microbial Activity. J. P. Shelton*, G. B. Reddy, and C. W. Raczkowski, Department of Natural Resources and Environmental Design, North Carolina Agricultural and Technical State University, Greensboro, NC 27411; and J. M. Grossman, Department of Soil Science, North Carolina State University, Raleigh, NC 27695.

The coastal plains region of the southeastern United States has agricultural land with poor soil quality, partly due to intensive cultivation and ineffective crop residue management. Well-managed cover crop residue will increase soil organic matter content and improve soil quality. This study was conducted from October 2011 to October 2012 in Goldsboro, North Carolina. The objectives of the study were: (1) to evaluate the decomposition of residue from two winter cover crops under three different spring kill methods, and (2) to evaluate changes in soil microbial activity under each cover crop/kill method treatment. The experimental design was a split-plot with legume cover crop types (hairy vetch (*Vicia villosa*) and Austrian winter pea (*Pisum sativum*)) assigned to main plots and cover crop kill methods (flail-mowed, rolled over the soil surface, and soil incorporated by disking) to subplots. Mesh bags with an initial 100 g of fresh cover crop material were placed on the soil surface and at the 10 cm soil depth at planting of the summer corn crop, and removed during the growing season to measure the decomposition rate. Soil samples were collected at 3, 8, and 16 weeks after planting and laboratory incubated to determine basal respiration and soil microbial biomass. The results of the study will provide a basis for a grower recommendation of a cover crop management scheme that increases soil organic matter content and improves soil microbial activity.

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Screening of Purslane Arsenic Tolerance Identifies Two Accessions with Strong Arsenic Tolerance and their Potential Use in Bioremediation. S. Battle*, S. Weeda, and S. Ren, Virginia State University, Petersburg, VA 23806.

Arsenic has been widely used in agriculture as arsenic-based herbicides for weed and pest control. However, arsenic is extremely toxic and its contamination in water and soil causes global health problems. To eliminate the detrimental impact of arsenic contamination in the environment, efficient phytoremediation systems are prerequisite. Although extensive studies have been focused on establishing such systems, currently plant species that fit for such systems still remain to be identified. In this study, experiments were conducted to examine whether purslane can be used for arsenic bioremediation. Genetic variations among different purslane accessions, collected from geographically different regions of the world, on arsenic tolerance were evaluated by growth responses on 200 ppm arsenic soil mixtures. Significant genetic variations on arsenic tolerance of purslane were demonstrated. The results identified two extreme arsenic-tolerant purslane accessions and three extreme arsenic-sensitive purslane accessions. These two arsenic-tolerant purslane accessions were originated from Africa, and three arsenic-sensitive accessions were from Africa, Europe and USA, respectively. Shoot and root biomasses were also examined for all accessions, with most accessions significantly reducing their biomass accumulation when treated

with 200 ppm arsenic. However, one arsenic-resistant accession grew better on 200 ppm arsenic soil mixture than that on control soils. Arsenic accumulation in shoot tissues was under investigation, and possible mechanisms on purslane arsenic-tolerance will be discussed.

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Removal of Phytic Acid-Phosphorus from Broiler Litter. P. P. Defoe*, and K. Kpombrekou-A, Department of Agricultural and Environmental Sciences, Tuskegee University, Tuskegee, AL 36088.

A major portion of phosphorus (P) in broiler litter (BL) originates from phytic acid and its phytate salts. The P in this form is poorly utilized by chickens because of the absence of phytase—an enzyme in their digestive systems. The objectives of this study are to develop a chemical method capable of separating phytic acid-P from BL and to investigate the chemical composition of the by-products obtained after removal of the phytic acid-P. A 25-g (<0.5 mm) of four BL samples was equilibrated at room temperature overnight in deionized water, extractant A, or B. The sample was centrifuged and filtered (< 0.45 μm). The BL residue was ground to pass through a 100-mesh sieve while the filtrate was acidified and P precipitated. The precipitate was separated from the supernatant and washed repeatedly in an acid solution. Total P content of the BL residues obtained following extraction with deionized water, extractant A, or B was reduced from 23.2 g P kg^{-1} in the original BL to 17.6, 4.35, or 3.64 g P kg^{-1} , respectively, while N content was reduced from 39.4 g N kg^{-1} to 25.3, 22.2 and 20.2 g N kg^{-1} , respectively. Total and inorganic P in the supernatants obtained following precipitation of phytic acid-P was low, suggesting that P in the filtrates was precipitated successfully. The low P and the high N contents of the BL residue obtained following extraction demonstrated that the extractants (A and B) used were very selective in removing P from the analytes.

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Analysis of Trace Elements in Some Arkansas Soils. T. Weatherspoon*, and S. Ntamatungiro, Department of Agriculture, University of Arkansas at Pine Bluff, Pine Bluff, AR 71601.

The goal of the study is to assess the concentration of trace elements in soils of Arkansas and Louisiana, focusing on arsenic (As), barium (Ba), cadmium (Cd), cobalt (Co), chromium (Cr), copper (Cu), manganese (Mn), nickel (Ni), lead (Pb), mercury (Hg), selenium (Se), and zinc (Zn). These elements naturally occur in nature but many are attributed to anthropogenic contributions. The objective is to provide a database of information to be used as a resource for agricultural crops, land management and developmental projects. Trace elements correlate with factors such as cat ion exchange capacity, organic carbon, particle size, pH and calcium carbonate. Evidence has shown that trace elements are typically found in the O horizon of a given soil profile and have the ability of translocation throughout the soil profile. With this study we hope to find a link between the land uses (i.e. agricultural, mining, or municipal) and corresponding trace element levels.

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Consumer Demand and Willingness to Purchase Asian Fruits and Vegetables Produced by Local Farmers in Selected Korean Communities in Alabama and Georgia. D. Alkordi*, Y. Diabate, and R. Zabawa, Department of Agricultural, Environment and Nutrition Sciences, and George Washington Carver Agricultural Experiment Station, Tuskegee University, Tuskegee, AL 36088.

Historically, immigration to the United States has been a major source of population growth and cultural change. Research has shown that the increase in ethnic populations has increased the demand for fresh ethnic produce in local markets. The main goal of this research was to estimate the consumer demand and willingness to purchase Asian fruits and vegetables, produced by local farmers in selected Korean communities in Alabama and Georgia. The general objective of this study was to analyze opportunities for Alabama farmers to grow Asian fruits and vegetables from a market demand perspective. Specific objectives were to: estimate consumer demand for Asian fruits and vegetables; develop a list of potential Asian fruits and vegetables, and estimate consumer willingness to pay. A survey instrument was designed and used to collect consumer preferences, willingness to pay, and farm production data. The survey was constructed in English and Korean, and it also included photographs of selected produce for ease in understanding. Finally, participants were recruited from employees of KIA and Hyundai manufacturing plants in Alabama and Georgia. Descriptive statistics showed that a majority of the respondents were willing to pay more for fruits grown by local farmers. The results also showed that despite a relatively small selected fruits and vegetables presented to the respondents, a majority said that they wished to buy

Asian/Korean fruits and vegetables if produced locally. Preliminary results of this study confirmed that the production and marketing of Asian fruits and vegetables will provide an economic opportunity for local farmers.

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Participation in Selected USDA Programs by Socially Disadvantaged Farmers in Selected Black Belt Counties of Georgia. L. Asare-Baah*, Agricultural and Resource Economics Program; R. Zabawa, G. W. Carver Ag Exp Station; H. Findlay, Continuing Education; N. Baharanyi, Cooperative Extension Program, Tuskegee University, AL 36088.

USDA farm programs such as Environmentally Quality Incentive Program (EQIP), Value Added Producer Grant Program (VAPG), Farm Loans (FO) and Operating Loans (OL) provide means through which farmers can borrow money, obtain better commodity prices, improve land, and otherwise increase income. African American farmers, characterized as socially disadvantaged farmers (SDF), continue to exit agriculture at a higher rate and refrain from USDA program participation. The objectives of this research were to examine SDFs overall awareness of the programs, investigate the main reasons for participation and non-participation of these programs, assess the relationship between program application and the rate of approval, and examine the relationship between USDA program outreach to SDFs and their implementation. Results revealed less awareness, non-qualification, limited funds and complicated program requirements as major problems facing EQIP and VAPG participation. With FO/OL, major reasons for non-participation were issues on being turned down in the past, not qualifying, lack of collateral and applications passing deadlines. Regression results show awareness, age and assistance from community based organizations (CBOs) as statistically significant to participation in EQIP and VAPG. Pearson correlation was used to compare relationships between agencies: Cooperative Extension, CBOs and USDA offices on FO/OL by SDFs. Information provided by CBOs and USDA offices shows a high positive effect on rate of application and approval to FOs/OLs. It was found that applications turned in for all programs were very low; however for SDFs who applied half of the applications were approved.

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Literature Review on Simulation Models for a Disaster Relief Supply Chain. E. Bizimana*, and K. Feng, College of Business and Applied Professional Sciences, South Carolina State University, Orangeburg, SC 29117.

When natural or man-made disasters occur, it is very important for federal and local governments to distribute disaster relief supplies such as water, food, and medicine to the disaster-stricken areas in a timely manner to save the lives of people in the communities. A simulation model can be used to create the relief supplies and distribution operations in order to evaluate the effectiveness of a disaster relief supply chain. The simulation model may include the following: a disaster relief supply chain processes modeling, the preposition decision of relief supplies in the supply chain, the demand uncertainty of affected areas, the inventory management of relief goods, and the distributing and routing analysis. This research will review the existing simulation models for a disaster relief supply chain.

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Marketing of Small Scale Aquaculture Products in Kentucky. R. Bryant*, and S. Dasgupta, College of Agriculture, Food Science, and Sustainable Systems, Aquaculture Research Center, Kentucky State University, Frankfort, KY 40601.

Kentucky's small-scale aquaculture industry is naturally tied to niche marketing and direct marketing for its existence. This project investigates these marketing channels for a few signature aquaculture products from this state. Catfish is an important aquaculture species for Kentucky that presents challenges using traditional marketing of fillets through wholesalers. Our project investigated the likelihood of marketing whole catfish (on ice) to Hispanics via Hispanic grocery stores. This was done by first conducting experimental auctions for whole catfish among Hispanic consumers, which resulted in a willingness to pay between \$6.60-\$11/kg (\$3-\$5/lb). This was followed by sales of whole catfish (on ice) to Hispanic grocers for \$3.30-\$3.74/kg (\$1.50-\$1.70/lb). This project resulted in establishing new markets for whole catfish in Lexington and Louisville, KY. The average weekly demand per store was 13 kg (30 lb), and the size preference was 0.45 kg (1 lb) fish. Additional niche marketing investigations were done by surveying CSA customers about buying fresh catfish fillets. Results from 6 Kentucky CSAs showed that most customers highly favored fresh, local catfish fillets, and were willing to pay \$17.60-\$22/kg (\$8-

\$10/lb). Clearly, these markets are fertile ground for the state's small scale aquaculture producers. This project also investigates marketing of other seafood items from Kentucky, such as freshwater prawns, largemouth bass, etc. The results suggest that small scale aquaculture in Kentucky is profitable, provided the suppliers target markets where freshness of the products is paramount (i.e., farmers' markets, CSAs, Hispanic markets, and restaurants).

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Use of Cow Pea and Goat Manure to Facilitate Natural Yield of Scotch Bonnet Peppers Using Low Input Systems for Historically Underserved Farming Communities. M. Cooke*, College of Agriculture and Food Sciences, Florida A&M University, Tallahassee, FL 32307; and S. Reitz, USDA/ARS, CMAVE 32308, Tallahassee, FL 32308.

The use of green and animal manure is time tested cultural practices. Few studies have measured this field benefit with the historically underserved farmers challenges as the framework for yield quantification. This study uses low input sources of labor, and materials to mimic the economically harsh field agricultural conditions often faced by the subsistence farmer. A plot of land was sectioned off and the soil tested for initial agronomic conditions. The experiment was then designed to test, through marketable yield the effectiveness of the treatments of Cowpea, Goat Manure, Cowpea/Goat Manure. This study provided useful insights for the development of low input farming strategy.

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Putting Theory into Practice: Aquaculture as a STEM Tool in the Classroom. C. R. Janiak*, and D. McIntosh, Department of Agriculture and Related Sciences, Delaware State University, Dover, DE 19901

The movement behind the Science, Technology, Engineering, and Mathematics (STEM) has gained momentum in an effort to make our students competitive on a global scale. K-12 educators are constantly seeking novel methods to incorporate STEM subjects into lessons while engaging various learning types. We have addressed this need by developing the concept of introducing mummichogs (*Fundulus heteroclitus*) as a model species for use in the classroom. We have fostered this adoption by local educators through workshops, facility tours, and fish donations. The production of a fact sheet available for download on the Delaware State University web site, and a presentation of the logistics to aquaculture educators and extension staff at Aquaculture America 2012 have brought national interest to this initiative. In the fall of 2012 we began working with a local high school teacher to incorporate *F. heteroclitus* into class lessons. We provided the class with fish, technical assistance, and guidance on spawning and grow out methods developed at the DSU Aquaculture Research and Demonstration Facility. Students have had the opportunity to engage with university scientists and work hands-on with aquaculture technology; furthermore, students also learned about natural resources, chemistry, and biology. Highlights of this classroom introduction and future implications for the Mummichogs in the Classroom project will be discussed.

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The Cost Effectiveness of Biological Control: The Case of Invasive Mole Crickets and Florida's Commercial Pastureland. G. Mhina*, and M. Thomas, College of Agriculture and Food Sciences, Florida A&M University, Tallahassee, FL 32307.

Classical biological control (CBC) programs are initiated to protect natural resources, agriculture and other human interests. Because these control measures are costly, it is important to know the potential ecological and economic benefits of these efforts. This is particularly relevant since CBC programs typically involve an investment of public funds. One well known CBC program was the statewide effort to control three species of pest mole crickets in Florida. In the early 1900's, the first of three species of mole crickets began its slow invasion of Florida. Originating in South America, it was soon joined by a second and third species, and by the 1940's the three began to cause large agricultural losses in the central and southern parts of the state. These losses were particularly acute in commercial pastureland. Initially, chlordane was successful in controlling the outbreak, but when it was removed from the market in the 1970's, mole crickets quickly returned to cause extensive damage to commercial pastureland and vegetable crops. Project costs are fairly well documented, however surprisingly; no attempts have been made to document the benefits of these efforts. Policy makers are interested in knowing if the mole cricket project passes the efficiency test. In September of 2012, over 3,000 owners of commercial pastureland in Florida were randomly sampled and asked a series of questions regarding their historic efforts of mole cricket

control. In the mail survey, participants were asked to document their control costs, both from an historic perspective and their efforts today. An estimate of the cost of controlling mole crickets will be determined by combining the historic cost data and information from these recent outbreaks. This avoided cost represents the benefit of the successful mole cricket biological control project and when compared to the project's cost figures, a measure of economic efficiency is possible.

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Building Capacity and Enhancing Economic Development Through Experiential Learning in Apparel Merchandising and Textiles (AMTX). A. D. Scott*, Apparel Merchandising and Textiles; D. Y. Butler, School of Graduate Studies; G.W. Namwamba, College of Agricultural, Family and Consumer Sciences, Southern University and A&M College, Baton Rouge, LA 70813.

The Division of Family and Consumer Sciences with its state-of-the-art classrooms and laboratories, is positioning itself to be a leader in preparing students for careers in the global economy through experiential learning opportunities. The Division already operates a student-run cafeteria, Café LaCumba, which serves nutritious lunch alternatives. The Division also houses one of the few Body Scanning laboratories located on a college campus in the United States. This project established a student-operated retail store laboratory, known as *Southern Niche* that serves as an internship site for senior-level students and a field experience site for lower-level students in AMTX, Business, and related disciplines. It affords students the opportunity to increase their team-building, problem-solving, and decision-making skills. *Southern Niche* sells merchandise that is produced in Louisiana by small-scale entrepreneurs, and merchandise that was produced elsewhere but significant value was added in Louisiana. Therefore, in addition to building capacity, the project serves an economic development function in Baton Rouge and throughout the State. The goals of the project were to establish a university-housed and student-operated retail store laboratory; to increase human capital by training students for leadership positions in retail merchandising and related fields; and to enhance economic development by strengthening the University's linkages with small-scale entrepreneurs and other producers in the State. The project uses a multidisciplinary approach to accomplish its goals.

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Investing in the Future of Agribusiness via Ag-Discovery. S. E. Smiling*, Department of Family and Consumer Sciences; C. C. Mathis, Jr., 1890 Research & Extension, South Carolina State University, Orangeburg, SC 29117.

SC State University's 1890 Research & Extension partnered with the U.S. Department of Agriculture, Animal and Plant Health Inspection Service (USDA-APHIS), and Marketing and Regulatory Programs Business Services (MRPBS) to host the AgDiscovery Summer Enrichment camp, a national competitive program, for the past three years (2010-12). Within the program, we used quantitative and qualitative methodology to evaluate the strengths, the weaknesses, and the lessons learned at the camp. Participants ranged from 14-17 years of age from all across the country. Our program is designed to increase awareness of career opportunities and possibilities in various disciplines needed by the Animal and Plant Health Inspection Service's programs. This program allows students to live on the SC State University campus for two weeks and to learn about a variety of administrative professions from the USDA-APHIS and MRPBS staff in the field of finance, human resources, information technology, emergency management, investigative services, biosafety, acquisition, and facilities management. Such a program also increases understanding for students on the various federal career opportunities in the targeted disciplines. The participants realize and appreciate the importance of accounting, agricultural business operations, business administration management, marketing, family and consumer sciences/human sciences, information technology, biology, chemistry, environmental science, administrative professions and the laws that regulate our nation's agriculture programs. Moreover, AgDiscovery promotes increasing the overall diversity of students for the future entering targeted disciplines and the acceptance of individuality in others.

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Calibrating Dissimilar Payment Vehicles in Contingent Valuation Studies: an Example of Reducing Hydrilla in Two North Florida Spring-Fed River Systems. V. Thomas*, Land Grant Program; M. Thomas, College of Agriculture and Food Sciences, Florida A & M University, Tallahassee, FL 32307; and

N. Stratis Florida Department of Environmental Protection Florida State University, Tallahassee, FL 32313.

In contingent valuation (CV) studies, the willingness-to-pay (WTP) estimate is influenced by the construction of the survey instrument. One key component of the instrument, the hypothetical payment or payment vehicle (PV), is of particular importance and its choice may influence the likelihood of strategic behavior on the part of participants. It is the desire of any CV practitioners or policy maker to avoid strategic behavior and elicit unbiased WTP responses. This is best accomplished by choosing PVs that are both familiar and believable to survey participants. Furthermore, the PV should avoid controversy and by its nature remind the participant of their household budget constraint. While the possibility of PVs is only limited by the practitioners' imagination, some common candidates include gate fees, taxes and utility bills. Policy makers wish to compare the WTP to reduce the presence of the invasive aquatic weed (*Hydrilla verticillata*) by 50% in the Wacissa River, a spring-fed system with free public access. A comparable nearby river system (Wakulla River) has gated fee-access. In this study three hundred visitors of these two systems were randomly sampled during the summer of 2012. Visitors to the free-access system were asked their WTP for Hydrilla reduction using a utility-PV CV. Visitors to the gated system were asked the same question but one half were presented with a gated-PV CV and the balance were presented with the utility-PV CV. The result provided a conversion index that allowed policy makers to directly compare WTP across the two systems.

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CYPRESS as a Model That Facilitates Year-Round Learning. K. L. Wilson*, Department of Family and Consumer Sciences; A. R. McCray Quarles, Department of Health Sciences and Physical Education; C. C. Mathis, Jr., 1890 Research & Extension; and M. A. Fields, 1890 Research & Extension, South Carolina State University, Orangeburg, SC 29117.

A majority of minorities have pigeonholed agricultural careers to just “working on the farm,” limiting their scope of career options. Thus, our project Combining Youth, Passion, and Resources for Environmental Science Studies (CYPRESS) focuses on dispelling the myth and on creating a seamless pipeline from middle to high school for underrepresented youth to explore agricultural careers and professions and to promote student awareness of what it takes to pursue agricultural majors while in college. In addition, our project establishes and facilitates year-round learning via a Junior 4-H and Minorities in Agriculture, Natural Resources, and Related Sciences (MANRRS) chapter After-School Program to foster human development, leadership skills, and teamwork activities. Participation in the program also makes students eligible to apply for attendance into the one-week Summer Enrichment Program on the campus of SC State University. During weekly meetings, students experience dual exposure to Agriculture. First, CYPRESS exposes participants to specific agricultural careers (i.e., Licensed Dietitian/Nutritionist, Veterinarian, and Agricultural Entrepreneur); and the second half relates to the hand-on experiences in which students engage. Therefore, whether its food, nutrition, or caring for their own garden, the students gain interest through field experiences that give them a realistic feel for determining a career choice for college. Even at the high school level, students were introduced to various keynote speakers, and a curriculum was developed especially for their class. As a result, two high school students have decided to pursue agriculture-related degrees at a college.

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Perception of Store and Restaurant Managers About Crawfish, and Their Willingness to Pay for Graded Crawfish Products. S. Yasmin*, M. M. Dey, and K. Singh, Department of Aquaculture and Fisheries, University of Arkansas at Pine Bluff, Pine Bluff, AR 71601.

Lack of industry wide uniform grading standard for live crawfish is an important marketing issue, which potentially jeopardizes its market expansion. The study describes the store/restaurant manager's perception and their willingness to pay for the graded crawfish. We conducted surveys of the store/restaurant managers in six key cities (Little Rock, Houston, Baton Rouge, Memphis, Atlanta, and St. Louis). We conducted face to face interviews of the randomly selected 21 seafood store managers and 24 restaurant managers with pre-tested interview schedule. Grading of domestic live crawfish is done based on length and size. Two main length-based grades are: 1) Category 1:(3"-4"), and 2) Category 2 :(mixed). Main size-based grades are: 1) 10 count/lb (jumbo), 2) 10-15 count/lb (selected /medium), and 3) 16-20 count/lb (mixed). The demand for live crawfish varies significantly with size and length. The price difference in retail stores ranges from \$ 0.34/ lb to \$ 1.00 /lb. In restaurants, price varies from \$0.99/ lb to

\$1.50 / lb. Retail store managers are willing to pay extra \$ 0.38/ lb and restaurant managers want to pay extra \$0.86/lb for the graded crawfish. 58% of all stores managers prefer the U.S product and are willing to pay higher prices. Survey results reveal the potentiality of market expansion for graded crawfish, but the feasibility may be hampered due to seasonal variability in size and availability, related high cost, and unawareness of the consumers about the grade. It is hoped that the survey results will be helpful for establishment of crawfish grading systems.

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Textural Properties of Goat Milk Ice Creams Formulated with Three Different Levels of Milk Fat.

C. McGhee*, J. Oglesby-Jones, B. Gupta, and Y. W. Park, Agricultural Research Station, Fort Valley State University, Fort Valley, GA 31030.

Although ice cream is a highly popular frozen dessert around the world, scientific study of goat milk ice cream has been almost non-existent. Texture plays an important role in sensory quality and consumer acceptability of ice cream. A study was conducted to compare textural qualities of three different levels of fat in goat ice creams. Three batches of 3 different goat ice creams were manufactured using a commercial ice cream mix (0.25% fat) and 3 levels of milk fat, including skim (0.46%; SIC), 2.0% (2IC), and whole (3.65%; WIC) goat milk formulated using otherwise identical mix ingredients. The fresh ice creams were stored for 0, 2, 4, and 8 weeks in a freezer at -18°C. Textural characteristics of all experimental ice creams were determined, including firmness (g force), consistency, cohesiveness, and index of viscosity in samples of 0, 1, 14, 28, and 56 days in a frozen storage using a texture analyzer (Model TA.XT2i, Texture Technology Corp., Scarsdale, NY). Firmness and consistency values of fresh SIC, 2IC, and WIC ice creams were 121.3, 180.6; 216.6, 302.2; and 149.7, 214.6, respectively, indicating that fresh soft-serve 2IC had significantly higher firmness and consistency than SIC and WIC ice cream although the exact reason for this is not known. With respect to soft-serve vs. 1-day frozen ice cream, substantial increases in all textural properties were observed in the frozen ice creams probably due to the hardened texture of the three types of frozen products. All tested textural properties were elevated in the ice creams after the frozen-storage periods, regardless of fat levels.

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Assessment of the Antioxidant Property of Methanolic Extract of *Vernonia amygdalina* (Bitter Leaf).

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The preference to consume natural products in food has led to the search for natural antioxidants to help prevent lipid oxidation. Synthetic antioxidants such as butylated hydroxyanisole (BHA), butylated hydroxytoluene (BHT), and Propyl Gallate are commercially available and widely used to control lipid oxidation. However, there has been a shift by the food industry to reevaluate the use of synthetic compounds as a result of consumers' preference for natural products. The plan of focus in this study is *Vernonia amygdalina* (bitter leaf), a plant native to Sub-Saharan Africa. The interest in this plant is due to its proven antibacterial properties and other attributed physiological benefits. The leaves are used for soup-making, and the aqueous extracts are used as tonics for the treatment of various illnesses. Dried leaf samples (5g) were extracted with methanol (20 mL) and were centrifuge; the supernatant was saved for analyses. The Folin-Ciocalteu method will be used for total phenolics determination; whereas, total flavonoids will be determined by UV-spectrophotometry. The antioxidant property of the extract will be assessed by the following: a free radical scavenging activity, a DPPH assay, a chelating effect on ferrous ions, a determination of reducing power, an inhibition of beta-carotene bleaching, and a total antioxidant activity determination.

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Effects of Estrogen and Progesterone Treatment on HB-EGF Expression in RL95-2 Cells.

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In the normal pre-menopausal endometrium, the processes leading to implantation and successful pregnancy demand well-controlled regulatory mechanisms that include estrogen, progesterone, and factors such as Heparin-binding, epidermal-growth, factor-like growth factor (HB-EGF). Heparin-binding, epidermal-growth factor-like growth factor (HB-EGF) is expressed significantly in pre-menopausal

endometrium and thus has been reported to play a role in these normal regulatory mechanisms. In cancerous tissue, however, estrogen-mediated cell proliferation is unregulated by progesterone, and abnormal levels of HB-EGF have been linked to cancer progression. In this study, our objective, therefore, was to examine the effects of estrogen (E_2) and progesterone (P_4) on HB-EGF expression in an endometrial cancer cell line, RL95-2 cells. We hypothesized that P_4 will decrease HB-EGF expression, and E_2 will increase HB-EGF expression in this cell line. Over a period of four days, RL95-2 cells were treated as follows: (i) Control (no steroid hormones); (ii) 10^{-8} M E_2 ; (iii) 10^{-6} M P_4 ; (iv) 10^{-8} M E_2 and 10^{-6} M P_4 ; and (v) 10^{-8} M E_2 for two days followed by 10^{-6} M P_4 for two days. The expression levels of HB-EGF were higher in cells that were treated with E_2 alone and lowest in those that were treated with E_2 followed by P_4 . Alternatively, there was a down-regulation of HB-EGF expression in P_4 -treated cells relative to control cells. Immunocytochemistry results indicated that HB-EGF expression followed the same pattern as detected by Western Blot analysis. These data suggested that HB-EGF expression in RL95-2 cells is modulated by estrogen and progesterone—all of which may play significant roles in endometrial carcinogenesis.

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Economic Impact of the Deepwater Horizon Oil Spill on Domestic Gulf Coast Seafood Industry. P. Phillips*, A. L. Parks, and O. A. Ojumu, Department of Agriculture, Nutrition & Human Ecology, Prairie View A&M University, Prairie View, TX 77446.

The United States is the world's fifth-largest fishing nation following China, India, Indonesia, and Vietnam. On April 20, 2010, 200 million gallons of oil was dispensed into the Gulf of Mexico from a broken Deepwater Horizon oil drilling rig. Immediate issues, including ensuring potentially contaminated seafood would not enter markets and pose a risk to human health were raised. This resulted in fishery closures and consumer concerns which resulted in economic harm to the Gulf fishing industry. The National Oceanic and Atmospheric Administration (NOAA) had to close approximately 88,522 square miles or nearly 37% of federal waters from Louisiana and Florida. Although many factors could be calculated, Gulf commercial fishery landings declined sharply immediately following the BP Oil Spill. The objective of this research was to conduct an economic assessment of the impact of Deepwater Oil Spill on the Gulf Coast seafood industry. Preliminary trend analysis shows that Gulf Coast fisheries suffered significant economic despair immediately following the spill. This created a negative impact on the seafood industry for Gulf Coast seafood producers. The available data shows that markets are rebounding and restoring to normalcy.

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Chemical Characterization of Crude Oil from the Seed of *Ricinodendron heudelotii* (Njangsa). A. A. Salako*, C. Fusong, S. Besong, and S. E. Lumo, Department of Human Ecology, Delaware State University, Dover, DE 19901.

The purpose of this study is to chemically characterize crude oil from the seeds of *Ricinodendron heudelotii* (njangsa) for food applications. Even though the seeds are edible, the crude oil has been rarely extracted for commercial purposes and as such has never been fully characterized. The crude oil was extracted with hexane, and its fatty acid profile was analyzed by gas chromatography. Preliminary results indicated that the oil is rich in monounsaturated (oleic) and long-chain polyunsaturated fatty acids (linoleic, linolenic, etc), and palmitic acid is the predominant saturated fatty acid. Triacylglycerol (TAG) analysis using reverse-phase HPLC-MS confirmed the presence of TAGs made up of short and long-chain fatty acids. Ongoing investigations will focus on the oxidative stability of the oil and total characterization of the oil using GC-MS to detect flavorful low molecular weight compounds, tocopherols and sterols, and possible contaminants and natural oil components that may be injurious to health.

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Development of a Plant-Based Treatment Regimen Against HIV Replication in Sweet Potato [*Ipomoea batatas* (L.) Lam] Expressing Synthetic Lytic Peptide Genes *Jc41n* and *Jc41n*. S. B. Samuels*, M. Egnin, and J. M. Jaynes, Department of Agriculture and Environmental Sciences, Tuskegee University, Tuskegee, AL 36088.

Pharmaceutical industries have undergone significant transformation in product development over the last two decades, driven largely by advances in biopharming and biotechnology. Biotechnology has played a key role in the expansion of large and small molecule drugs as opposed drugs manufactured by

chemical synthesis for treatment of cancer, cardiovascular, and infectious diseases such as HIV. Significant progress has been made in the treatment of Acquired Immune Deficiency Syndrome caused by human immunodeficiency virus (HIV), which is responsible for millions of deaths annually. Although treatments for HIV are available, current therapies of complex regimens of nucleoside and non-nucleoside reverse transcriptase inhibitors have many side effects and are very expensive. To curtail these drawbacks, synthetic lytic peptide gene expression in plants offer a novel and an effective method of treatment and have lower toxicity and can target different components of the replication cycle, while offering an inexpensive and efficient means of production. Synthetic peptides genes *jc4In* and *jc4Ind* were designed with an intron sequence to facilitate cloning in bacteria and the accumulation in plants without any penalty or lethality. *Agrobacterium tumefaciens* strain EHA105 harboring recombinant binary plasmid pGPTV/*jc41N* and pGPTV/*jc41ND* were used to transform sweet potato cultivar PI318846. Seven putative transgenic plantlets were PCR positive and confirmed by Southern blot analysis. Further screenings at the transcriptional and translational levels, as well as the effectiveness of the transgenic peptides on HIV, are currently under investigation.

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School Lunch Project: If They Cook It, They Will Eat. M. A. Schwarz*, and S. Parveen, Department of Agriculture, University of Maryland Eastern Shore, Princess Anne, MD 21853.

In an effort to improve child health and reduce childhood obesity, the Healthy, Hunger-Free Kids Act of 2010 mandates that more fruits, vegetables, and legumes be added to the National School Lunch Program. Despite implemented changes, high school students do not have to choose these items. Normally, non-traditional vegetables and legumes have low demand in the lunch room. This school lunch project is aimed to promote student choice of legumes and dark green leafy and orange vegetables during school lunch at a high school in Wicomico County on Maryland's Eastern Shore; this will be interacted through educational programming that gives students ownership in the school lunch menu. The three-week school lunch project was tested as a means to introduce a motivating nutritional experience into the current curriculum, including project presentation, justification and parameters, a food service kitchen tour, nutrition lessons, group planning, food preparation, and food tasting. Recipes were developed to meet the USDA guidelines with the food available to food service and were required to incorporate at least one of the newly required non-traditional vegetables and legumes. The winning student group worked with food service staff to prepare and to serve the new menu item in the cafeteria. Surveys were conducted at mealtime to measure the students' preferences. Classroom test subjects completed surveys throughout the longitudinal semester study. Survey data were analyzed using ANOVA. Student recipes sold out consistently in the cafeteria with a 75% intention of repurchase. Students chose the healthier items when they were a part of the decision-making process.

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Increasing the Protein Yield of Peanuts and Cow Peas to Alleviate Malnutrition. S. M. South*, and G. Osuji, Cooperative Agricultural Research Center, Prairie View A&M University, Prairie View, TX 77446.

Protein is an essential nutrient needed for growth and development in the human body. Minimal or no dietary protein intake is a contributing factor for the increasing risk of malnutrition in developing countries. Plant protein is the main source of dietary protein for many people worldwide; therefore, increasing the protein yield will eliminate or will reduce malnutrition. Experimentally determining a cost-effective method of increasing the protein yield of leguminous food crops without increasing the fertilizer applied or land area is essential toward decreasing the incidence of malnutrition. Protein yield has to be improved in peanuts and cow peas that are planted for human consumption in order to alleviate malnutrition. Peanuts (*Arachis hypogaea*) and cow peas (*Vigna unguiculata*) were grown in seventeen experimental plots at the Prairie View A&M University field plots in Waller County. Different stoichiometric mineral nutrient combinations were applied to the peanuts and cow pea plants. At maturity, the seeds were harvested, and the free amino acids were extracted and were analyzed by reversed-phase high pressure liquid chromatography (HPLC). Total protein content and cellulose were also analyzed by standard gravimetry. The total protein extracted from the KCl-treated cow peas and the P+K treated peanuts had the highest protein yield compared to the control and the other mineral treatments. The K+N+N treated cow peas and the N+P+K+S treated peanuts had the lowest total protein content. The best stoichiometric mineral nutrient combination for increasing protein yield was KCl in cow peas and P+K in peanuts.

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Chemical Composition, Functional Properties, and Microstructural Characteristics of Virginia-Grown Kabuli Chickpea (*Cicer arietinum* L.) Cultivars. M. Thomas*, Y. Xu, S. S. Narina, and H. L. Bhardwaj, Agricultural Research Station, Virginia State University, Petersburg, VA 23806.

Chickpea (*Cicer arietinum*) is an important food legume crop worldwide and is a major ingredient for preparation of hummus, a Middle Eastern and Arabic food dip or spread. Chickpea is being researched extensively as an alternative crop to promote income diversification for Virginia farmers. During the adoption or establishment of a 'new' crop, parallel initiatives to identify opportunities to enhance its utilization should be taken. This study addresses this issue. Chemical composition, functional properties, and microstructural characteristics of seeds and starches from Virginia-grown kabuli chickpea cultivars were investigated. It was found that Virginia-grown kabuli chickpea cultivars were rich in carbohydrates, especially starch, raffinose, sucrose, and stachyose. Resistant-starch content significantly increased after the starch was isolated from other seed constituents. Although the starches from all cultivars presented a C-type crystalline structure and similar granular shapes, their degree of crystallinity, molecular weight distribution, granular size, gelatinization temperature range and enthalpy, and water absorption capacity were significantly different. The results provided baseline information for the following: (1) plant breeders in developing new cultivars with improved properties and (2) food scientists in determining the potential end-uses of the seed and constituent starches.

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Antioxidant Potential and its Possible Role in Antitumor Activity of *Scutellaria*. B. N. Vaidya*, and N. Joshee, Agricultural Research Station, Fort Valley State University, Fort Valley, GA 31030.

Our recent studies on the efficacy of various *Scutellaria* species extracts on malignant glioma (cell lines and animal model) revealed antitumor action especially with *S. ocmulgee* leaf extract. We will present our research on the antioxidant potential of fresh and dry extracts of 18 *Scutellaria* species maintained at Fort Valley State University, Fort Valley, GA. Rosemary (*Rosemarinus officinalis*) leaf extract was used as an internal standard. The three assays conducted were total polyphenol (TPP) content, antioxidant capacity measurement as Trolox-equivalent antioxidant activity (TEAC assay) using ABTS [2,2'-azino-bis(3-ethylbenzothiazoline-6-sulphonic acid)] decolorization assay, and the aluminum chloride colorimetric method for estimation of total flavonoid (TF) content. The results on antioxidant potential of fresh and dry extracts of all 18 *Scutellaria* species and rosemary were wide-ranging. The TPP, TEAC, and TF values ranged between 50.56 - 568.75 mg GAE g⁻¹, 240.10 - 2,463.96 µmol/g⁻¹, and 21.29 - 200.63 µg/mL, respectively. It was interesting to note that among all 18 species, *S. ocmulgee* and *S. montana* had the two highest values for all three assays. This may indicate a correlation between antioxidant activity and the anti-tumor properties these extracts possess. This could provide a means to screen a large germplasm collection and then proceed with phytochemical and biomedical investigations. One serious constraint for securing enough plant material for research is federal (*S. montana*) and state (*S. ocmulgee*) conservation status. We have optimized the transverse thin cell layer technique for micropropagation, requiring minimal amount of initial explants. Further, research on *Agrobacterium*-mediated transformation employing tTCL explants is in progress.

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Physiological Implications of Altered Thyroid Function and High Fat Diets in Rats. V. Welch-White*, N. Dawkins, and R. Pace, Dept. of Food and Nutritional Sciences; and T. Graham, Dept. of Pathobiology, Tuskegee University, Tuskegee, AL 36088.

Diets with adequate energy are sufficient to promote normal growth and normal sexual maturation, and diets which exceed this may result in excessive weight gain. The objective of this study was to conduct a comparative analysis of the physiological differences between euthyroid and thyroid-altered rats fed high fat diets. Adult male Sprague Dawley rats (n = 100) were exposed to a control, or one of four test diets, containing 12% (control) or 25 and 37% saturated and unsaturated for a period of 8 weeks. Each diet group had ten normal and ten altered thyroid animals. A chemically reduced thyroid state was obtained through the addition of 0.05% propylthiouracil (PTU) in drinking water. The body weights of the normal animals were significantly higher than in the altered thyroid groups. Thyroid hormone levels were higher in thyroid-altered animals, compared to the euthyroid animals. Histopathological evaluations confirmed damage to

thyroid tissue in the altered thyroid groups. Total cholesterol levels were generally higher in thyroid-altered animals compared to the euthyroid groups. In conclusion, chemically-induced hypothyroidism negatively impacted fat metabolism and growth which contributed to an increased lipid accumulation in the liver.

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Effects of Different Post-Chill Shipping Methods on the Survival of *Salmonella* on Chicken Skin Over Time. S. Williams*, and V. G. Stanley, Cooperative Agricultural Research Center, Prairie View A&M University, Prairie View, TX 77446.

Online shipment of post-chill processed chicken is increasing, and it has heightened the concern for food safety. Chicken meat has been reported as the main source of *Salmonella* contamination. To examine the safety of shipping post-chill chicken carcasses, four packaging methods were used to determine the survival of *Salmonella*- control (without treatment), ice-packed, frozen, and CO₂ packed over time. The contact time for the bacteria to attach was at 24 and 36 hours. Each treatment group was inoculated with *Salmonella typhimurium* (10⁹log/cfu). The skin, approximately 2 cm square, was placed in a stomacher for 60 seconds, serially diluted, plated, and incubated at 37°C for 24 hours. The results for Phase I after 24 hours of exposure showed that the probable number of bacteria recovered from the skin, compared to the control of 8.36 log/cfu, decreased significantly ($P < 0.05$) to 4.59, 4.97, and 4.97 log (cfu/g) when treated with CO₂ and ice-packed, as well as frozen with CO₂, respectively. In Phase II, after 36 hours of exposure, the number of bacteria for each treatment group remained relatively the same. In conclusion, after 24 and 36 hours, the different shipping methods did not eliminate but reduced the growth of *Salmonella* on chicken skin.

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Isolation and Screening of Lactic Acid Bacteria (LAB) from Kimchi and Chicken Intestine and Feces for Use as Probiotics. J. Young*, and J. Lee, Department of Human Ecology, Delaware State University, Dover, DE 19901.

Lactic acid bacteria (LAB) are generally recognized as safe (GRAS) microorganisms that can produce compounds such as lactic acid, hydrogen peroxide, and bacteriocins; these can contribute to their antimicrobial activity and used as probiotics. Chicken intestine and fermented food such as Kimchi contain many LAB strains. These LABs can be isolated for probiotic development, as well as their ability to inhibit the growth of pathogenic bacteria such as *Salmonella* and *Campylobacter* strains. The objective of this study is to isolate LAB that have strong probiotic characteristics and that have antimicrobial activity against *Salmonella* and *Campylobacter*. The methods used in this study to test the probiotic activity of the isolated strains were bile and acid tolerance, antibiotic resistance, and adhesion to mucosal cells. To test the antimicrobial activity of the isolates, the Top Agar method was used with several *Salmonella* spp. as the test strain. LABs were isolated from Kimchi and from chicken ileum, cecal, and fecal materials. With the results, these isolated strains could be used as probiotics in chickens and in humans by improving their intestinal microbial balance for health benefits.

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Promising Bone Implant Materials: Hydroxyapatite Grafted Carbon Nanotubes. C. Johnson*, A. Oyefusi, G. M. Neelgund, D. Patterson, J. M. Stone, E. Williams, G. Regisford, L. Carson, and A. Oki, Department of Chemistry, Department of Biology, Cooperative Agricultural Research Center, Prairie View A&M University, Prairie View, TX.

Hydroxyapatite [Ca₁₀(PO₄)₆(OH)]₂ (HA) is a bioceramic material often used for clinical bone grafting and implantation due to its unique bioactivity and osteoconductive properties. However, the brittle nature of HA impedes its clinical application especially under load-bearing conditions. Thus, practical usage of HA requires reinforcement by a secondary material. The excellent mechanical and biological characteristics of carbon nanotubes (CNTs) facilitate the opportunity for strengthening and reinforcing of HA without reducing its bioactivity. In the present study, HA was successfully grafted to carboxylated CNT. The successful functionalization of CNTs was studied using FT-IR, TGA, SEM and X-ray diffraction. The HA grafted CNTs (CNTs-HA) were further used to examine the proliferation and differentiation rate of a temperature-sensitive human fetal osteoblastic cell line (hFOB 1.19). Total protein assays and western blot analysis of osteocalcin expression were used as indicators of cell proliferation and differentiation. Our results indicate that hFOB 1.19 cells proliferate and differentiate well in treatment

media containing CNTs-HA. Hence, both CNTs-HA could be promising materials to use as scaffolds in bone tissue engineering.

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Consumers' Willingness to Pay for Genetically Modified Salmon: Results from a Georgia Survey.

V. King*, M. Ibrahim, and J. Whitehead, Agricultural Research Station, Fort Valley State University, Fort Valley, GA 31030.

Biotechnology has introduced novel techniques of improving and in some cases totally transforming both plants and animal organisms. One of such techniques is transgenesis. Transgenesis involves the technique of altering the characteristics of animals or fish by directly changing the genetic material. The idea that transgenic fish (salmon) are about to enter the human food chain seems scary to many consumers. However, studies have shown that consumers were apprehensive in accepting transgenic plant organisms but later accepted those products (e.g., genetically modified –GM-corn). Most studies that have examined the willingness to consume or to pay for transgenic meat have done so by using GM feed. The objective of the study was to determine consumers' willingness to pay for transgenic salmon. The data for this study were secured through a survey conducted at the 2010 Sunbelt Agricultural Exposition (Ag Expo) in Moultrie, Georgia. The study used a logit model to analyze consumer willingness to pay for genetically modified salmon. Preliminary results indicate that 90% of the respondents who consider GM Salmon to either be low risk or no risk are more likely to consume the product compared to those who consider it to be high risk.

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Effect of Proximity of Compost Piles on Fly Populations in High Tunnel Tomato Production.

W. Mallory*, M. Kraemer, S. Pao, and F. Hashem, Agricultural Research Station, Virginia State University, Petersburg, VA 23806.

Organic production of vegetables is becoming more important to consumers. Compost from manure is commonly used as fertilizer but also poses a risk to the public due to possible microbial contamination from fly activity. The safe distance that vegetables can be grown from compost piles is not known. As part of a larger project, we conducted an experiment in two adjacent high tunnels, one with and the other without manure in plastic tubs. Both tunnels had four rows of bush tomatoes. We compared the species and numbers of flies between tunnels and over time. Flies were monitored using yellow sticky-traps placed in each of the four quadrants of each high tunnel for a week at three-week intervals for three months. Captured flies were identified with a binocular microscope using wing venation, bristles, coloration patterns, and other physical characteristics. The major fly species found were the house fly (*Musca domestica* L.), the lesser house fly (*Fannia canicularis* L.), the stable fly (*Stomoxys calcitrans* L.), the black garbage fly (*Ophyra* spp.), syrphids (Syrphidae), and tachinids (Tachinidae). Species abundance varied over time. Significant differences between means were determined using an Analysis of Variance (ANOVA) and a Least Significant Difference (LSD). Tachinid parasitoids were the only group significantly different between high tunnels probably attracted by an infestation of tomato hornworms in one of the tunnels. These results showed that flies will easily travel between adjacent high tunnels. Additional research is needed to determine the minimum distance vegetables need to be grown from compost piles.

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The Effect of Refrigerated Storage on Proteolysis and Lipolysis of Commercial Cow Milk and Goat Milk Yogurts. M. Mobley*, J. Oglesby-Jones, and Y. W. Park, Agricultural Research Station, Fort Valley State University, Fort Valley, GA 31030.

Yogurt, as a fermented dairy product, has a long tradition of consumption in European and Asian countries, due to its nutritional and therapeutic health benefits. A study was performed to compare the effect of refrigerated storage on commercial cow and goat milk yogurts in relation to proteolytic and lipolytic changes in the products. Commercial cow milk yogurt (CCY) and commercial goat milk yogurt (CGY) were purchased from local retail stores, and Fort Valley State University plain goat milk yogurt (FVGy) was manufactured using direct vat set (DVS) lactic culture (YC-350, Chr. Hansen, Inc., Hoersholm, Denmark). All experimental yogurt samples were subjected to 4°C refrigeration storage for 0, 2 and 4 weeks. The pH acid degree value (ADV), water soluble nitrogen (WSN), and basic nutrient contents of all yogurt samples were analyzed to compare lipolytic and proteolytic changes among the products

during the 4 weeks of storage period. The respective mean total solids and fat content (%) of CCY, CGY, and FVG products were 11.28, 3.05; 13.1, 3.65; and 11.03, 3.40, indicating the CGY contained the highest total solids and fat contents among all tested varieties. The initial and final ADVs of CCY, CGY, and FVG were 0.503, 1.009; 0.756, 0.685; and 0.707, 1.094, respectively, suggesting significant lipolysis occurred in CCY and FVG while minimal lipolysis was observed in CGY. No significant changes occurred in the pH in the three types of yogurts while WSN levels were elevated in all yogurt products during 4 weeks storage, implying that proteolysis steadily increased in all experimental yogurts.

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Capsaicin Levels in Pepper (*Capsicum annuum* L.) Collections. R. Morris*, A. Almeida, A. Alvarado, V. L. Abburi, P. Nimmakayala, and U. K. Reddy, Gus R. Douglass Institute & Department of Biology, West Virginia State University, Institute, WV, 25112; and G. Kaushal, Department of Pharmaceutical and Administrative Sciences, University of Charleston School of Pharmacy, Charleston, WV 25301.

Ninety-six pepper varieties belonging to *Capsicum annuum* L. were grown in a field and greenhouse. Peppers were taken at two developmental stages, one at 2 weeks and the other at maturity. Capsaicin content has been estimated only for the first developmental stage. Briefly, 100 mg of powder was dissolved in 1 ml of acetonitrile. Samples were incubated at 65°C in a water bath for 1 hour and then shaken at room temperature for 1 hour, incubated again at 65°C in a water bath, and finally shaken at room temperature for another hour. Afterwards, the extracts were filtered through a 0.2 µm PVDF membrane. Capsaicin was quantified using an HPLC method developed by Dr. Kaushal's on Waters HPLC Alliance system. The separations were done on a Symmetry 3.5µ column (75 x 4.6 mm I.D., Waters, Milford, MA). The column effluents were monitored at the wavelength of 281 nm at the temperature of 30°C. The mobile phase was 50% water and 50% acetonitrile set at a flow rate of 0.5 mL/min. Capsaicin was noted to be in the range of 0.5 ppm (Ancho pepper) to 266 ppm (Fire cracker pepper). Peppers with the range of Capsaicin below 10 ppm were classified as low Capsaicin types. The varieties with the range of 50 to 100 ppm were categorized as moderate, and the types with the 150 ppm were classified as high Capsaicin containing groups, respectively. Capsaicin data is currently being used for genetic studies, which will lead to the cloning of the genes and DNA variation associated with the trait.

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Investigating the Effects of Resistance Band-Training on Elderly Type 2 Diabetics. E. Onwasigwe*, Department of Nutritional Sciences, and B. Frishberg, Department of Health Sciences and Physical Education, South Carolina State University, Orangeburg, SC 29117.

The purpose of this study is to establish a direct correlation between muscle mass and hemoglobin A1c on elderly diabetics undergoing resistance band-training exercises. Recent studies have shown that resistance exercises have helped increase insulin activity on skeletal muscles and achieve a closer to normal Hgb A1c level. The participants were both males and females who were 60 years and above in age. Their blood glucose and insulin data were collected before and during the testing period. The study lasted 6 months during which the participants trained twice a week for 30 minutes. The training consisted of 3 sets of 10 repetitions in one of the following exercises: triceps extension, biceps flexion, hips flexion and extension, knee flexion and extension, and shoulder internal and external rotation. The first two sets were performed slowly with the third set completed as fast as they could move. Also, at the end of each training, the participants were shown a Borg scale to determine how much effort was needed for the workout. In conclusion, according to the Borg scale, we have already witnessed some improvements during the training sessions, and we expect there to be an improvement in their insulin sensitivity and Hgb A1c levels at the end of the training period.

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Effects of Purple Sweet Potato Powder on Bone Mineral Content of Ovariectomized Rats. T. Smith*, L. Huang, C. Butler, and C. Wang, Division of Food and Animal Science, Kentucky State University, Frankfort, KY 40601.

The objective of this study was to determine if consumption of purple sweet potato powder would affect the bone mineral content of ovariectomized rats. Female SD rats (9 months old) were either ovariectomized or sham-operated before they were randomly assigned into 6 treatment groups. Group A's rats were sham-operated, but those in other groups were ovariectomized. Groups A and B were fed the AIN93M diet, but Groups C, D, and E were fed the AIN93M diet with 5%, 10%, or 15% of the corn starch

replaced by equal amounts of purple sweet potato powder, respectively. Group A was fed ad lib, but the amounts of diets given to other groups were restricted to the average intake of Group A. The rats were fed their assigned diets for 6 weeks before they were sacrificed. The bone mineral content for group A was higher than for other groups, but the group fed 10% of purple sweet potato powder had bone mineral content similar to that of Group A. Groups fed 15% purple sweet potato powder had diarrhea and uterine inflammation. These results confirmed that ovariectomy surgery significantly reduced bone mineral content. However, consumption of purple sweet potato powder at 10% of the total diet helped to maintain the bone mineral content close to the sham-operated rats. These results indicated that purple sweet potato powder helped to prevent bone loss caused by ovariectomy. Excessive consumption of purple sweet potato powder (15% of the diet) caused digestive disorders and was not protective against bone loss.

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Attitudes and Practices of Healthy Lifestyles in Students Attending a Historically Black University.

A. Taltoan*, A. M. Topè, and P. F. Rogers, College of Agriculture, Food Science, and Sustainable Systems, Kentucky State University, Frankfort, KY 40601.

Obesity is linked to a greater risk for Metabolic Syndrome (MetS), a cluster of conditions that includes elevated waist circumference, diabetes, hypertension, and lipid imbalance. Ethnic disparities in the prevalence of obesity continue to exist. A higher incidence of obesity is reported among African Americans (AA) than any other ethnic group. The objective was to evaluate the attitudes, life style choices, and risks for MetS among young AA adults attending a historically black college (HBCU). Each fall since 2009, students 18-24 years (n = 376) attending Kentucky State University were recruited. Anthropometrics and clinical screenings were performed. NCEP-ATP III definition of MetS was used. Overall prevalence of MetS was 12%. More females than males believed in having three nutritious meals a day, maintaining a healthy weight, and avoiding the use of alcohol and tobacco. More females than males had higher waist circumference (WC). More males than females reported greater frequency of physical activity and having seven hours of sleep. Less than half of the participants reported consuming less than the recommended servings of fruit, vegetables, and dairy per day. A correlation was found between high WC and lack of minimum exercise and between high blood pressure (BP) and vegetable intake. Young AA adults are at a significantly higher risk for MetS. It is critical in any college setting especially in HBCUs to re-implement the practice of performing physical examination, to collect data from the health history of the students, and to offer well-targeted Health Education Programs around healthy life style choices.

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Effectiveness of Parent-Focused Interventions in Childhood Obesity Prevention. T. R. Thompson*, M. D. Ravola, and O. Pittman, Department of Human Sciences; V. Njiti, Department of Biotechnology, Alcorn State University, Alcorn State, MS 39096; and J. Escorcía, Thompson Head Start Center, Natchez, MS 39096.

Parents are role models whose health attitudes and eating behaviors play critical roles in the development of their children's eating behaviors and nutritional choices. Therefore, it is important to infuse changes in parents about health and nutrition so that they in turn will promote healthy nutritional choices to their children. The purpose of this study is to design a structured nutritional education program for parents of pre-school children in head start programs and to examine the benefits of the program in improving health and nutritional behaviors of the parents. The objectives of the study were the following: 1) to educate parents about nutrition and healthy choices through a nutrition education curriculum; 2) to engage parents in nutrition-related activities that will promote healthy behaviors; and 3) to evaluate the efficacy of the parent-nutrition education program. Parents were exposed to a structured nutrition-education program for a period of eight weeks on a once-a-week basis. The curriculum included informational sessions on health, nutrition, food demonstrations, and nutrition-based hands-on activities for parents. Baseline and final data were collected before and after the program. The baseline data included recording parents' anthropometric measurements. In addition to anthropometric measurements, parents were required to complete a questionnaire on health status, nutritional choices, eating behaviors, and activity levels. The baseline and final data were compared to assess the efficacy of the nutrition education program. The results will generate practical steps for parents to provide a nutritionally-healthier and physically-active home environment for pre-school children.

Association between Television Viewing, Physical Activity, and Obesity among Preschool Children. J. Wilson*, M. D. Ravola, O. Pittman, Department of Human Sciences; and V. Njiti, Department of Biotechnology, Alcorn State University, Alcorn State, MS 39096; and J. Escorcía, Thompson Head Start Center, Natchez, MS 39096.

There is a strong consensus that extended hours of television viewing and inadequate physical activity are pre-disposing factors for childhood obesity. Sedentary activities do compete for time that would have otherwise been spent in physical activity. Long hours of television viewing and inadequate physical activity are likely to increase body fat over time. Ample studies have demonstrated that extensive television viewing and inadequate physical activities pose as high risks factors for obesity. The purpose of the study was to examine the relationship between television viewing, physical activity, and their linkage to obesity in pre-school children. The study was designed to do the following: 1) investigate the television viewing patterns; 2) assess the physical activity levels; and 3) determine if television viewing and physical activity are affecting changes in obesity indices. Through a random sampling method, 200 parents of children attending Head Start Programs in Adams and Jefferson counties were selected for the study. Data were collected using a Child Health and Behavior Questionnaire. The associations between the covariates of television viewing and of physical activity on the outcome variable of obesity indices (height, weight, BMI) were examined to assess the plausibility of different causal pathways. The outcomes are expected to indicate if reducing television viewing and enhancing physical activity will lower the risk of obesity. In addition, the study will generate practical messages to promote physical activity and to reduce sedentary pursuits such as television viewing and video games among pre-school children. These positive behavioral changes have the potential to lower the risk of obesity in pre-school children.

Effects of NPK Fertilizer Combination on Yield Study of *Hibiscus sabdariffa* Grown in Baton Rouge, Louisiana. R. C. Nicholas*¹, Y. Qi^{1,2}, K.L. Chin², ¹Urban Forestry Program, and ²Agricultural Research and Extension Center, Southern University and A&M College, Baton Rouge, LA 70813.

Most plants that are in production in the Southern United States require correct rates of NPK fertilizers for optimum yields, but the nutrient requirements of roselle (*Hibiscus sabdariffa*) are unknown. A completely randomized experiment with 27 NPK fertilizer combination treatments was conducted in 2011 to evaluate the effects of NPK fertilizers on growth and yield of Jamaica accession roselle in Baton Rouge, Louisiana. The fertilizer applications ranged from 0-0-0 NPK (control row) to 100-100-100 NPK (row 27). Roselle plants were measured for height and spread near the end of October 2011. Row 10 (50-50-50 NPK) was the shortest. Rows 26 (100-100-50 NPK), 24 (100-0-100 NPK), and 23 (100-50-50 NPK) were among the tallest. Rows 10 (50-0-0 NPK), 12 (50-0-100 NPK), and 9 (0-100-100 NPK) had the smallest spread while row 27 (100-100-100 NPK) had the widest. Fruit and biomass yield were harvested from 4 plants per treatment in November. Row 26 (100-100- 50 NPK) yielded the most fruit production with an average of 3kg per plant. Row 27 (100-100-100 NPK) along with rows 26 (100-100- 50 NPK) and 23 (100-50-50 NPK) yielded the most foliage biomass ranging 11.3-12.6 kg per plant. However, various other levels of combination of NPK yielded mixed results. Not all the combinations were favorable for roselle growth as compared to the control treatment. The advantages and disadvantages of using NPK fertilization on roselle production will be discussed.

Aluminum Accumulation in Tomato Seeds harvested from A1-Treated Plants and the Effect on Proteome Expression During Seed Maturation and Germination Processes. I. Okekeogbu*, S. Sangireddy, and S. Zhou, Department of Agricultural Sciences, College of Agriculture, Human and Natural Sciences, Tennessee State University, Nashville, TN 37209.

Aluminum is one of the prominent minerals in the earth's crust (8%); the toxicity of A1 is affected by acidity of the surrounding environment. At pH<5 condition, increase of the chemically accessible metal ions (A1 3+) causes ion toxicity which dramatically reduces the productivity of plants. In this study, we used maturing tomato fruits to provide a natural acidic condition (4.3-4.5) to investigate how the toxic ions affect protein expression in maturing seeds. Tomato (*Solanum lycopersicum* cv. Micro-tom) plants were growing in a hydroponic system, and tomato fruit juice was 4.5 at the time of seed collection. For seed germination, they were wrapped in filter paper acidic water provided by a filter wick to prevent leaching on the ions from seeds. Seeds harvested from plants without A1-treatment were used as controls. The A1

content of seeds and seedlings was detected in situ by means of morin staining, and results conformed high level A1 in those tissues. Differentially expressed proteins between the A1- enriched seeds and controls were identified using two-dimensional gel electrophoresis (DIGE) analysis. Proteins were labeled with the Cydye DIGE Fluor minimal dyes (GE Healthcare Life Sciences) and gel images were analyzed in Progenesis SameSports Program to identify protein spots showing significant difference between treated and control samples. Those spots were picked and proteins in those spots were identified following a procedure of in-gel trypsin digestion-mass spectrometry-database search (the annotated tomato database). A molecular model of ion toxicity from endogenous A1 during seed maturation and germination is proposed based on the putative function of those identified proteins.

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Attracting Beneficial Insects to Blackberries Using Methyl Salicylate-Based Lures. J. A. Riddick*, J. D. Sedlacek, and K. L. Friley, College of Agriculture, Food Science, and Sustainable Systems, Kentucky State University, Frankfort, KY 40601.

Kentucky produces approximately 45 ha of blackberries for a total value of \$1,000,000 annually. Demand for locally grown and damage-free blackberries usually exceeds the supply. Developing more sustainable production methods, including the use of beneficial insect attractants, such as a methyl salicylate-based lure, is important for the success of small and limited resource farmers. Eight blackberry plots, including six collaborators, were located in Franklin, Fayette, Scott, and Shelby counties in Kentucky. Three plots were certified organic and the other five plots had no pesticides applied. Four sticky traps and posts were placed in all plots and two PredaLure® lures were placed in each of the PredaLure® baited sites. Sticky traps were collected weekly, placed in labeled Ziploc® bags and taken to the laboratory where beneficial insects were identified using an illuminated magnifier. Total number per species, average number per trap, and treatment type was then calculated. Eight species of lady beetles were identified in the PredaLure® baited sites, while six species were found in the non PredaLure® baited sites. Averaged over all sampling intervals, PredaLure® baited sites had more pink lady beetles, *Coleomegilla maculata*, while non PredaLure® baited sites had more Asian multicolored, *Harmonia axyridis*; spotless, *Cycloneda munda*; and mildew-eating, *Psyllobora vigintimaculata* lady beetles. Syrphid flies were the most abundant beneficial insects found. Big-eyed bugs, minute pirate bugs, and green lacewings were found in very low numbers. Results will be discussed with respect to location and size of each sampling site, as well as the surrounding landscape.

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Proteomic Analysis of Tomato Roots Under Aluminum Stress. S. Sangireddy*¹, S. Zhou¹, R. Sauve¹, K. J. Howe², T. Fish², and T. W. Thannhauser², ¹Department of Agricultural Sciences, College of Agriculture, Human and Natural Sciences, Tennessee State University, Nashville, TN 37209; and ²Plant Soil and Nutrition Research Unit, USDA-ARS, Ithaca, NY, 14853-2901.

Under acidic conditions (pH<5.0), aluminum (Al₃₊) ions are released from soil clay and they become highly cytotoxic to plants. The objective of this study was to identify cellular processes affected by Al toxicity in tomato roots. Tomato (*Solanum lycopersicum* cv. Micro-Tom) plants were growing in a hydroponics system. The Al treatment was applied by supplementing 50 micro molar aluminum sulfate and the controls was with lanthanum sulfate at the same molar concentration. The treatment experiment lasted for 5 days. Aluminum content of the root tissues was analyzed using the inductively coupled plasma-atomic emission spectroscopy (ICP) method and in situ Morin staining. Total root protein was isolated using TCA-acetone precipitation followed by extraction with reagents in the Sigma-ProtecoPrep® Total Extraction Sample Kit. Root proteins were analyzed using isobaric tags for relative and absolute quantification (iTRAQ). Mascot version 2.3 was used to quantify the level of expression of each protein identified via the iTRAQ reporter ions. Results show that the Al content per gram dry weight in the treated roots is significantly higher than the control. The higher content of Al was also confirmed by stronger fluorescence after Morin staining. The iTRAQ analysis identified a total of 600 proteins, of which 42 proteins had significant changes in abundance level (p≤ 0.05) from treated to control samples. Those identified proteins are involved in ubiquitin protein degradation, single transduction, chaperonins, and some metabolic reactions. Effect of Al treatment on transcription of genes encoding for those proteins is being evaluated.

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Enhancing Tomato (*Lucopersicon esculentum*) Production and Utilization in Southwest Mississippi.

Q. Thomas*, C. Campbell, J. Jackson, A. Burks, A. Cuadra, and P. Igbokwe, Department of Agriculture, Alcorn State University, Alcorn State, MS 39096.

A field study was used to determine the effect of four spray frequencies of “Response 9-9-7” liquid fertilizer on “Roma” tomato yield potential and quality. The study was conducted on Memphis silt loam (Typic Hapludalfs fine silty, mixed, thermic) soil at the Alcorn State University Experiment Station, in southwest Mississippi. A randomized complete block (RCB) experiment design, with four replications of each spray frequency (0, 7, 14, 21, or 28 days), was used in this study. Similarly, a laboratory “Taste” test was used to determine the quality (appearance, texture, and flavor) of developed tomato paste from each spray frequency (treatment). All data were analyzed by the analysis of variance (ANOVA) and means separated by the least significant difference (LSD) test procedure. Plant growth was not influenced by spray frequency except for root dry matter content. Marketable tomatoes generally increased with decrease in spray frequency. The quality of processed tomatoes (Tomato Paste) was similar in appearance and flavor, but better in texture compared to commercially available product.

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Characterizing Population and Genetic Structure of *Aleurodicus rugioperculatus* Martin (Hemiptera: Aleyrodidae) in Florida.

M. Wilkerson*¹, R. Hix¹, I. Stocks², C. McKenzie³, and J. Lu⁴, ¹Center for Biological Control, and ⁴Center for Viticulture and Small Fruit Research, College of Agriculture and Food Science, Florida A&M University, Tallahassee, FL 32307; ²Division of Plant Industry, Florida Department of Agriculture and Consumer Services, Gainesville, FL 32608; and ³USDA-ARS, U.S. Horticultural Research Laboratory, Fort Pierce, FL 34945.

The genus *Aleurodicus* comprises over 30 species of whiteflies natively found in abundance throughout Central America and the Caribbean. Whiteflies are tiny, polyphagous, sap-ingesting insects affecting fruit crops, ornamental plantings as well as various shrubs and trees. A wide range of hosts with annual overlapping generations coupled with short developmental cycles, allow this species to quickly reach infestation on suitable host plants. The Rugose Spiraling Whitefly, *Aleurodicus rugioperculatus*, has quickly become an emerging pest to Florida’s agriculture, chiefly problematic for the southernmost counties, especially to vegetables, herbs and floral crops. High speculation of its geographic origin and low morphological discrepancies among species, reiterate how imperative genetic differentiation at a molecular level is in properly identifying and characterizing this population. Since morphological characteristics are immensely influenced by environmental factors, molecular profiles become vital to defining polymorphisms and understanding evolutionary changes. The goal of this research is to determine phylogenetic relationships, using molecular and genetic tools to determine whether prevailing *A. rugioperculatus* exist as a single population. Furthermore, it may be possible to reconstruct ancestral geographic origins with biological characteristics through molecular experimentation.

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Sustainable Medicinal Plant (*Tanacetum parthenum*) Production and Utilization in Mississippi.

R. Williams, Jr.* , C. Campbell, J. Jackson, A. Burks, Z. Cuadra, and P. Igbokwe, Department of Agriculture, Alcorn State University, Alcorn State, MS 39096.

Two field experiments were used to investigate the impact of organic mulching materials (Pine Bark Nuggets) and two synthetic mulching materials (“Black Plastic” and “Weed Barrier”) on purple nutsedge (*Cyperus rotundus*) control in field-grown feverfew (*Tanacetum parthenum*). The medicinal impact of harvested foliage was also investigated. A randomized complete block (RCB) experiment design, with five replications of each treatment and control was used in this study. All data were analyzed by the analysis of variance (ANOVA) and means were separated by the Least Significant Difference (LSD) test procedure. Purple nutsedge control was perfect (100%) due to “Black Plastic” mulch application during the first study period, but was perfect (100%) for both “Black Plastic” and “Weed Barrier” during the second study period. Values for both soil extractable nutrients and leaf mineral compositions were generally increased after the second study period.

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Developing Root Growth Models for Switch Grass Under Different Levels of Water Deficits. Z. Ye*, S. Zhou, and R. Sauve, Department of Agricultural Sciences, college of Agriculture, Human and Natural Sciences, Tennessee State University, Nashville, TN 37209.

In the biomass production system using switchgrass, the seedling stage is vulnerable to prolonged soil drought conditions. This project aims to construct the root growth models for switchgrass under different levels of water deficits. A drought treatment system was developed to replicate soil conditions in the field while allowing for non-invasive sample collection. We used PVP double pipes where the inner perforated pip was filled with basic potting mix and the space between the outer and inner pipes was filled with different types of inert materials. The system allows root to grow out of soil into an inert materials for tissue collection. The outer pip was cut into halves and held together using duck tapes. Because the outer pip can open into two halves, the root system can be examined with minimal mechanical disturbance. For drought treatment, switchgrass 'Alamos' seeds were germinated in seed cubes and transferred into the inner pip, and plants was let growing until two-leaf stage under moist soil condition. Then drought treatment was applied by withholding watering until the soil condition. Then drought treatment was applied by withholding watering until the soil moisture at 20 cm depth reached the set level, which was monitored using a soil moisture probe. The root-tips can imaged under a VHX- 10000E digital microscope (Keyence), and the length and Diameter of root can be measured using the manufactory installed function. Those data are used to construct growth models of the root system. The model will be used to determine the stress level and tissue types for characterization of molecular mechanism for drought tolerance and improving the tolerant traits in switchgrass.

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Differential Root Proteome Expression in Tomato Genotypes with Contrasting Drought Tolerance Exposed to Dehydration. S. Zhou*¹, S. Bhatti¹, R. Sauve¹, and T. Thannhauser², ¹Department of Agricultural Sciences, College of Agriculture, Human and Natural Sciences, Tennessee State University, Nashville, TN 37209; and ²Plant, Soil and Nutrition Research Unit, USDA-ARS, Ithaca, NY 14853.

A comparative proteomics study using isobaric tags for relative and absolute quantitation (iTRAQ) was performed on a mesophytic tomato (*Solanum lycopersicum*) cultivar and a dehydration-resistant wild species (*Solanum chilense*), to identify proteins that play key roles in tolerance to water deficit stress. In tomato Walter LA3465, 140 proteins were identified, of which 104 (80%) were repressed and 26 (20%) were induced. In *S. chilense* LA1958, a total of 170 proteins were identified, with 106 (62%) repressed and 64 (38%) induced. According to their putative molecular functions the differentially expressed proteins belong to the following subgroups: stress proteins, gene expression, nascent protein processing and protein folding, protein degradation, carbohydrate metabolism, amino acid and nucleotide metabolism, lipid metabolism, signal transduction, and cell cycle regulation. Based on changes in protein abundance induced by the dehydration treatment, cellular metabolic activities and protein biosynthesis were suppressed by the stress. In *S. chilense*, dehydration treatment led to elevated accumulation of proteins involved in post-transcriptional gene regulation and fidelity in protein translation including prefoldin, which promotes protein folding without the use of ATP, several hydrophilic proteins, and calmodulin in the calcium signal transduction pathway. Those protein changes were not found in the susceptible tomato cultivar Walter. Within each functional protein group, proteins showing opposite changes (dehydration induced versus repressed) in the two species were identified and roles of those proteins in conferring tolerance to water deficit stress are discussed. Information provided in this report will be useful for selection of proteins or genes in analyzing or improving dehydration tolerance in tomato cultivars.

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Mobility of Cadmium, Arsenic, Copper, Nickel and Chromium in Alabama Ultisols. E. L. Cadet*, K. Kpomblekou-A, and D. Mortley, Department of Agricultural and Environmental Sciences, Tuskegee University, Tuskegee, AL 36088; and D. L. Eggett, Department of Mathematics and Statistics, Brigham Young University, Provo, UT 84602.

Mobility of toxic elements such as Cd, As, Co, Ni and Cr in soils is primarily influenced by soil texture, soil organic matter, and soil redox potential. When poultry litter containing trace elements is added to agricultural land, the elements may move downward in the soils and pose a risk to groundwater. We evaluated total trace element contents of six Alabama Ultisols profiles (0-90 cm) using the USEPA digestion method 3052. The soils had received poultry litter over a 20-year period and were compared with

counterpart soils that had not received poultry litter. Pair-wise comparison tests indicated that trace element concentrations were significantly greater ($P < 0.05$) in poultry litter-amended soils than in the non-amended soils. The trace element concentrations significantly increased with soil depth relative to the non-amended soils. Cadmium concentration did not move beyond 30 cm in Fuquay soil while in Malbis soil, it moved beyond 90 cm depth. No significant differences were found in Cd and Ni concentrations in Orangeburg and Fuquay soil, respectively, throughout the profiles between poultry litter-amended and non-amended soils. Chromium concentration significantly increased from 38.8 mg kg^{-1} (0-15 cm) to 116 mg kg^{-1} (75-90 cm) in Malbis soil and was evenly distributed throughout the profile of Fuquay soil (between 30 and 35 mg kg^{-1}). These results demonstrate that trace elements are highly mobile in these Alabama Ultisols. The downward migration of these metals and metalloids may pose a risk to shallow groundwater resources, especially in areas with heavy poultry litter loads.

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Defense against Invasive Species by *Asimina triloba* through Competition. B. May*, K. W. Pomper, J. D. Lowe, N. Cook, D. Davidson, and S. B. Crabtree, College of Agriculture, Food Science and Sustainable Systems, Kentucky State University, Frankfort, KY 40601.

The pawpaw (*Asimina triloba*) is a native understory tree that grows in the forested lowlands of Eastern North America. *Asimina triloba* fulfills several important roles in its native ecosystem that include soil erosion control near stream banks, fruit production for wildlife and increasing biodiversity through pawpaw obligate species such as the Zebra swallowtail butterfly, *Protographium marcellus*. Fruit set in pawpaw is typically restricted by limiting factors such as self-incompatibility and low light availability. Propagation is most often accomplished through root suckering; this behavior results in dense clonal pawpaw patches of trees and increased shading of other understory plants. It has been suggested that these qualities make *A. triloba* a candidate for a native species that can hinder the advancement of destructive invasive plant species. The objective of this study was to assess the capability of *A. triloba* to hold its ecological niche against invasive species such as *Lonicera maackii* and *Alliaria petiolat*. Three pawpaw patch sites were sampled in Central Kentucky, where soil samples were taken and the incidence of *A. triloba*, *L. maackii* and *A. petiolat* was evaluated in 5 meter by 5 meter plots, both within and outside pawpaw patches of varying density. Comparative soil analysis and the impact of pawpaw patch density on invasive plant occurrence will be discussed.

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Evaluation of Monitoring Methods for the Redbay Ambrosia Beetle (*Xyleborus glabratus*), a New Invasive Species from Southeast Asia. L. Tanner*, L. H. B. Kanga, and J. Peters, College of Agriculture and Food Sciences, Florida A&M University, Tallahassee, FL 32307; and T. Smith, FDACS, DPI, Gainesville, FL 32608.

A non-native insect, the redbay ambrosia beetle (*Xyleborus glabratus* Eichhoff) was discovered in the United States in 2002. This invasive species from Southeast Asia is now established in coastal forests of Georgia, South Carolina, and Florida and has been reported in Mississippi, North Carolina and Alabama. The beetle carries the laurel wilt fungus *Raffaelea lauricola* which is lethal to members of the family Lauraceae: redbay, sassafras, camphor, silkbay, pondspice, bay laurel, the endangered pondberry and several cultivated trees of economic importance. The redbay ambrosia beetle and laurel wilt fungus pose a serious threat to the \$13 million-a-year avocado crop of the state of Florida. Currently there are no control measures for this pest and very little is known about the biology of the beetle and its interactions with various host trees. Also, there are no records from the Apalachicola National Forest, a large protected area in Panhandle Florida. Preliminary data indicated that one dominant and four semidominant species of *Xyleborus* were present in the Apalachicola National Forest. Here we report survey results from the Apalachicola Forest comparing two attractants, a) a mixture of manuka and phoebe oil, and b) ethanol gel attractants, and provide useful information on monitoring Scolytinae.

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Patterns of Forest Cover, Hydrologic Regime, and Freshwater Fish in North and Central Alabama Streams. C. A. White*, and X. Chen, Department of Biological and Environmental Sciences, Alabama A&M University, Normal, AL 35762.

This research aims to quantify the correlation between changes in forest cover, stream flow regime, and distribution of freshwater fish in North and Central Alabama streams. We examined the

relationship between forest cover, stream flow, and fish distribution by analyzing land use data, gauged stream records, and total number of documented fish species over the period of 1992-2006 for 2nd to 4th order streams in North and Central Alabama. We hypothesized that loss of forest cover will impact the natural stream flow regime, applying intense selective pressure to freshwater fish populations. Loss of forest cover was found to be associated with an increase of peak flow, decrease of low flow, and an increase in the magnitude and frequency of disturbances of stream flow. This research also allows the comparison of stream flow responses to forest cover loss in both dammed and undammed streams of various soil types and topography, the response of populations of various species of freshwater fish, and the effectiveness of a medium resolution land cover product for regional scale ecological studies.

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Assessing the Efficacy of *Cricotopus lebetis* Sublette (Diptera: Chironomidae) for Controlling *Hydrilla verticillata* (L.F.) Royle in the Wacissa River. E. K. Kariuki*, and R. L. Hix, Florida A&M University, Tallahassee, FL 32307; and J. P. Cuda, University of Florida, Gainesville, FL 32611.

Hydrilla verticillata (L.f.), commonly called hydrilla, has been referred to as a perfect aquatic weed because of the extensive adaptations that allow it to be an aggressive and competitive colonizer of aquatic habitats. Hydrilla can elongate at a rate of up to 1 inch per day until it nears the water surface, where it branches profusely, forming a dense mat that is able to intercept light to the exclusion of other submersed native species. Recent studies indicate that chemical control of hydrilla in Florida may no longer be an effective option after it was recently discovered that the plant has developed resistance to fluridone, the only EPA-registered systemic herbicide approved for use in aquatic system. This finding confirmed field observations of declining hydrilla control by aquatic plant managers even though the same procedures from previously successful fluridone treatments were used. The fluridone resistance was unexpected because hydrilla reproduces asexually in Florida. More than six clones have been identified with a two- to seven-fold increased resistance to fluridone, and the resistance is stable over time, even in the absence of fluridone selection pressure. Potential spread of the fluridone-resistant hydrilla in Florida and the higher rates of fluridone required to control it may negatively impact Florida's rivers and lakes. The objective of this research project was to conduct greenhouse and field trials to study the potential of *Cricotopus lebetis* Sublette (Diptera: Chironomidae) in localized and environmentally friendly control of hydrilla in Florida's rivers and lakes.

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Characterization of Floristic Composition and Diversity of the Depression Marsh, Munson Sandhills, Apalachicola National Forest. S. M. Sapp*, and K. Milla, Center for Water & Air Quality, College of Agriculture and Food Sciences; and O. Onokpise, College of Agriculture and Food Sciences, Florida A&M University, Tallahassee, FL, 32307; and J. Tobe, Ecological Resource Consultants, Inc., Tallahassee, FL 32303.

The Apalachicola National Forest is the largest of three national forests in Florida and is home to the sandhills ecosystem. Dispersed throughout this landscape are numerous shallow limestone depressions that form the setting for the depression marsh, also termed seasonal marsh. The depression marsh habitat supports a diverse assemblage of wildlife species, several of which are listed as federal or state threatened wildlife species. Additionally, the beautiful open landscape attracts recreational off-highway vehicular (OHV) users. The goal of this research was to characterize the impact of OHV use through the floristic analysis of three representative marshes. Two marshes were selected that displayed minimal or no indication of disturbance, 266 and 55, respectively, and one marsh that displayed moderate to severe indication of OHV disturbance, marsh 26. Research parameters included vegetation and soils. A quantitative plant sampling methodology was implemented to describe the populations at each site. Marshes 266 and 55 displayed four to five distinct zones of vegetation, with zonation in marsh 26 being far less defined. A soil profile was excavated to a depth of 12 inches at each point along a gradient using a tiling spade or to depth of saturation using a bucket auger. Relative to marshes 266 and 55, results for marsh 26 were as follows: zone 2 exhibited a significantly higher percentage of bareground coverage; zones 3, 4, and 5 exhibited a higher percentage of vegetative coverage and species richness. Soil results revealed significant anthropodurbation in zones 3 and 4 and compaction in zone 5.

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Effects of Stream Impoundment on Aquatic Insect Communities in Headwater Steephead Ravines of the Apalachicola River Basin, Florida. A. M. Heupel*, and A. K. Rasmussen, College of Agriculture and Food Sciences, Florida A&M University, Tallahassee, FL 32307.

The Florida Panhandle is considered one of five biological hotspots in the continental United States due to the high concentration of endemic flora and fauna. A large portion of this diversity can be found within the unique drainage networks known as steephead ravines that carve into the deep permeable sandhills of the Citronelle Formation across panhandle Florida. Steephead ravines harbor particularly rich aquatic insect communities, but decades of anthropogenic disturbances such as headwater impoundments have impacted many of North Florida's delicate steephead habitats and associated communities. To date, the disturbance of steephead habitats has received little attention, and the impacts of headwater impoundments on aquatic communities are even more uncertain. In this study we are investigating how headwater impoundments have affected aquatic insect communities in steephead ravines. To do this, we are sampling aquatic insects and their terrestrial adults at three sites within the Apalachicola River Basin: below a current impoundment, below a recently removed impoundment, and at an undisturbed control stream. Species richness, diversity, and abundances, as well as functional feeding groups, will be compared among the three sites to determine the effects on the aquatic insect communities. Our overall goal is to provide important baseline data for assessing the health of impounded headwater ravine ecosystems across north Florida.

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Assessing Total Economic Impacts of Wildfires. K. Blakemore*, A. L. Parks, and O. A. Ojumu, Department of Agriculture, Nutrition and Human Ecology, Prairie View A&M University, Prairie View, TX 77446.

Wildfires create enormous environmental, economic and social impacts in the United States, and their occurrences have been steadily increasing over the past decade. These fires destroy forest and rangeland vegetation, adversely impact wildlife habitat, recreation and tourism, water quality and supply, and property values, with the extent of damage depending on the affected regions' forested landscape. Over this period, federal and state agencies keep records of the total acres burned, structures destroyed and fire suppression costs. There is limited empirical evidence regarding the magnitude of total economic damages, particularly the data on indirect and continuing impacts of the wildfire. Such limited analysis impacts issues like restoration costs, alteration of wildlife habitat, lost tourism revenue, and human health effects. The objective of the study was to estimate the total economic cost of the Boulder County wildfire on the whole county, not ignoring parts of the county that do not fall within the fire damage. The study uses market and non-market valuation method and concentrates on the Fourmile Canyon in Arapahoe-Roosevelt National Forest, Colorado-Boulder County over a 25-year period. Specifically, the study examined the total acres burned, the cost of fire suppression, damage to homes and structures, alteration of wildlife habitat, damage to public recreation facilities, tourism impacts, the costs of rehabilitation and restoration, and the public health impacts of wildfire in Boulder County. Preliminary results show that the magnitude of environmental, social and economic impacts from wildfires is dependent on the size, intensity and location of the fire.

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The Economic Impact of Federal Sustained Yield Unit on Community Well-Being. R. Taylor*, A. L. Parks, and O. A. Ojumu, Department of Agriculture, Nutrition & Human Ecology, Prairie View A&M University, Prairie View, TX 77446.

In 1944, the Federal Sustained Yield Forest Management Act authorized the creation of five Sustained Yield Units (SYUs). The original intent of the Act was to stabilize forest industries through continually harvesting in a designated area rather than exhausting timber in one area and moving to the next. Additionally, the Sustained-Yield Act proposed to stabilize communities, forest industries, employment, and taxable forest wealth. Of the five SYUs created, only two remain open. Several studies have shown that SYUs are no longer meeting the current objectives of forest-based communities. The aim of this study was to examine the economic impacts of SYUs, more specifically the economic impacts of the Grays Harbor Federal Sustained Yield Unit (GHFSYU) in Grays Harbor County, WA. Using four macroeconomic indicators, this study examined production efficiency in forest industries, investment in forest industries; employment and unemployment through shift-share analysis of SYU and non SYU

communities; taxable forest wealth; and community well being. Results from this study indicate that SYUs have the potential to contribute positively to community well-being; however, they are not as beneficial to the stabilization of forest-based communities as once perceived more than 60 years ago.

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Conservation Agriculture Production Systems for Food Security in Cambodia. S. Boulakia, S. Chabierski, and P. Kou, CIRAD-PADAC, General Directorate of Agriculture, Phnom Penh, Cambodia; and L. Hok*, and M. R. Reyes, Department of Natural Resources and Environmental Design, North Carolina Agricultural and Technical State University, Greensboro, NC 27411.

Degraded soils that cause low crop and soil productivity are increasing annually in Cambodia. Due to rapid expansion of agriculture, forests were cut and converted for food production. Newly cut forests' rich fertile soils produce excellent yield for a few years only, and are thereafter abandoned. Eventually, with its rapid population growth, Cambodia will be food insecure, and poverty will exacerbate. Conservation agriculture principles and practices, which involve minimal soil disturbance, continuous mulching and diverse species rotations, constitute the best 'tool box' to create sustainable, permanent cropping systems for annual crop production. Conservation agriculture production systems (CAPS) have been known to reverse soil degradation, increase crop yield and profits. Results showed a gradual increase in corn yield of 11% in CAPS plots, while yield in plow-based plots decreased by 30% within three years (2009 – 2011). The assessment of the main cropping systems indicated an increase over time in the Gross Profit Margin (GPM). Corn yield under CAPS increased from year to year, while costs decreased because of no-tillage, a decrease in weed pressure, etc. GPM on CAPS-managed plots was slightly lower than the traditional ones during the two first years. However, the constant decrease in yield observed in the plow-based systems led to an ineluctable drop in GPM, while yields from CAPS plots increased with the number of crop cycles. Apparently, CAPS will significantly minimize risks in food production systems by increasing crop yields and profitability of farmers in Cambodia.

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Natuculture: Conservation Agriculture in Urban Landscapes. D. I. A. Edralin*, L. Hok, K. Le Ngoc, M. Williams, and M. R. Reyes, North Carolina Agricultural and Technical State University, Greensboro, NC 27411.

Cities, where people tend to concentrate in search of jobs, can potentially become food deserts. Food deserts are areas where people have low access to safely and freshly grown food, particularly vegetables. Conservation agriculture (CA) is a sustainable way of producing food and is known to increase soil quality. While the number of farms being converted to CA is increasing, it has not been known to be practiced in urban landscapes. Following CA principles of minimum soil disturbance, continuous mulch and diverse species in urban lands will potentially provide safe and fresh vegetables to the household as well as improve the soil's physical, chemical and biological properties. A turf grass lawn at Sockwell Hall at NCA&T was converted into an oasis sofa. Oasis sofas are 3' by 6' raised beds for urban conservation agriculture. On treatments with cover crops, a mixture of red, white and crimson clovers were planted in fall 2011 prior to planting vegetables in summer 2012. The treatments with cover crop were planted to leafy vegetables prior to planting in summer 2012. The plants' height and total fresh biomass did not differ among treatments. The number of fruits and yield per oasis sofa of both tomatoes as well as eggplant were not significantly different. Okra's number of fruits and total fruit weight was significantly reduced by half, possibly due to producing less canopy cover, which may have encouraged the re-growth of clovers and increased competition for nutrients. Results of soil quality will be presented along with the fall 2012 vegetable yield.

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Urban Forest Structure Characteristics of Typical City Parks in Beijing. L. Gong*, Urban Forestry Program, Southern University, Baton Rouge, LA 70813 and School of Forestry, Beijing Forestry University, Beijing, P. R. China 100083; C. Xu, School of Forestry, Beijing Forestry University, Beijing, P. R. China 100083; and Y. Qi, Urban Forestry Program, Southern University, Baton Rouge, LA 70813.

The rising urbanization and human population growth means shrinking urban green space and increasing demands for natural experience. City parks, as the important part of urban green infrastructure, play a significant role in people's daily life for social well-being. This study characterizes the urban forest structure of typical city parks in Beijing, China. The purpose is to better understand the functions of city

parks in balancing the conflict between increasing human need and decreasing green space. From August to September 2010, a field investigation was taken in 9 city parks of Beijing. We selected 24 sample plots, each 20m x 20m, as the representatives of the most frequently occurring planting patterns in these city parks. Within each plot, height, diameter, canopy width and length of each tree and shrub were measured. The coverage rate of herb was observed. The general site information was recorded. During the same time, an on-site survey of “Public Acceptance of Forest Construction in Parks of Beijing” was taken in 8 parks, with 629 questionnaires collected including 99 invalid ones. The structure characteristics of tree species composition, species richness, diversity, uniformity, height, diameter, and density in typical city parks of Beijing were analyzed, and also taking public preference into consideration, we put forward some suggestions for forest management of city parks in Beijing.

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Effects of Urbanization on Rural Tennessee: Verifying Green Remediation for Remediation of Environmental Quality Issues in Williamson County, TN. A. Smith*, Agriculture Science Program, Tennessee State University, Nashville, TN 37209.

This paper addresses important issues that impact human environmental health in predominantly rural urbanizing counties in Tennessee. The object of this project is to investigate and determine the impact of activities associated with the landscape industry in Williamson County on environmental health. Williamson County is transitioning from rural/agriculture to suburban/urban. This process of urbanization is impacting farming operators and farmlands in the county. The landscape industry grows proportionately with population growth. The research project will be undertaken over the period January 2013 to December 2014. Soil quality and water quality will be monitored. Outputs will include workshops with information and education for local stakeholders on the benefits of using rain gardens, constructed wetlands, and phytoremediation techniques to remediate soil and water resources in Williamson County that have been impacted by landscape/horticulture operations. In depth research will be conducted on the use of Green Infrastructure, which can be applied to remediate environmental issues in urbanizing areas. Green Infrastructure is the concept of using rain gardens, bioswales, and phytoremediation in rural areas and communities to positively affect the health of the environment. These remediation tools facilitate cleanup of contaminated soils, assist in remediating water pollution issues, and aid in preventing serious flooding with minimal negative impact on the environment. Unlike traditional methods green remediation is an affordable, stable, and sustainable to environmental issues in urbanizing areas.

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Cloning of a cDNA Encoding the Muscadine Dihydroflavonol-4-Reductase (DFR) and its Expression in Transgenic Cell Lines Increases Flavonoid Flux. A. Ananga*¹, K. Acheampong², C. Zheng², E. Or², V. Georgiev¹, and V. Tsova¹, ¹Florida A & M University, College of Agriculture and Food Sciences, Center for Viticulture and Small Fruit Research, Tallahassee, FL 32317; and ²Department of Fruit Tree Sciences, Institute of Plant Sciences, Volcani Center ARO, Beit Dagan, 50250, Israel.

Flavonoids are a diverse group of phenolic secondary metabolites that occur naturally in plants and therefore form an integral component of the human diet. Many of the compounds belonging to this group are potent antioxidants. In vitro and epidemiological studies suggest a direct correlation between high flavonoid intake and decreased risk of cardiovascular disease, cancer and other age-related diseases. Modifying flavonoid biosynthesis in chosen crops may provide new raw materials that have the potential to be used in foods designed for specific benefits to human health. Muscadine grapes are known for their high antioxidant capacity, and there is a need to enhance the production of nutraceutical compounds in many cultivars. A clone representing a full-length of the dihydroflavonol-4-reductase (*DFR*) gene from muscadine grapes was isolated from the berry skin total RNA using the *Vitis vinifera* *DFR* gene as a probe. Sequence analysis of the clone confirmed homology to published *DFR* gene sequences. Nucleotide sequence homology of the full-length clones was highest to published *DFR* sequence from *V. vinifera* (about 94% identity) followed by *V. Amurensis*, *Prunus avium*, *Malus domestica* and *Pyrus communis*. When expressed using the CaMV 35S promoter, the *in vitro* transgenic muscadine grape cell lines were much darker red than the controls. Some heterogenous lines not normally highly pigmented, were also dark red. These data confirm the identity and function of the muscadine clones and further suggest that overexpression of the muscadine *DFR* could be used to increase anthocyanin production in transgenic plants.

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A Hierarchy of H4K12ac AND H3K9me2 Acquisition in Common Bean (*Phaseolus vulgaris* L.).

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Epigenetic modulation of gene expression is critical for cell differentiation, and extremely important for normal growth and development of higher eukaryotes. Epigenetic control is a complicated interplay between various molecular mechanisms like DNA methylation and histone modifications. Histones bind DNA that modifies the structure of the chromatin, making the DNA either accessible or inaccessible to normal cellular processes such as replication and expression. The established procedure to investigate histone modifications is Chromatin Immunoprecipitation (ChIP), which now combined with next generation sequencing is termed as ChIP-seq. Histone modifications have been studied in some model plants, but no such work reported in common bean. This study developed a ChIP methodology for common bean. Several ChIP-seq libraries were constructed from four common bean genotypes (Sierra, Bat93, Jalo, G19833) and one mung bean. Our goal is to identify differences in the locations of DNA binding as a result of two histone modifications-H4K12_{ac} (acetylation) and H3K9_{me2} (dimethylation). This will serve as the first reference histone-DNA interaction map for common bean.

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Alternative Food Legumes as Forages. H. L. Bhardwaj*, Agricultural Research Station, Virginia State University, Petersburg, VA 23806.

The New Crops Program of Virginia State University is evaluating several new food legumes (Chickpea, Fenugreek, Guar, Lablab, Mungbean, Mothbean, Pigeonpea, and Tepary bean) to diversify cropping system in the southern USA. A few of these crops also have potential as forage crops. Tepary bean (*Phaseolus acutifolius* A. Gray), a short-duration, drought-tolerant crop native to arid southwestern USA and pigeonpea (*Cajanus cajan* (L.) Millspaugh) have been observed to have considerable potential as summer forage crops. Contents of crude protein (%), ADF (%), NDF (%), and Net Energy (mcal/lb) in tepary bean forage, when grown in Petersburg (Virginia) have ranged from 15 to 26, 24 to 52, 28 to 59, and 0.33 to 0.62, respectively. Corresponding values for pigeonpea forage, when grown in Petersburg were dependent upon number of plants per row and planting date and ranged from 19 to 24, 36 to 40, 27 to 50, 0.36 to 0.70, respectively. An interesting observation was that these crops can be planted after winter wheat has been harvested and in case field corn crop fails due to environmental conditions. Pigeonpea, when planted on July 5, 2012 in Petersburg has been successful as a grain crop. In addition, this crop, when harvested as forage in late August, re-grew to provide substantial forage yield in mid-November. Further details indicating forage potential of these and other new food legume crops will be provided and discussed.

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Holistic Organic Farm Approach Update. J. E. Brown*, College of Agriculture, Family Sciences and Technology, Fort Valley State University, Fort Valley, GA 31030.

Holistic approach to organic farming may be a more suitable way to produce fruits, vegetables, and animals organically. Therefore, we are testing six methods of production in a diverse, multiple farming system (18.5 acres) in an effort to create profitable marketing opportunities for the grower as follows: 1) Organic Tree, Shrub and Vine Fruit Growing - designed for farmers who are interested in growing edible tree fruit and berries; 2) Organic Mini Barrel Gardening - designed to produce small fruits and vegetables in 20 to 30 gallon size plastic barrels; 3) Organic Small plot Gardening, 50 by 50 feet, - to determine the ideal size for a family of five or six people; 4) Organic Hoop House Gardening - designed for growers who want to extend the growing season of their organic crops; 5) Organic Animal Production - to determine grazing patterns of different animal species for producers who are interested in producing their own animals (i.e. cows, sheep, and goats) organically; and 6) Growing Vegetables on Plastic Mulch - designed to demonstrate how to produce vegetables using different colors of plastic mulches and organic matter to promote fruit and vegetable growth, conserve fertilizer and soil moisture, and weed control. With the completion of two years of growth and management practices according to Federal and State guidelines, we are hoping to have a certified organic farm within a four-year period.

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The Effects of Salinity on *Phytophthora ramorum* Viability and Infectivity. D. Collins^{*1}, J. Preuett², D. Luster³, and T. Widmer³, ¹Department of Agriculture, Alcorn State University, Alcorn State, MS 39097; ²Urban Forestry Program, Southern University, Baton Rouge, LA; and ³USDA ARS Foreign Disease-Weed Science Research Unit, Fort Detrick, MD.

Phytophthora ramorum, a threat to Eastern U.S. forests, has been found in waterways outside the boundaries of infested ornamental nurseries outside of California and Oregon. Very little is known about what factors are conducive to its survival and sporulation in water. Water collected from various sources with different salinity was used to better understand what effect salinity has on the life cycle of *P. ramorum* and its ability to infect tissue. Water samples, collected from natural bodies of water in May 2010 that had measured conductivity values of 5.6, 30.5, 32.3, and 35.3 ms, were added to cups containing *P. ramorum*-infested sand (1,000 chlamydospores/cm³). Rhododendron leaf disks were placed on the water surface for 1 week at 20°C and then plated on a *Phytophthora*-selective medium (PARPH+V8). Very few leaf disks ($\leq 3\%$) were infected at the three highest conductivity levels while 100% infection occurred at the lowest level (5.6 ms). Similarly, Rhododendron leaf disks were placed on the surface of different salt solutions (conductivities of 10.3, 26.5, 36.0, 57.2, and 67.9 ms) added to *P. ramorum*-infested sand at two chlamydospore levels (100 and 1,000/cm³) for 1 week and plated on PARPH+V8. The percentage of leaf disks infected exposed to 100 chlamydospores/cm³ were 61.1, 23.1, 3.3, 0, and 0%, respective of the above conductivity values, while the percentage of infection at 1,000 chlamydospores/cm³ was 100, 70.0, 55.6, 2.2, and 0%, respectively. This research demonstrates that *P. ramorum* can form infective propagules that infect plant tissue at high salt concentrations gaining an insight as to the survival and factors affecting infectivity of *P. ramorum*.

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Cell Suspension of Native American Muscadine Grape as Prospective Source of Nutraceuticals-Rich Biomass. V. Georgiev^{*}, A. Ananga, and V. Tsoleva, CAFS, Center for Viticulture and Small Fruit Research, Florida A & M University, Tallahassee, FL 32317.

Cell suspension of muscadine grape (*Muscadinia rotundifolia* (Michx.) Small. var. Nobel) was generated by repeated selection and adaptation to liquid cultivation of friable clusters from heterogeneous primary callus culture. The suspension was grown on submerged conditions in shaking flasks and 2.5 L stirred tank bioreactor for 25 days and the growth parameters were calculated. The contents of total phenolics, flavonoids and anthocyanins in produced biomasses were analyzed and the biological activities of their extracts, including antioxidant (DPPH, TEAC, FRAP and CUPRAC) and acetylcholinesterase inhibitory activities were evaluated. The level of produced total flavonoids was significantly higher in cell biomass cultivated in bioreactor, compared to callus and shaking flasks cultures (1.80 \pm 0.13 vs. 1.01 \pm 0.01 and 0.91 \pm 0.01 mg QE/g DW, respectively). The extracts, obtained by callus and bioreactor cultures, showed comparable antioxidant activities, which were significantly higher compared to shaking flasks culture. Anthocyanins fractions showed the highest antioxidant activities, followed by phenolics, flavonoids, polar and nonpolar compounds fractions. Polar compounds fraction showed the best antiacetylcholinesterase activities, followed by nonpolar and phenolics fractions, whereas flavonoids and anthocyanins fractions were inactive. The presented results clearly demonstrate that the stirred tank bioreactor is a suitable cultivation system for *in vitro* production of muscadine grape biomass, rich in various biologically active secondary metabolites.

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Identification and Characterization of Gene-Based SSR Markers in Date Palm (*Phoenix dactylifera* L.). Y. Zhao, R. Williams, C. S. Prakash, and G. He^{*}, Department of Agricultural and Environmental Sciences, Tuskegee University, Tuskegee, AL 36088.

Date palm (*Phoenix dactylifera* L.) is an important tree in the Middle East and North Africa due to the nutritional value of its fruit. Molecular Breeding would accelerate genetic improvement of fruit tree through marker assisted selection. However, the lack of molecular markers in date palm restricts the application of molecular breeding. In this study, we analyzed 28,889 EST sequences from the date palm genome database to identify simple-sequence repeats (SSRs) and to develop gene-based markers, i.e. expressed sequence tag-SSRs (EST-SSRs). We identified 4,609 ESTs as containing SSRs, among which, trinucleotide motifs (69.7%) were the most common, followed by tetranucleotide (10.4%) and dinucleotide motifs (9.6%). The motif AG (85.7%) was most abundant in dinucleotides, while motifs AGG (26.8%),

AAG (19.3%), and AGC (16.1%) were most common among trinucleotides. A total of 4,967 primer pairs were designed for EST-SSR markers from the computational data. We tested a sample of 20 random selected primer pairs for amplification and polymorphism detection using genomic DNA from date palm cultivars. Nearly one-third of these primer pairs detected DNA polymorphism to differentiate the twelve date palm cultivars used. Functional categorization of EST sequences containing SSRs revealed that 3,108 (67.4%) of such ESTs had homology with known proteins. Date palm EST sequences exhibit a good resource for developing gene-based markers. These genetic markers identified in our study may provide a valuable genetic and genomic tool for further genetic research and varietal development in date palm, such as diversity study, QTL mapping, and molecular breeding.

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Epigenetic Mechanisms in Plants with a Special Focus on Epigenomics of Biotic Stress in Common Bean. V. Kalavacharla^{*1}, E. Richards², J. Thimmapuram³, and T. Smonlinski⁴, ¹College of Agriculture and Related Sciences and Center for Integrated Biological and Environmental Research (CIBER), and ⁴Department of Computer and Information Sciences, Delaware State University, Dover, DE 19901; ²Boyce Thompson Institute for Plant Research, Ithaca, NY 14853; and ³Bioinformatics Core Center, Purdue University, West Lafayette, IN 47907.

Epigenetic mechanisms have been found to play integral roles in physiological processes in diverse species from bacteria to mammals. These non-sequence based genomic modifications are known to be widespread in plants and control processes such as flowering time, seed development, and responses to biotic and abiotic stress. These epigenetic changes in plants may be propagated through mitosis or meiosis, and are controlled through at least three mechanisms: DNA modification, histone modification and non-coding RNAs. Here we discuss research findings in model plant organisms in various areas of epigenetics, and specifically present current work in common bean. We are developing reference epigenomes from several common bean genotypes by using chromatin immunoprecipitation sequencing (ChIP-seq). Specifically, by using the common bean-bean rust interaction as a model system for epigenomics, differential histone-DNA interactions between mock-inoculated and inoculated plants will be identified at various time points, and relate this to global epigenetic mechanisms in the plant.

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Proteomic Analysis of Ripening Muscadine Berry to Identify and Characterize Proteins Associated with Synthesis of Metabolites Responsible for Superior Enological Characteristics. D. M. Kambiranda^{*}, and S. M. Basha, Center for Viticulture and Small Fruit Research, Florida A&M University, Tallahassee, FL 32317.

The muscadine industry is currently expanding throughout the southeastern United States as interest in grapes and wine increases nationally. However, muscadine grapes are not readily acceptable to consumers because of their poor berry and wine quality and short shelf life. Berry composition plays a major role in determining its acceptance as fresh fruit or wine grape. In muscadine grape little is known about the functional complexity of proteomic changes during berry development. Hence, proteome analysis of muscadine berry was conducted employing a quantitative proteome technique, iTRAQ to determine molecular and cellular changes that occur during berry maturation and ripening. Protein samples from different berry developmental and ripening stages were labeled with iTRAQ 8 plex reagents followed by LC/MS/MS analysis. Mass spectrometric data from four different replications was analyzed using Protein Pilot software's paragon search algorithm. The protein data was analyzed, and proteins were arranged into 12 categories based on their function. From these categories proteins of enological significance were identified and grouped into carbohydrate and organic acid metabolism, and polyphenols categories. The data analysis showed that in pre-*véraison* phase, expression profiles of carbohydrate metabolizing enzymes were consistent with sucrose conversion to malate. In post-*véraison* phase, up-regulation of enzymes involved in polyphenols production was observed. The majority of proteins expressed under the polyphenols category are involved in terpenoid, flavonoid and anthocyanins biosynthesis. A detailed analysis of function-related protein profile helped discover a set of proteins as the potential candidates for improving muscadine berry quality.

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Pollination Efficacy of the Blue Orchard Bee (*Osmia lignaria* Say) in Eastern Orchards.

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Native bees in the family Megachilidae are used as orchard pollinators in Japan, the US, and Europe. The blue orchard bee (*Osmia lignaria* Say) is native to most of temperate North America and has been used for pollination of fruit and nut trees in western North America. We used similar management techniques to evaluate these bees in eastern orchards over a 4 year period. Nest establishment and population growth were determined using artificial nesting boxes placed in and near five orchards in Virginia and North Carolina. Pollen samples were removed from individual nest cells, cleaned, and individual pollen grains identified using a scanning electron microscope. Bees did not stay in the orchards. Nest provisions included pollen from several tree, shrub, and weed species. Most cells had pollen from at least 2 sources and orchard pollen was usually not predominant. Pollen from the flowers Eastern redbud (*Cercis canadensis* L.) was most common, followed by oak, willow, and black gum. Because eastern orchards are usually small and surrounded by deciduous forests it is likely that the blue orchard bee will provide only limited pollination services to commercial orchards unless methods are developed to better restrict their foraging to orchards.

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Effects of Organic Mulching on Microbial Biomass, Enzyme and Mineralization Activity in Relation to Soil Organic Carbon, P, and N under Organic System. R. N. Mankolo*, and L. M. Nyochembeng, Department of Biological and Environmental Sciences, Alabama A&M University, Normal, AL 35762.

Agricultural management practices that improve soil quality and control insect-weeds are needed to maintain high crop productivity under organic system. This study was conducted to determine the effect of long term application of different organic mulches on soil organic matter, microbial biomass and mineralization processes involved for Carbon (C), Nitrogen (N), and Phosphorus (P) turnover. Field experiment was conducted for three years on a Decatur silty clay loam (Clayey, Kaolinitic, thermic Rhodic Paleudults) soil. Total enzyme activity and four hydrolase activities (b-glucosidase, urease, acid and alkaline phosphatases) under three different organic mulches were used to characterize the soil functional diversity. The three organic mulches tested were spent mushroom compost (SMC), Sudan x sorghum hybrid (SS), and spent mushroom compost + Sudan x sorghum hybrid (SMC+SS). Partial results indicate substantial improvement in the enzyme activities, C, N, and P mineralization, especially spent mushroom compost+ Sudan x sorghum hybrid (SMC+SS) performed better than spent mushroom compost (SMC) and Sudan x sorghum hybrid (SS) alone. In conclusion, the analysis of biochemical indices can provide a reliable comprehensive indication of changes in soil quality and organic nutrient cycling, after long term application of organic mulching.

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A More Improved Peanut (*Arachis hypogaea* L.) Protocol for Direct Shoot Organogenesis in Mature Dry-Cotyledonary and Root Tissues. K. Matand*, N. Wu, E. Tucker, and K. Love, Center for Biotechnology Research and Education, Langston University, Langston, OK 73050.

Peanut is an important economic legume whose improvement could greatly benefit from integrating both classical and modern techniques. Although biotechnology techniques (tissue culture and gene transformation) have been used with the peanut, they have mainly focused on standard organs, such as, the leaf, stem, and embryo axis. Little has been achieved using seed cotyledon; primarily, because of the limited success with seed cotyledons when using *in vitro* culture for adventitious plant formation. The main purpose of this study was to develop a tissue culture protocol that could induce direct shoot formation in dry peanut cotyledon and root tissue more efficiently. This goal was achieved by preparing mature dry seeds in four explant types, including the whole cotyledon, half cotyledon, diced cotyledon and two-side sliced cotyledon, and root segments from germinating embryos pre-cultured for 0, 1, 2, 3, 4, 5, 6, or 7 days on hormone-free culture medium. The culturing of those explants on nutrient media containing kinetin, 6-benzylamino purine, 2, 4-dichlorophenoxyacetic acid, or thidiazuron used alone or in combinations of cytokinin with auxin resulted in the greatest number of multiple shoots per explant (93). The proximal region formed more shoots than the distal region. However, overlapping multiple shoot formation in both regions was greater than current protocols. Thidiazuron-based treatments induced greater shoot formation in cotyledon than other growth-regulator treatments. No root tissue explants that were pre-cultured more

than one day formed shoots. All newly formed shoots were transferred onto control medium without growth regulators for rooting and subsequently grown normally in the greenhouse.

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Quantification and Analyses of Histone Deacetylase Activity During Rust Fungal Inoculation in Common Bean (*Phaseolus vulgaris* L.). K. Melmaiee^{*1}, A. Brown², V. Ayyappan¹, and V.

Kalavacharla^{2,3}, ¹Department of Ag & Natural Resources, ²Department of Biological Sciences, and ³Center for Integrated Biological and Environmental Research (CIBER), Delaware State University, Dover, DE 19901.

Histone deacetylases (HDACs) are one of the primary causes of epigenetic changes of a genome by modifying the structure of the DNA. HDACs remove acetyl groups from histone proteins thereby repressing the transcriptional activity and are mostly associated with heterochromatin regions. As there was no prior study on epigenetic modification of common bean during rust fungal infection, we were interested in measuring the changes in HDACs levels at 0, 12 and 84 hours after inoculation in inoculated and mock inoculated plants. Our study shows that the total amount of HDACs decreased at 12 hours in inoculated plants than in mock inoculated plants.

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Map Based Phylogenies, Linkage Disequilibrium and Association Mapping for Fruit Traits in Melon.

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Melon (*Cucumis melo* L.) has tremendous fruit diversity, which is the product of complex interactions of consumer preferences of different countries and a wide range of agro-climatic zones. Understanding footprints of divergence underlying formation of various morphotypes is important to develop sustainable and high quality melons. Basic understanding of population structure and linkage disequilibrium (LD) is limited in melon and has lagged behind when compared to the other crops. Characterization of population structure and LD are essential for carrying out association mapping of QTLs (quantitative trait loci) underlying various complex traits. Mapped single locus microsatellite markers are known to be very valuable to resolve population structure and 268 of such markers were used in the current study to resolve population structure and LD pattern using 87 accessions of melons belonging to Eastern European, Euro-North American and Asian types. Mixed linear model (MLM) was implemented to detect QTLs for various fruit traits. Various levels of QTLs with high to moderate stringency were detected for fruit shape, fruit weight, soluble solids, and rind pressure and a majority of them found to be tallied with the previously published indicating that the association mapping can be very useful for melon molecular breeding. Minor discrepancies in the position, strength and the variation absorbed by the QTLs present between the methods of association and recombinant mapping approaches can be bridged if more melon groups and larger sets of accessions are involved in future studies combined with high throughput marker panels.

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An Update on New Pawpaw Variety Development at Kentucky State University. K. W. Pomper^{*}, S. B. Crabtree, and J. D. Lowe, College of Agriculture, Food Science, and Sustainable Systems, Kentucky State University, Frankfort, KY 40601.

The North American pawpaw is in the early stages of commercial production in the eastern United States. Pawpaw fruit are usually sold at farmers markets, organic grocery stores, through direct sales to restaurants and through community supported agriculture. Producers are now also looking for methods to process pawpaw fruit and for varieties that would facilitate pulp processing. Kentucky State University serves as the USDA repository site for pawpaw species and has a wide selection of unique pawpaw germplasm. The objective of the KSU horticulture program is to screen existing repository germplasm and conduct breeding approaches to develop superior pawpaw varieties for fresh market production and for pulp processing. As a result of these efforts an advanced selection trial was initiated in 2011 containing the selections G4-25, G5-23, G6-120, G9-109, G9-111, Hi4-1, and Hy3-120 that were identified in 2008 and 2009. Additionally, two selections were identified in 2010, Haz-1 and Hi7-5. Both of these selections have excellent fruit size and fruit characteristics. Hi 7-5 has an appealing globe shaped fruit and mango like flavor, and should serve well for the processing and fresh market. Haz-1 has good fruit size, a dark orange

pulp, and strong mango flavor and should serve well in the processing market. Yield trials will be conducted at multiple sites to test for yield and regional suitability.

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Transcriptome Analyses of the Sweetpotato Root: Towards Identification of Genes Involved in Tuber Formation. S. K. Ponniah^{*1}, V. Kalavacharla², J. Thimmapuram³, and M. Manoharan¹, ¹Department of Agriculture, University of Arkansas at Pine Bluff, Pine Bluff, AR 71601; ²Department of Agriculture & Natural Resources, Delaware State University, Dover, DE 19901; and ³Cyber Center/College of Agriculture, Purdue University, West Lafayette, IN 47907.

The storage roots of sweetpotato (*Ipomoea batatas*) provide high levels of digestible nutrients and fiber. Although morphological data indicate that the tuberizing events result from the activation of the cambium followed by cell proliferation, detailed molecular information on genes controlling tuber formation is lacking in sweet potato. In order to understand the mechanism of tuberization, we have carried out RNA-Seq analyses of both hexaploid (tuber forming cultivated species-Beauregard) and non-tuber forming ancestor – *Ipomoea trifida* root tissues. Transcriptome sequencing using short-read technologies (RNA-Seq) generates millions of short sequence reads. The *de novo* assembly of these sequence reads will be useful for annotation, since the sweetpotato reference is as of yet poorly annotated. Currently we are in the process of developing both hexaploid and tetraploid maps of both the genome assemblies and relating this to existing genomic and transcriptomic sequences. These two annotated genomes could help understand the synteny between these two species and to identify unique genes involved in tuberization in sweetpotato. The unique list of tuber-forming genes, transcriptome-derived microsatellites, and single nucleotide polymorphisms (SNPs) will be presented at the conference.

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Molecular and Cellular Approach to Understand Sugar Metabolism in Muscadine Grape. S. M. Basha^{*}, and D. M. Kambiranda, Center for Viticulture and Small Fruit Research, Florida A&M University, Tallahassee, FL 32317.

Muscadine grapes (*Vitis rotundifolia*) are widely used for making wine and eaten as fresh fruit. Sugar accumulation is an important event in berry ripening physiology and is vital for sustaining superior enological characteristics and value of grape products. Differences in berry physiology can alter its sugar content and composition, and adversely affect quality and product value. To better understand sugar metabolism in muscadine grape, sugar accumulation pattern and its metabolizing enzyme activities were studied during berry development and ripening. Biochemical analysis of berry revealed accumulation of large amount of sucrose and low glucose:fructose ratios in muscadine berry compared to bunch grape. Sugar metabolizing enzyme assays revealed that muscadine grape contained lower amount of invertase compared to bunch grape. Real Time PCR analysis of berry mRNA showed no major differences in invertase-mRNA levels among the Bunch, Florida Hybrid Bunch and Muscadine genotypes. Further studies on invertase enzyme activity of these genotypes revealed possible presence of invertase-inhibitor in Muscadine berry. Invertase inhibitor from muscadine berry was amplified using berry RNA and gene specific primers by RT-PCR. Sequence analysis revealed that Muscadine invertase-inhibitor nucleotide sequence has 95% homology with *V. vinifera* inhibitor sequences. The deduced amino acid sequence showed variation in invertase-inhibitor amino acids sequences between *V. vinifera* and *V. rotundifolia*. These data suggested that sugar metabolism in muscadine berry is distinct, and low sucrose breakdown results in sucrose buildup in berry, and this may cause feedback inhibition and reduced sugar transport from leaf to berry.

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Response of *Ocimum tenuiflorum* (Basil) Photochemical Content to Different Levels of Nitrogen in North Alabama. C. A. Sims^{*}, Department of Agriculture, Alcorn State University, Alcorn State, MS 39096.

Ocimum tenuiflorum, belonging to mint family, Lamiaceae (Labiatae), is a popular herb containing essential oil with medicinal, antioxidant and antimicrobial properties. A field trial was conducted to determine the response of the photochemical content of *O. tenuiflorum* to different levels of nitrogen in North Alabama. Four kg/ha of N (0 control, 75, 150 and 225) were applied in a completely randomized block design within *Ocimum* accession PI 652056. The treatments were harvested monthly and compared for essential oil content, composition and photochemical profiles of leaves and stems. The major

constituent eugenol with the highest amount of 47.9% and 40.7% 0 kg N/ha treatment at first harvest (30 DATP), and for 150 kg/ha at second harvest (60 DATP), respectively. Nitrogen level at 0 kg/ha decreased in relative oil percentage from first to second harvest (47.0% to 34.9%, respectively), while 75, 150 and 225 kg/ha increased in relative oil percentage from first to second harvest. The different harvest times displayed a completely different relative oil percentage. There were some oils indicating a stronger relative oil percentage during the first harvest (Linalool and trans- β -guaiene), as were some having a stronger relative oil percentage during the second harvest (eugenol, methyl chavicol and 1,8-cineole). Of the 28 essential oil components identified in the oil, eugenol, (Trans)- β -guaiene, methyl chavicol, 1, 8-cineole and linalool were most abundant at all harvest stages. This chemotype of *O. tenuiflorum* may have potential as an alternative source of medicinal herb in Alabama and possibly in the southeastern United States.

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Developing Resources for Understanding Epigenomics in Common Bean (*Phaseolus vulgaris* L.). Y. Thurston^{*1}, and V. Kalavacharla^{1,2}, ¹College of Agriculture and Related Sciences, and ²Center for Integrated Biological and Environmental Research (CIBER), Delaware State University, Dover, DE 19901.

Over time, common bean has proven worldwide to be a nutritional and economical legume that has hope of feeding the world's growing population. Our research outlines epigenetic methods involving DNA methylation, chromatin remodeling, small RNA analysis, which show promise in improving common bean resources and lead to a better understanding of legume crops. Briefly, we focus on the role of epigenetics in disease resistance and susceptibility to bean rust. As we learn more about epigenetic factors, common bean resources are being developed which allows us to better understand how plants react to the fungal pathogen.

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Identification and Analyses of Leaf Transcriptomes in Fungal Rust-Challenged Common Bean (*Phaseolus vulgaris* L.). A. Todd^{*1}, V. Kalavacharla^{1,2}, N. Donofrio³, ¹College of Agriculture and Related Sciences, and ²Center for Integrated Biological and Environmental Research (CIBER), Delaware State University Dover, DE 19901; and ³Department of Plant and Soil Sciences, University of Delaware, Newark, DE 19716.

Common bean (*Phaseolus vulgaris* L.) is an economically important crop grown in the U.S. and is a major source of protein and fiber throughout the world. The *Ur-3* gene confers resistance to 44 of the 89 races of the fungal rust pathogen *Uromyces appendiculatus* curated in the United States. Race 53 of bean rust is avirulent on resistant cultivar 'Sierra' and is virulent on susceptible cultivar 'Olathe' as well as Sierra-derived mutants *crg*, *ur3-Δ2* and *ur3-Δ3*. While *ur3-Δ2* and *ur3-Δ3* are allelic and both susceptible to race 53, mutant *crg* carries a deletion in the *Crg* gene which is required for *Ur-3*-mediated resistance. Smaller rust pustules are produced on mutant *crg* than mutants *ur3-Δ2* and *ur3-Δ3*. Susceptible plants that are challenged with race 53 exhibit the formation of rust pustules on their leaves, while resistant plants exhibit hypersensitive resistance (HR), causing small necrotic spots at the site of infection. We seek to employ methods which aim to understand interactions between common bean and fungal rust in such wild type and Sierra-derived mutant plants by capturing transcriptional changes in various mock inoculated (MI) and inoculated (I) leaf tissues collected at 0, 12, and 84 hours post inoculation. The Illumina sequencing method is used to generate transcriptomic information. Our long term goal is to isolate and characterize the gene(s) involved in gene for gene interactions between *U. appendiculatus* and common bean.

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DArT Markers for Pumpkin Phylogenies and Association Mapping. V. G. Vajja^{*1}, Y. Tomason^{1, 2}, U. K. Reddy¹, and P. Nimmakayala¹, ¹Gus R. Douglass Institute & Department of Biology, West Virginia State University, Institute, WV 25112; and ²Department of Plant Breeding, Dnepropetrovsk State Agrarian University, Voroshilov 25, Dnepropetrovsk 49600, Ukraine.

We used 1200 genome wide DArT (Diversity Array Technology) markers on 233 accessions belonging to the entire representative *Cucurbita* species and resolved genetic and evolutionary relationships among various species. Based on Delta K across the clusters (estimated using the program STRUCTURE 2.3.2), we noted that the *Cucurbita* spp. collections in our study have 8 (K-8) sub-clusters. We performed association mapping using General Linear Model (GLM) and Mixed Linear Model (MLM) using the program TASSEL 2.4. Common markers are identified for fruit weight (FW) (75 markers) and soluble solids (SS) (89 markers) that can be used for marker-assisted selection to simultaneously improve yield and

quality. Two markers were identified to be linked with the resistance to Cucurbit Powdery Mildew (CPM). This is the first QTL identification study using association mapping in pumpkins. We used 75 FW markers and 89 SS markers separately to analyze LD (Linkage Disequilibrium) in whole *Cucurbita* genome and separately in various species. Our LD study showed that the blocks of markers (red) distribution is quite varied from species to species and some species have more blocks (red spots on top edge) when compared to the other species. For example, *C. pepo* was with fewer alleles for FW and SS than the other species. *C. argyrosperma* and *C. moschata* indicated a shared ancestry for both fruit weight and soluble solids. *C. maxima* contained alleles for FW and SS that are completely unshared indicating that this species belong to different lineage than others.

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de novo Next-Generation Sequencing, Assembling and Annotation of *Arachis hypogaea* L. Spanish Botanical Type Whole Plant Transcriptome. N. Wu*, K. Matand, S. Conley, M. Bailey, and G.

Acquaah, Center for Biotechnology Research and Education, Langston University, Langston, OK 73050.

Peanut (*Arachis hypogaea* L.) is a major member of the legume family and an important source of plant oil, proteins, vitamins, and minerals for human consumption, animal feed, bioenergy, and health products. Peanut genomic research efforts lag behind those of other legumes of economic importance, mainly due to the shortage of essential genomic infrastructure, tools, resources, and the complexity of the peanut genome. This research with Spanish peanuts is a pioneering study that explored the whole plant (including leaf, stem, flower, root, pod, and peg). This study also examined transcriptome and developed related unigene database by applying normalization and next-generation sequencing technologies. The study sequenced 8,308,655,800 nucleotides and generated 26,048 unigenes among which 12,302 were annotated and 8,817 were functionally characterized. The remaining 13,746 (52.77%) unigenes, had unknown functions. These results can be applied as the reference genome sequences for expanded transcriptome sequencing for three other peanut botanical types. The results can also be used for RNA-seq, exome identification, and potential genomic marker development. This study will provide important tools and resources for other plant genomic research.

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Characterization and Compilation of Polymorphic Simple Sequence Repeat (SSR) Markers of Peanut from Public Database. Y. Zhao*, C. S. Prakash, and G. He, Department of Agricultural and Environmental Sciences, Tuskegee University, Tuskegee, AL 36088.

There are several reports describing thousands of simple sequence repeat (SSR) markers in the peanut (*Arachis hypogaea* L.) genome. There is a need to integrate various research reports of peanut DNA polymorphism into a single platform. Further, because of lack of uniformity in the labeling of these markers across the publications, there is some confusion on the identities of many markers. We describe below an effort to develop a central comprehensive database of polymorphic SSR markers in peanut. We compiled 1,343 SSR markers as detecting polymorphism (14.5%) within a total of 9,274 markers. Amongst all polymorphic SSRs examined, we found that AG motif (36.5%) was the most abundant followed by AAG (12.1%), AAT (10.9%), and AT (10.3%). The mean length of SSR repeats in dinucleotide SSRs was significantly longer than that in trinucleotide SSRs. Dinucleotide SSRs showed higher polymorphism frequency for genomic SSRs when compared to trinucleotide SSRs, while for EST-SSRs, the frequency of polymorphic SSRs was higher in trinucleotide SSRs than in dinucleotide SSRs. The correlation of the length of SSR and the frequency of polymorphism revealed that the frequency of polymorphism was decreased as motif repeat number increased. The assembled polymorphic SSRs would enhance the density of the existing genetic maps of peanut, which could also be a useful source of DNA markers suitable for high-throughput QTL mapping and marker-assisted selection in peanut improvement and thus would be of value to breeders.

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Implementation of Extension IPM on Selected Vegetable and Fruit Crops in North Florida.

M. Haseeb^{*1}, G. Umar², B. R. Phills², O. Mbuya³, V. Richardson⁴, and A. Bolques⁴, ¹Center for Biological Control, ²Center for Viticulture and Small Fruits Research, ³Center for Water and Air Quality, and ⁴Cooperative Extension, College of Agriculture and Food Sciences, Florida A&M University, Tallahassee, FL 32307.

Pests continue to pose serious challenges to vegetable and fruit production in North Florida. Implementation of IPM is therefore essential to improve competitiveness of vegetable and fruit production and to enhance environmental sustainability. Since 2009, we have established several training and demonstration plots to conduct field days and workshops with a specific aim to promote healthy vegetable and fruit crops. The availability of these demonstration plots has enhanced the capacity for IPM training to farmers and other clientele including backyard growers and students. Several season based, annual and one time field days and workshops were organized including: i) two field days were conducted on the vegetable and fruit production strategies in June 2012 and these were attended by more than 30 participants; ii) a vineyard management and small fruit pruning workshop was organized in February 2012, attended by 30 participants; iii) In March, 'let's grow workshop' was organized targeting beginning and advanced farmers and community gardeners interested in just eating healthy; iv) two grape and small fruits harvest festivals were organized in August 2011 & 2012, attended by more than 5000 participants; and v) two fall vegetable and fruit field days were organized in October 2011 and June 2012 these field days were attended by 35 participants. The demonstration plots have provided a good vehicle for practical application and dissemination of different IPM approaches for selected vegetable and fruit crops. More effective linkages with stakeholders are being established providing the opportunity for problem identifications and development of more appropriate solutions.

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Specialty Crops in North Carolina Piedmont: Making Meaningful Choices for Sustainable Pest

Suppression (IPM). L. E. N. Jackai*¹, H. O. Sintim¹, J. L. Fry¹, B. N. Dingha², and B. M. Rodriguez¹,
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The production of specialty crops in the South has become increasingly popular among small vegetable growers, partly because of increasing demand for organic and locally grown produce. As a result, growers must find ways to grow crops with little or no pesticides. The pest complex coupled with food safety concerns make this truly challenging. Growers ultimately determine which pesticides to use; however, scientists need to provide them enabling options to facilitate this choice. We conducted studies aimed at developing sustainable pest management approaches for insect pests of selected specialty crops at the N.C. A&T State University Farm. We evaluated biorational and low risk synthetic insecticides (neem-derived products Agroneem[®], Azatin[®] & Neemix[®], Spinosad[®] a microbial formulation, and Actara[®], a synthetic neonicotinoid insecticide) for their efficacy as single products or mixtures for control of pests on cowpea, pigeon pea, egg plant and collard, and their impact on crop yield and natural enemy abundance. The results show that even among similar insecticides (neem) control is variable, and inherent risks exist in over-reliance on biorational insecticides. Spinosad[®] controlled mandibulate herbivores (caterpillars and coleopterans) but not haustellate pests (stink bugs and phytophagous mites). Actara[®] suppressed sucking insects such as the harlequin bug on collards but also promoted mite reproduction on egg plants. Corn earworm on pigeon pea, the crucifer caterpillar complex and the harlequin bug on collards were effectively managed with Actara[®] alternated with Spinosad[®]. Yields from neem insecticide plots were comparable to those from Actara[®]-treated plots. Beneficial arthropods were seemingly unaffected by the biorational treatments.

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Developing Trap Cropping Systems for Effective Organic Management of Key Insect Pests of Cucurbit Crops (IPM).

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Trap cropping is a behaviorally-based pest management approach that functions by planting highly attractive plants next to a higher value crop so as to attract the pest to the trap crop plants, thus preventing or making less likely the arrival of the pest to the main crop (= cash crop). In 2012, a series of studies aimed at comparing the effectiveness of Blue Hubbard squash, Red Kuri Hubbard, and Buttercup squash as trap crops to manage three key insect pests of cucurbits in organic systems were conducted in Missouri and Florida. The three key insect pests targeted were spotted cucumber beetle (*Diabrotica undecimpunctata howardii*), striped cucumber beetle (*Acalymma vittatum*) (both Coleoptera: Chrysomelidae), and squash bug (*Anasa tristis*) (Heteroptera: Coreidae). Our results indicate that significantly fewer insect pests were consistently recorded on a per plant basis in the cash crop (zucchini) compared to the trap crops, indicating

excellent performance of trap crop plants at attracting multiple insect pest species. For cucumber beetles trap crop performance was better early in the season compared to late in the season due to the presence of attractive flowers in the cash crop, but for squash bug all trap crop species performed equally well throughout the season.

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Using Native Perennial Plant Borders for Small Farm Integrated Pest Management Programs at Kentucky State University (IPM). J. D. Sedlacek*, K. L. Friley, J. J. Haak, and J. A. Riddick, College of Agriculture, Food Science, and Sustainable Systems, Kentucky State University, Frankfort, KY 40601.

Native perennial plants create habitat for wildlife species including beneficial insects. Attracting beneficial insects in a farmscaping approach can be important in trying to establish sustainable methods of insect pest management in vegetable and fruit crops. Non-crop vegetation such as grasses and floral strips planted as crop field margins can enhance populations of predaceous arthropods and parasitoids. Thus, the objective of this study was to compare insect groups colonizing newly established perennial borders vs. non-mowed mixed grass/weedy pasture borders. This study was conducted at the Kentucky State University Research and Demonstration Farm in Franklin Co., KY. Big bluestem (*Andropogon gerardii*), thimbleweed (*Anemone virginiana*), New England aster (*Aster novae-anglica*), side-oats grama (*Bouteloua curtipendula*), purple coneflower (*Echinacea purpurea*), gray-headed coneflower (*Ratibida pinnata*), rattlesnake master (*Erygium yuccifolium*), common boneset (*Eupatorium perfoliatum*), blue lobelia (*Lobelia siphilitica*), bee balm (*Monarda fistulosa*), switchgrass (*Panicum virgatum*), foxglove beardtongue (*Penstemon digitalis*), hairy beardtongue (*Penstemon hirsutus*), slender mountain mint (*Pycnanthemum tenuifolium*), little bluestem (*Schizacharium scoparium*), and prairie dropseed (*Sporobolus heterolepis*) were established in 25 m x 2 m border rows replicated three times during June and July of 2011. Insects were sampled using 15 cm x 15 cm sticky traps and 475 ml pitfall traps in each border row. Lady beetles, solitary bees, soldier beetles and green lacewings were the foliage dwelling insects caught while ground beetles, rove beetles and spiders were the primary soil surface dwellers caught. Results will be discussed relative to the two types of borders and potential importance to small farm Integrated Pest Management.

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Molecular Biomarkers and Resistance in Goats Pasture-Exposed to *Haemonchus contortus*.

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Goats (*Capra hircus*) that exhibit disease resistance characteristics can increase the price of goat from \$250 to \$800 per head. In the U.S., *H. contortus* treatment can cost over \$3 billion. The mechanism of genetic resistance to *H. contortus* continues to be an enigma. The correlation between parameters of *H. contortus* infection (FAMACHA (FAM) eye color charts, packed cell volume (PCV), fecal egg counts (FEC)) and the ability to evaluate parasite resistance through molecular biomarker analysis needs to be assessed in goats. This work focused on molecular biomarkers that may influence host characteristics such as genetic resistance, innate and adaptive immunity, and gastrointestinal motility. This study evaluated selected parasite-resistant goats. Whole blood and abomasal and intestinal tissues were harvested from goats exhibiting resistance to *H. contortus* based on standard and DNA detection methods, Enzyme Linked Immunosorbent Assay (ELISA), Reverse Transcriptase PCR (RT-PCR), and quantitative Real Time PCR (qRTPCR). Breed and gender influenced gene expression of cytokines in parasite-resistant goats. Genes controlling gastrointestinal motility were up-regulated in goats naturally susceptible to *H. contortus* infection. Breed and gender differences were also observed. Overall, there was a strong correlation between immune and gastrointestinal motility biomarker expression and FAMACHA, FEC and PCV. These data indicate that select molecular biomarkers may be useful in elucidation of the mechanism of genetic resistance to *H. contortus* in goats, allowing biomarker-based anthelmintic drug development, and giving goat producers the ability to select resistant animals.

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Reclaimed Water Aquaculture: An Innovative Sustainable Technology of Producing Fish.

R. Cuevas-Urbe*, and S. D. Mims, College of Agriculture, Food Science, and Sustainable Systems, Kentucky State University, Frankfort, KY 40601.

Reclaimed water is treated wastewater that has received at least secondary treatment and disinfection, and is reused for a beneficial purpose, such as indirect potable reuse. Around 32 billion

gallons per day of reclaimed water is produced in United States, and just 7 to 8 percent is reused. There is a tremendous potential for expanding the use of reclaimed water. Kentucky State University has been conducting research to develop a novel application of reclaimed water to be used in aquaculture. Four decommissioned wastewater treatment plants have been adapted by renovating lagoons and clarifier tanks, and retrofitting them with reclaimed water. Hybrid catfish (female channel catfish *Ictalurus punctatus* x male blue catfish *I. furcatus*), hybrid striped bass (female white bass *Morone chrysops* x male striped bass *M. saxatilis*), and paddlefish (*Polyodon spathula*) are being studied for fingerling and market production. Further, efforts are on-going to assess the food safety of these species by monitoring bioaccumulation of heavy metals, organochlorine, and endocrine disruptors in the tissue of fish compared to those raised in traditional culture systems. With better methods for processing wastewater, many municipalities are now building new, larger facilities, and decommissioned the old ones, many of which include sedimentation ponds and tanks that could easily be converted for fish culture. Many are being needlessly demolished, when recycling them for aquaculture could save the community demolition costs, create new jobs and generate revenue for rural communities and their economies as well as increase food fish supply in the United States.

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Effects of Feeding a Pelletized Diet Containing Pumpkin Seeds on Nematode Fecal Egg Counts (FEC), and Blood Hematocrit (PCV) in Meat Goat Kids. E. N. Escobar*, J. Rodriguez, A. N. Gideon, V. Purnell-Cropper, and H. Taylor, University of Maryland Eastern Shore, Princess Anne, MD 21853.

This investigation was conducted to evaluate the effect of ground pumpkin seeds (*Cucurbita* sp.) on *Haemonchus contortus* infections in meat goat kids (*Capra aegagrus hircus*). To minimize feedstuff selection, pumpkin seeds (PS) were ground and incorporated into the pelletized mixture. Sixteen 6- to 8-month-old females and castrated male kids, average BW 20.8 ± 4.6 kg, were used. Following a 2-week adjustment period, the kids were assigned to individual pens (1.9 x 2.3 m) with slotted floors. The kids were dewormed with albendazole (Valbazen® 10 mg/kg) and Cydectin® (0.2 mg/kg). After a 21-day dewormer withdrawal period, all goat-kids were orally inoculated three times, every other day, with a larval inoculum containing 1,450 L3 *H. contortus*. A pelletized commercial 15% CP diet was used as the control (CTRL) feed (n = 8 kids). The treatment feed (TRT) was formulated with similar ingredients as the CTRL diet plus 21% PS, calculated to be similar in protein and energy content (n = 8 kids). The experimental diets were fed for 8 consecutive weeks. Weekly, the kids were weighed, and rectal fecal and blood samples were collected. The Modified McMaster Technique was used to determine FEC (eggs/gram), and hematocrit (PCV) was determined in whole blood. After 8 weeks, the values for FEC were 473.2 and 478.5 for the CTRL and TRT kids, respectively. The values for PCV were 26.07% and 27.30% for the CTRL and TRT kids, respectively. Ground PS fed at a level of 21% incorporated into a pelletized diet failed to reduce *H. contortus* burdens in goat kids expressed as FEC and PCV.

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Effects of Dietary Lipid Levels on the Growth, Feed Efficiency and Mitochondrial Function in Rainbow Trout. J. C. Eya*, M. F. Ashame, and C. F. Pomeroy, Department of Biology and Gus R. Douglass Institute, West Virginia State University, Institute, WV 25112; and A. L. Gannam, USFWS, Abernathy Fish Technology Center, Longview, WA 98632.

A 2 x 3 factorial experiment was conducted to evaluate the effects of rainbow trout full-sibling families (designated as 129 or 134) and practical diets (42/10, 42/20 or 42/30 percent protein/fat) on the performance, mitochondrial respiratory chain enzyme activities, and mitochondrial gene expression in the liver, muscle and intestine. Two full-siblings of rainbow trout (average weight \pm SD = 106 ± 3.04 g and 97.84 ± 4.02 g for the full-sib families 129 and 134, respectively) were stocked into eighteen 152-L aquaria at a density of 11 fish/aquarium. Results indicated that family type had significant ($P < 0.05$) main effects on weight gain, FE and SGR. Diet composition had significant ($P < 0.05$) main effect on feed consumption, weight gain, FE, CF, and SGR. Family 134 with the low weight gain and FE had significantly ($P < 0.05$) low nutrient efficiencies in terms of PER, PPV, EER, LPV and LER compared to family 129. There was significant interaction ($P < 0.05$) between family and diet for mitochondrial respiratory control ratio. There were variations in the mitochondrial complex enzymatic activities in different tissues. There were significant interactions between family and diet in the expression of the mitochondrial genes in the liver, intestine and muscle. Our data indicate that diet has important impact on rainbow trout production and that a practical diet containing 42% dietary protein and 20% dietary fat is better than diet containing 42%

protein and 10% fat but is as good as diet with higher fat level (42% protein and 30% fat) for enhanced growth performance, mitochondrial enzyme activities, and gene expression.

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Chemical Composition of Liver and Skeletal Muscle of Laying Hens Fed Supplements of Waterleaf (*Talinum triangulare*). M. Ezekwe*, S. Council, R. Johnson, and F. Jeewani, Department of Agriculture, Alcorn State University, Alcorn State, MS 39096

Waterleaf (*Talinum triangulare*) is a vegetable rich in omega-3 fatty acids, antioxidant vitamins and minerals that have a positive effect on heart diseases. The purpose of this study was to determine whether or not the essential nutrients present in waterleaf would lower the risk of coronary heart disease, by evaluating the level of total cholesterol and fat in liver and skeletal muscle of hens fed two levels of waterleaf supplements. The eating quality of meat from birds fed waterleaf was also determined. Twenty-four birds were randomly assigned to three different treatment groups and placed into separate cages to test the effect of waterleaf supplement on tissue composition. The hens were fed corn-soybean diets containing 0%, 5%, and 10% freeze dried waterleaf leaves for six weeks. There was a significant reduction ($p < 0.05$) in liver lipids in hens consuming 5% waterleaf when compared to controls. No significant differences ($p > 0.05$) were noted among the liver total cholesterol of the hens consuming 0%, 5%, or 10% waterleaf. The muscle lipids showed no significant differences ($p > 0.05$) among the treatment groups. However, significant decrease ($p < 0.05$) in muscle total cholesterol was observed in the hens consuming 5% and 10% waterleaf supplemented diets. The muscle protein and meat quality characteristics showed no significant difference ($p > 0.05$) among the treatment groups. The results indicate that the nutrients present in waterleaf could provide a non-pharmacological method of reducing cardiovascular disease risks in humans consuming poultry meat from treated birds.

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Monitoring and Mechanisms of Resistance to Miticides in the Ectoparasitic Mite, *Varroa destructor*, Populations in Honey Bee, *Apis mellifera*, Colonies. L. Kanga*, College of Agriculture and Food Sciences, Florida A&M University, Tallahassee, FL 32307; and J. Adamczyk, USDA-ARS, Popperville, MS 38856.

The occurrence of resistance to pesticides in *Varroa* mite populations is a serious threat to the beekeeping industry and more than 400 crops that rely on honey bee for pollination. More than 40% of honey bee colonies have died within the last four years due mainly to *Varroa* mite and viral diseases. The present study was undertaken to monitor the evolution and spread of resistance in *Varroa* mite, to determine the mechanisms of resistance and to develop a resistance management strategy. *Varroa* mites collected from several apiaries were screened using the glass vial bioassay procedure to determine their susceptibility to insecticides. Thus, diagnostic concentrations needed to separate susceptible genotypes from resistant individuals were determined for cypermethrin, fluvalinate, malathion, coumaphos, diazinon, methomyl, propoxur and endosulfan. Resistance to organophosphorus insecticides (malathion, coumaphos) and pyrethroids (cypermethrin, fluvalinate) was widespread in Florida and in Texas from 2007 to 2012. The seasonal patterns of resistance in Florida were different from those of Texas; unlike Texas, the frequencies of resistance to all insecticides tested decreased from 2007 to 2012. The mechanisms of resistance to these insecticides were both metabolic and target site. The frequencies of resistance were unstable, suggesting that resistance could be successfully managed. This study led to the development of a fast, simple and user-friendly resistance monitoring technique needed to maximize the likelihood of success in resistance management programs for *Varroa* mite populations. It provided useful insights in the development of an integrated pest management strategy.

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Use of Scanning Electron Microscopy to Determine Effects of Sericea Lespedeza Diet on Adult Female *Haemonchus contortus* in goats. D. S. Kommuru*, and T. H. Terrill, Agricultural Research Station, Fort Valley State University, Fort Valley, GA 31030; N. C. Whitley, Cooperative Extension Program, North Carolina A&T State University, Greensboro, NC 27420; J. E. Miller, Department of Pathobiological Sciences, School of Veterinary Medicine, Louisiana State University, Baton Rouge, LA 70803; and J. M. Burke, USDA/ARS/DBSFRC, Booneville, AR 72927.

Feeding pelleted sericea lespedeza (SL; *Lespedeza cuneata*) to goats is an effective natural anthelmintic, but the mechanism of action has not been determined. Two experiments (Exp) were designed

to study the effect of feeding SL leaf meal pellets on established *Haemonchus contortus* infection in Spanish or Boer crossbred goats in confinement (Exp 1; 75% SL; mixed sex kids individually fed; n = 18/treatment) or under grazing (Exp 2; 75 and 95% SL fed at 0.9 kg/head/day; young bucks; n = 10/treatment). Control animals in each study were given commercial pellets. A total of five adult female *H. contortus* recovered from the abomasum of two animals from each treatment group in each experiment were examined for evidence of surface damage using scanning electron microscopy. There were constricted folds and a disheveled cuticular surface on two worms (40%) and damage on the cuticular surface on one worm (20%) from the 75% SL leaf meal pellet treatment group in Exp 1, with no damage observed on control worms. In Exp 2, all five worms (100%) observed from both the 75% and 95% SL leaf meal pellet treatment goats (but not control goats) showed a disheveled surface. As previously reported, fecundity of worms in Exp 1 and 2 was reduced ($P < 0.05$) by SL, and total adult worm numbers were reduced ($P < 0.05$) by SL in Exp 2. Together, this work suggests that SL has a direct effect on female *H. contortus* in goats.

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Effects of Sea Level Rise on Barrier Island Stopover Points for Transient Birds in Apalachicola, Florida. L. A. Lester*, M. Guterrez, and C. M. Heckscher, Department of Agriculture and Related Sciences, Delaware State University, Dover, DE 19901.

Many barrier islands on the Gulf Coast of the United States are important stopover points for migratory birds. Although many transient species may utilize barrier island ecosystems, little is known regarding the use of barrier islands in Apalachicola, Florida by migratory song birds. The effects of climate change, such as sea level rise, may negatively impact barrier island habitats for migratory birds. In this study, we aimed to determine if sea level rise will affect habitat availability of veeries (*Catharus fuscescens*). We used digital elevation models (DEM) from airborne light detection and ranging (LiDAR) technology to quantify elevation relative to sea level. Habitat maps were then developed from color infrared photography and veeries were monitored to determine stopover duration, habitat use, and demographic variables. Current and future distributions of *C. fuscescens* were calculated using the computer program, MaxEnt and a population model was developed with RAMAS GIS. The population dynamics of transient *C. fuscescens* were projected for the next 100 years, which allowed us to quantify the effect of sea level rise on population viability. Barrier islands are essential stopover habitats for *C. fuscescens* and many other transient bird species. Future management actions are necessary to protect barrier island ecosystems to sustain long-term viability of migratory bird species.

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The Role of Progesterone in Early Bovine Development and the Communication between the Dam and the Conceptus. M. C. Mason*, J. Copeland, and E. J. Cuadra, Department of Agriculture, Alcorn State University, Alcorn State, MS 39096; and S. Dogan, E. Memili, and J. Larson, Department of Animal and Dairy Sciences, Mississippi State University, Starkville, MS 39759.

Survival of a transferred embryo begins with the tolerance of the genetically different embryo by the maternal immune system, which is regulated by an array of cytokines secreted by the maternal and fetal cells at the site of implantation. Some cytokines are regulated by progesterone and can be either beneficial or detrimental to pregnancy success, depending on the timing and degree of their expression. Tumor necrosis factor alpha (TNF- α) and Interferon- γ are proinflammatory cytokines that play potentially important roles in the uterus before implantation and are embryotoxic. On the other hand, Interleukin-1 (IL-1), Interferon-tau (INF- τ) and transforming growth factor (TGF) may enable successful establishment of pregnancy. The gap in the knowledge base is that the molecular mechanisms by which progesterone improves the survival of the transferred embryos in the uterus are not known. The objective of the study is to ascertain the mechanisms by which suitable uterine environments are generated by progesterone. This will be achieved by identifying the role(s) of progesterone on regulating endometrial transcriptome and conceptus expression and production of TNF- α , IFN- γ , IL-1 β , INF- τ and TGF- β in heifers. To accomplish our objective, we will determine concentrations and mRNA expression of cytokines linked to the survival of embryos in embryonic and endometrial tissues of heifers after progesterone supplementation. We will employ diverse proteomic and transcriptomic approaches including real time RT-PCR, western blotting and ELISA. As an outcome of this objective, we expect to determine specifically the molecular networks of genes regulating embryo survival in response to progesterone.

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***Moringa oleifera* Tea Abrogates Inflammation.** R. C. Minor*, and J. Waterman, Department of Animal Sciences; J. Idassi, Cooperative Extension; D. Smith, Department of Family and Consumer Sciences; and S. Hurley, Department of Animal Sciences, North Carolina Agricultural and Technical State University, Greensboro, NC 27411.

An important cause of environmentally induced airway disease in agricultural occupations is exposure to bacteria-contaminated organic dusts (bioaerosols). In humans and animals, airway exposure to Lipopolysaccharide (LPS) causes an inflammatory response. *Moringa oleifera* Lam is a tree nutritionally packed with vitamins, minerals, antioxidants, and anti-inflammatory agents. We examined whether tea brewed from dried *Moringa* leaves abrogated lung inflammation after aspiration of LPS or extracts made from dust collected from a swine confinement facility (DE). In this study, mice drank water or *Moringa* tea for seven days. On day 7, mice were forced to aspirate phosphate buffered saline (PBS), LPS, or 10 percent DE. We report no significant differences in weight gain, food consumption, or liquid (water and tea) consumption. Necropsy of animals 24h post aspiration revealed that challenges with LPS or 10 percent DE, but not PBS, induced inflammatory responses in the lung, and that there were differences in the inflammatory responses observed in the water group as compared to the *Moringa* tea group. Brochoaveolar lavage (BAL) fluid analysis revealed that mice that consumed *Moringa* tea had significantly lower levels of total protein ($p < 0.05$) as well as significantly fewer cells that influxed into the lung [2.5 fold for LPS exposed ($p < 0.05$) and 4 fold for DE ($p < 0.001$)]. Furthermore, cytokine analysis revealed that mice that consumed *Moringa* tea and exposed to 10% DE differentially expressed anti-inflammatory cytokines as compared to mice that consumed water. Taken together these results demonstrate that leaves from the *Moringa oleifera* plant have anti-inflammatory properties that mitigate acute lung inflammation.

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Sheep Skin Fibroblast Cell Cultures from Room Temperature Stored Tissues After Ten Days of Animal Death. M. Singh*, and X. Ma, Animal Science Division, Fort Valley State University, Fort Valley, GA 31030.

Animal cloning technology has renewed interest in postmortem tissue storage, since these tissues can be used to reintroduce lost genes back into the breeding pool in animal agriculture, preserve genetic diversity, and revive endangered species. Several studies have demonstrated that cell survival decreases with increasing postmortem tissue storage. However, the limits of time interval within which live cells can be recovered from dead animals have not been adequately studied. Cell viability and their potential to be cultured ensure nuclear integrity, a requirement for successful cloning of animals. To test the postmortem storage limits of animal tissues, we cultured 2-3 mm² pieces ($n = 25$) of sheep skin after 0, 2, 4, 6, 8 and 10 days of postmortem (dpm) storage at room temperature. After 10 days of culture, outgrowth of fibroblast-like cells around the explants was scored. Our results showed migration and growth of fibroblast-like cells around explants at all of the time points studied. In general, the number of outgrowing cells per explant, on a given day, decreased with increasing postmortem storage time interval. To test the differences between cell cultures obtained from postmortem fresh and stored tissues, we established secondary cultures from primary cells of 0-dpm and 10-dpm time points and observed their growth overtime, which showed similar morphology. Comparison of these cell lines with respect to their growth curves and doubling times is underway. These results suggest that live cells can be recovered from skin tissues of sheep and perhaps other animals even after 10 days of their death with comparable growth profiles.

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Effects on Growth, Body Composition, and Processing Traits of Australian Red Claw Crayfish, *Cherax quadricarinatus*, Fed Diets Containing Two Different Protein Levels with Alfalfa Hay in Ponds. K. R. Thompson*, Y. Kobayashi, and C. D. Webster, College of Agriculture, Food Science, and Sustainable Systems, Kentucky State University, Frankfort, KY 40601.

Australian red claw crayfish (*Cherax quadricarinatus*) aquaculture is developing and research is improving procedures. Red claw are excellent aquaculture candidates for farmers for organic production and sustainable production, since they can consume a wide variety of foods, and a farmer can spawn the red claw themselves which closes the production loop. However, little information exists on their nutritional requirements for least-cost pond production. Thus, developing species-specific diet formulations will help to reduce production costs, since red claw can consume a broad range of ingredients. Forage-pellet-based

feeding has the potential to reduce diet costs. This feeding strategy may help to supplement prepared diets and spare proteins in the formulated diets. Application of forage assists to stimulate the natural food in the pond and offers shelter during crayfish molting. The objective of this study is to evaluate forage-based feeding and to determine the best feeding strategy that helps to reduce feeding costs for red claw producers. Growth, survival, body composition, and processing characteristics will be evaluated using three different treatments: a 25% crude protein (CP) diet with alfalfa hay; a 35% CP diet with alfalfa hay; and ponds with hay only. The feeding trial was conducted in 9, 0.02-ha earthen ponds and red claw (average initial weight of 15.7 g) were stocked at a rate of 640 per pond (3.2/m²). Dried alfalfa hay was added at a rate of 500 kg/ha/month and added every 2 weeks. Results from this study are forthcoming and data will be presented upon completion of the trial.

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Potential Use of the African River Prawn, *Macrobrachium vollenhoveni*, as a Biological Control for Schistosomiasis in West Africa. J. H. Tidwell*, and S. Coyle, College of Agriculture, Food Science, and Sustainable Systems, Kentucky State University, Frankfort, KY 40601; and S. Sokolow, E. Huttinger, and A. Kuris, University of California, Santa Barbara, CA 93106.

In 1986, the Diamo Dam was built on the Senegal River in West Africa to stabilize river flow, reduce drought, and support agriculture. However, within 5 years of dam completion, the parasitic disease schistosomiasis spread rapidly among local villagers. The epidemic has now reached 80% prevalence in some areas. Schistosomiasis is transmitted through direct contact with infectious larvae released from aquatic snails. African River prawns, *Macrobrachium vollenhoveni*, once lived in the river and their predation controlled snail populations. However, the prawns were extirpated as the dam blocked their ability to reach the sea for spawning. A cooperative project aims to develop an aquaculture program to supplement prawn reproduction and re-introduce native river prawns to the Senegal River to consume the snails that carry parasites. At KSU reproductive trials were performed on the prawns. Broodstock were successfully transported to KSU and eggs developed fully and hatched. However, survival to post-larvae (PL) was less than 2% and 65-75 days were required to reach PL, which is considerably longer than the 30-40 days required by the better studied prawn, *M. rosenbergii*. This prolonged larval period may be a result of delayed initial feeding in these undomesticated river prawns and poor nutrition. Further research will be needed to optimize production technologies for the larviculture of *M. vollenhoveni*. However, additional work is justified as this innovative parasite-control strategy could simultaneously combat disease transmission, restore the environment, and improve livelihoods by generating revenue through restoration of an artisanal prawn fishery.

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Carcass Yield and Composition of Meat from Sheep Artificially Infected with *Haemonchus contortus*. A. B. Yousuf*, Agricultural Research Station, Virginia State University, Petersburg, VA 23806; and A. L. Goetsch, American Institute for Goat Research, Langston University, Langston, OK 73050.

Carcass yield and composition of sheep artificially infected with the gastro intestinal nematode parasite *Haemonchus contortus* (HC) larvae (*L*₃) were compared. Sixteen intact male Barbados Blackbelly ram lambs similar in age and weight (247 days old and 33 kg) were randomly selected. Half of the animals were assigned to the control group and received no larvae and the other half were trickle infected at a rate of 1500 *L*₃ three times a week. The animals were maintained under stall-fed condition for three four-week periods. Throughout the study, the animals were maintained on *ad libitum* complete feed (50:50 alfalfa pellet, corn and soy concentrate). Amounts of feed offered and orts recovered were weighed and recorded daily. Live weight change, FAMACHA (anemia score), Packed Cell Volume, and Fecal Egg Counts were recorded weekly. Comparative slaughter was performed on samples of sheep, seven at the beginning and ten at the end of the experiment. Data were recorded for carcass and non-carcass (head, hide, internal organs and fat and blood) and chemical analysis performed on the two pools. At the end of the experiment, the sheep had higher slaughter weight, hot carcass weight and dressing percentage. The study showed there was numerical difference in chemical composition between the two treatments.

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Quantifying Household Carbon Footprint and Reduction Opportunities for Selected Communities in the Huntsville Metropolitan Area. B. S. Herbert*, Department of Community and Regional Planning, College of Agricultural, Life and Natural Sciences, Alabama A&M University, Normal, AL 35762.

Policymakers, planners, engineers and others seek effective ways to anticipate and manage greenhouse gas (GHG) emissions for a sustainable future. Estimates indicate that emissions from U.S. households account for between 4% and 14% of global GHG releases making energy and carbon quantification at the household level an important research element of the human dimension of global climate change. This research calculates current and future household GHG emissions that are compared under different scenarios with the Huntsville Metropolitan Area, one of the fastest growing regions in the southeast United States. Specific objectives include assessment of per capita GHG emissions of selected households; evaluation of relationships between household characteristics, behavior, land use and emissions; and calculation of potential savings in monetary terms and carbon dioxide (CO₂) production. The EPA Household Emissions Calculator is adapted for the study. Broad quantitative variables include household demographic characteristics, number of vehicles, gas mileage, vehicle miles travelled, energy consumption, and waste production. The research is important particularly in the context of sustainability, as CO₂ emissions are considered the most relevant criterion for environmental sustainability. Combating climate change is a significant challenge for the present generation and reducing global CO₂ is the most important aspect of that challenge. In the long term, the quantification of energy use and emissions of households will inform persons of their role in resource management and climate change. This research will provide tools to empower people to become proactive change agents. The results can also impact policies for key consumption activities.

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Reversible Carbon Dioxide Capturing Using Biocompatible Polymeric Blends. F. Jiru, University of Maryland Eastern Shore, Princess Anne, MD 21853; R. A. Kumarm and A. M. Isloor, Membrane Technology Laboratory, Department of Chemistry, National Institute of Technology, Karnataka, Mangalore 575 025, India; and V. V. Volkis*, University of Maryland Eastern Shore, Princess Anne, MD 21853.

Carbon capture and storage (CCS) is an approach to minimize global warming by capturing carbon dioxide (CO₂) from large point sources, such as power plants, and storing it instead of releasing it. Most of today's methods for capturing CO₂ utilize solid silica-based absorbents modified with amino- organic compounds. While solving the emission problem, this approach creates a new one: most modern CO₂ absorbents are irreversible. As a result, once captured, CO₂ is permanently linked to the absorbent, which is to be stored underground. Therefore, it is important to find methods for the reversible CO₂ capturing in which CO₂ can be released and utilized in another industrial process from the sorbent, and then the sorbent can be re-used. One such perspective is a bio-reactor producing fast growing biomass that can be easily transformed into ethanol fuel. Such application would require the absorbent to be not only reversible but also biocompatible. Here we present CO₂ sorption-desorption data for the natural and modified chitosan, pure or blended with modified polysulfone. Both of the polymers are biocompatible and are capable for wet CO₂ chemo-sorption due to the presence of amino-groups. CO₂ sorption happens at atmospheric pressure and room temperature. Applying deep vacuum at room temperature does not cause CO₂ to release. However, under atmospheric pressure CO₂ can be quickly released at temperatures as low as 45-50 °C. In addition, sorbent characterization before and after the CO₂ capturing will be presented.

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Relative Abilities of Selected Urban Tree Species in Mitigating Elevated CO₂. Z. Ning*, and K. Abdollahi, Urban Forestry Program, Southern University Agricultural Research and Extension Center, Southern University, Baton Rouge, LA 70813.

The potential onslaught of elevated CO₂, climate change and global warming has been leading scientists and policy makers to find methods of mitigating elevated CO₂ and options that may include the ability to start immediately with known technology to combat global warming for reasonable costs. Urban trees can affect the factors underlying global warming in two ways, by directly sequestering CO₂ and storing carbon, both in the trees themselves and in urban soil, and by reducing the energy needs for both cooling and heating around buildings. The purpose of this study is to quantify the relative ability of selected urban trees in mitigating elevated CO₂. Six commonly used urban tree species were tested under seven elevated CO₂ treatments. Results showed that net photosynthesis (CO₂ sequestration) of all species increased in elevated CO₂ condition, with peak rates at 500 ppm and 600 ppm. Most trees responded to increases in the CO₂ level by displaying reduced stomatal conductance and transpiration rates. This water savings can result in greater soil moisture contents in CO₂-enriched ecosystems.

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Urban Forest Ecosystem Assessment in Baton Rouge, Louisiana, Using I-Tree Eco Model. K. K. Abdollahi*, T. N. Legiandenyi, Z. Ning, and P. Khanel, Southern University Agricultural Research and Extension Center, Southern University, Baton Rouge, LA 70813.

I-Tree Eco, an adaptation of the Urban Forest Effects (UFORE) model, was used to provide urban and community forestry analysis and benefits assessment for the City of Baton Rouge, Louisiana, located in the Gulf Coastal region of the United States. The study was designed in collaboration with the USDA Forest Service to use field data from randomly located plots throughout a community, along with local hourly air pollution and meteorological data to quantify urban forest structure, environmental effects, and value to communities. The analysis of trees in the City of Baton Rouge, LA, revealed that this area has about 1,036,175 trees with tree canopies that cover 44.6 % percent of the city. The most common tree species are live oak, sweet gum, loblolly pine, pecan-hickory, bald cypress, water oak, crape myrtle and Southern magnolia. Trees in the City of Baton Rouge currently store about 2,029,342 tons of carbon per year with an associated estimated value of \$41 million per year. In addition, these trees remove about 48,699 tons of carbon per year (178,354 tons CO₂/year) (\$1.1 million per year). Baton Rouge's trees are estimated to reduce annual residential energy costs by \$8.0 million annually and to reduce air pollution by 860 tons per year with an associated estimated value of \$6.2 million per year.

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Ecological Assessment of an Urban Forest Through a Sample Street Tree Inventory. S. Elavarthi*, T. Johnson, and B. Breeding, Department of Agriculture and Natural Resources, Delaware State University, Dover, DE 19901.

A street tree inventory was conducted for the city of Dover to assess the state of urban forest. I-Tree Streets (ITS), a peer reviewed software suite was used for data analysis. The census gathered field and map data to generate the reports from the ITS. The reports revealed the value of street trees, ecologically and economically, to the city of Dover. Ten percent of Dover's streets, or 218 street segments, were randomly selected for the survey. This selection was done using TIGER census data from the year 2000 in conjunction with ArcMap to generate a segmented map. On each street segment, all trees within 15 feet from the street's edge on either side were identified and its diameter at breast height (DBH) was recorded. Invasive tree species to Delaware were noted. The zone location (residential, municipal or commercial) of each tree was recorded. Results showed species distribution, and replacement value. A grand total of 1,572 street trees were recorded for the 218 segments comprising of 10% of street trees. The three most abundant species were Red Maple (*Acer rubrum*), Pine (*Pinus* spp.), and Silver Maple (*Acer saccharinum*). Results reveal that it would cost approximately \$5,800,254 to replace the city's Red Maple population. There was no direct correlation between tree population by zone and real estate values.

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Qualification and Quantification of Selected Phenolic and Flavonoid Compounds in Twelve Tree Species. V. A. Ferchaud*, and Y. Qi, Southern University Agricultural Research and Extension Center, Southern University, Baton Rouge, LA 70813.

A reverse-phase high-performance liquid chromatographic (RP-HPLC) method based on isocratic elution was developed and validated for the simultaneous quantification of flavonols (kaempferol, kaempferol-3-O-glucoside, kaempferol-3-O-rutinoside, myricetin, quercetin hydrate and rutin), flavone (apigenin), flavonone (naringenin) and phenolic acids (chlorogenic and gallic). All these compounds were found to be important constituents of UV-B absorbing compounds in leaves. The wavelengths monitored for the detection of flavonols, flavone, flavonone and phenolic acids to achieve the λ_{max} were 254, 280, 310, 350 and 370 nm, respectfully. The external standard calibration equation was established for each standard. The above eight flavonoids and two phenolic acids were quantified in mature leaves of twelve selected tree species with five replications each. According to HPLC quantifications expressed as percentage dry weight, the ten combined compounds among twelve selected species ranked from high to low is as follows: green ash, Chinese elm, American elm, Chinese tallow, Shumard oak, Nuttall oak, pecan, river birch, Southern red oak, willow oak, Southern magnolia and live oak. The compounds identified in the study are all parts of UV-absorbing compounds found in leaves. Such information will be useful to understanding UV tolerance mechanisms in trees in general.

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Microclimatic Differences Between Mature Pine Silvopasture and Open-Pasture. U. Karki*, Cooperative Extension Program and the Department of Agricultural and Environmental Sciences, Tuskegee University, Tuskegee, AL 36088; and M. S. Goodman, Department of Agronomy and Soils, Auburn University, Auburn, AL 36849.

Information is needed on microclimatic modifications that occur during changes in land use in the Southeast USA, e.g. open-pasture versus silvopasture. This research tested the hypothesis that microclimatic conditions in mature-pine silvopasture would be milder compared to open-pasture. The research objective was to quantify microclimatic differences between mature-pine silvopasture and open pasture. The research was conducted in a loblolly-pine (*Pinus teada* L.)-bahiagrass (*Paspalum notatum* Flugge) silvopasture and an open bahiagrass pasture, 5-ha each, in Chipley, Florida. Microclimatic parameters (air temperature, soil temperature at 5 and 10 cm, wind speed, gust speed, wind direction, humidity, dew point, rainfall, soil-moisture content, total solar radiation, and photosynthetically active radiation) were collected from November 2005 to January 2008 using HOBO© weather stations located in each pasture type. Data were analyzed to determine overall, as well as seasonal, monthly, and diurnal differences between pasture types. Evapotranspiration was calculated from air temperature, wind speed, relative humidity, and total solar radiation. With the exception of soil moisture content, overall average values for all microclimatic parameters were lower in silvopasture compared to open-pasture. Seasonal, monthly, and diurnal differences between pasture types were also detected for several parameters. These results indicate that milder microclimatic conditions occur in silvopasture versus open-pasture on the Coastal Plain of the Southeast USA.

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Nanotechnology for Forest Protection and Wood Preservation. Y. Qi*, Southern University Agricultural Research and Extension Center, Baton Rouge, LA 70816; Q. Wu, Agricultural Center, Louisiana State University, Baton Rouge, LA 70808; K. Lian, Center for Advanced Microstructure & Devices, Louisiana State University, Baton Rouge, LA 70808; D. Collins, and K. L. Chin, Southern University Agricultural Research and Extension Center, Baton Rouge, LA 70816; Q. Wu, Agricultural Center, Louisiana State University, Baton Rouge, LA 70808; K. Klepzig, USDA-Forest Service, Southern Research Station, Asheville, NC 28804; and R. Menard, and F. Oliveria, USDA-Forest Service, Forest Health Protection, Pineville, LA 71360.

Dr. Yadong Qi and collaborating scientists from Southern University Research and Extension Center, Louisiana State University, and USDA-Forest Service developed a technique for using copper-core carbon-shell nanoparticles (CCCSNs) to provide long-term effective biological and physiological functions as fungicides and as wood preservatives. This approach can be regarded as a new generation of more stable functional and environmentally friendly nanomaterials. The CCCSNs enhance antifungal activities in trees. The project has developed suitable dosages of CCCSNs against blue-stain fungi and a white rot and a brown rot through in-vitro studies. The CCCSNs technology will result in developing a new wood preservative that is effective and more environmentally friendly because of less usage of copper.

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A Catastrophe in Fort Valley, Georgia: the Woolfolk Chemical Works Superfund Site and its Environmental Impact on the Community. J. Surrency*, Agricultural Research Station, Fort Valley State University, Fort Valley, GA 31030.

The Woolfolk Chemical Works Superfund Site is a 31-acre site located in the midst of an African-American neighborhood in the central business district of the city. It resulted from the facility's production, formulation, and packaging of pesticides, herbicides and insecticides since 1910. In the early 1980's, the Georgia Environmental Protection Division (GEPD) investigated the site based on complaints from local citizens. Investigations during the 1980's indicated that site operations had resulted in arsenic (As), lead (Pb), PCB, dioxin and pesticide contamination at the Superfund site. While the Woolfolk Chemical Works Superfund site once served the community's agricultural economy, today, this site lies at the center of EPA's environmental \$90 million remediation program. The production company was discharging waste products to a drainage corridor that headed south from the Superfund site through an African-American neighborhood surrounded by two schools, a playground, baseball field, and several churches. The objectives of this project were: 1) to study the effects of Arsenic (As) and lead (Pb) contaminants entering

soil and water sources surrounding the Woolfolk Chemical Works Superfund site and, 2) to study the Superfund site's environmental effects on Fort Valley citizens. Soil and water samples were taken from identified study sites on a ½ mile to 2 mile radius away from the Superfund site. Contamination has affected soil, sediment and groundwater on both commercial and residential properties in and around the Superfund site. While the site's cleanup investigation and the baseline risk assessment indicated that there were 48 contaminants of potential concern, the majority of the site risk is being driven by arsenic contamination. The environmental effect that this Superfund site has on this community is detrimental to the health of these citizens. Arsenic and lead cleanup, soil removal from neighboring yards, and the installation of protective linings at the Superfund site were a part of EPA's cleanup activities.

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The Chemistry and Distribution of Phosphorus Species in River Sediments. A. Atalay*, and B. Whitehead, Agricultural Research Station, Virginia State University, Petersburg, VA 23806.

Sediments are heterogeneous mixtures of assorted soil separates and organic matter that serve as repositories of many pollutants. This study investigated phosphorus (P) stability in river sediments as controlled by P speciation and environmental conditions, such as temperature (T), dissolved oxygen (DO), redox conditions (Eh), and pH. It attempted to characterize the chemical and physical parameters that affect P speciation in sediments, and to evaluate the experimental conditions under which sediment-bound P could potentially become available in river waters. Sediment cores samples were collected from the James River in Virginia near a former dairy farm and analyzed for T, pH, Eh, carbon (C) and pertinent metal ions. In a laboratory experiment, samples were suspended in deionized water and equilibrated under different pH and aerobic/anaerobic conditions to assess the most stable P species present under a controlled environment. High P concentration correlated well with Fe and had non-uniform correlations with clay, Al and Ca, which changed with depth of cores. At low pH, P concentration was higher in anaerobic than in aerobic sediments and aluminum precipitation was highest at low pH, which indicated Al phosphate stability in reduced (anaerobic) conditions. Above pH 7, in aerobic environments, the Minteqa2 speciation model predicted a high stability for Al-OH species. Elemental P distribution assessment using Scanning Electron Microscopy (SEM), Energy Dispersive X-ray (EDX), and Geographic Information Systems (ArcGIS Spatial Analyst) inferred that P at pH 4 could be bound more to C and Al than to Fe and Mn.

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Gypsum Curtains: a New Frontier in Nutrient Management. A. L. Allen*, and F. M. Hashem, Department of Agriculture, Food and Resource Sciences, University of Maryland Eastern Shore, Princess Anne, MD 21853; R. B. Bryant, and A. R. Buda, USDA-ARS Pasture Systems and Watershed Management Research Unit, University Park, PA 16802; and E. B. May, Department of Natural Sciences, University of Maryland Eastern Shore, Princess Anne, MD 21853.

The Delmarva Peninsula houses a thriving poultry industry that has been blamed for adding harmful nutrients to the polluted Chesapeake Bay. Decades of poultry litter applications have led to phosphorus (P) levels approaching 10 times the required crop optimum. This surplus of P is a major source of P entering drainage ditches that empty into streams and rivers that eventually flow to the Bay. University of Maryland Eastern Shore and USDA-Agricultural Research Service researchers have documented substantial P concentrations in agricultural drainage waters derived from these high P soils (350 to 550 mg kg⁻¹ Mehlich-3 P). Even when fields receive no P additions, losses due to soluble P in waters draining from these high P soils result in P concentrations in ditches of 2 to 4 mg L⁻¹. Loads can vary widely in response to precipitation patterns, but annual P losses of 25 kg ha⁻¹ are common. Existing conservation practices, such as minimum tillage and edge-of-field grass filter strips, are designed to reduce sediment-bound, particulate P in runoff, but offer no control over water-soluble P losses. Our strategy for controlling soluble P losses was to intercept field water flow paths by inserting FGD gypsum curtains adjacent to drainage ditches to sorb soluble P, thereby keeping it from reaching drainage ditches. Specific objectives were to design, construct and assess the effectiveness of these curtains for removing soluble P as field water from cropland is forced to cross them via subsurface lateral flow.

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Assessment of Benthic Diatoms as Water Quality Indicators in the Blackbird Creek Watershed, Delaware. K. Chintapenta*, and A. Pappas, Agriculture and Natural Resources Department, Delaware State University, Dover, DE 19901; and K. Lee and K. Coyne, College of Earth, Ocean and Environment,

University of Delaware, Lewes, DE 19958; and G. Ozbay, Agriculture and Natural Resources Department, Delaware State University, Dover, DE 19901.

Benthic diatoms have been used as water quality indicators in freshwater systems throughout the world. They are present in almost every aquatic habitat and due to their high growth rates and rapid response to changes in water chemistry, diatoms are ideal biological indicators. The goal of this study is to evaluate the use of benthic diatoms as water quality indicators in the Blackbird Creek Watershed in relation to land uses. Sediment samples were collected from selected sites in the watershed; DNA was extracted, amplified and analyzed using terminal restriction fragment length polymorphism (TRFLP) and later analyzed by peak scanner to identify the microbial community. The data from peak scanner was further analyzed by multivariate statistical analyses software PRIMER-E using ANOSIM, MDS plots to study the influence of environmental parameters on diatoms in determining ecological health. Water samples from the study sites were analyzed for nutrients and water quality parameters to determine relationships between diatom assemblage and water condition. This study will aid in identifying ecological issues such as eutrophication in the watershed and how the land use affects water quality and overall aquatic health.

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Hydrologic Processes Controlling Stream Water Quality in a Missouri Claypan Watershed. F. Liu*, and J. Yang, Cooperative Research Programs, Lincoln University in Missouri, Jefferson City, MO 65101; and R. Lerch, and C. Baffaut, Cropping Systems and Water Quality Research Unit, Agricultural Research Service, USDA, Columbia, MO 65211.

Processes controlling stream water chemistry in Goodwater Creek Watershed, a claypan soil watershed with a drainage area of 7250 ha in Mid-Missouri, were elucidated using chemical elements in rain water, stream water and groundwater. Samples have been collected since summer 2011. Land use is dominated by low density urban in the headwaters and by crops with increasing drainage areas, particularly at the watershed scale. Diagnostic tools of mixing models, a mathematical tool that distinguishes chemical equilibrium from mixing, were used to determine conservative and reactive chemical elements. Calcium (Ca), Mg, Na, K, Al and Sr in streams were determined to be conservative and resulted primarily from mixing of rainwater, seep flow from top soils above claypan layer and groundwater. Iron (Fe) concentrations in stream water were mainly gained from soils as a result of chemical reactions. Chemical concentrations in the headwater stream were higher than downstream locations, which were primarily caused by higher seep flow contributions from urban areas. These results help develop a conceptual understanding of contaminant sources in claypan watershed and remediate stream water quality in Mid-Missouri.

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Exploration of Effluence and Inexpensive Means for Microalgal Biomass Production. S. Palanisami*, and K. Lee, Center for Bioenergy, Cooperative Research, Lincoln University, Jefferson City, MO 65101; and P. Nam, Department of Chemistry, Missouri University of Science and Technology, Rolla, MO 65401.

Microalgal biomass is a valuable source for biodiesel production. For achieving maximum biomass, it is necessary to supply the culture with a sufficient amount of carbon dioxide. However, CO₂ sparging is cost intensive. In order to reduce the production cost, flue gas originating from the coal-fired power plant was used as a source of carbon dioxide. For outdoor culture, chemicals used in laboratory culture would be inappropriate because of their high cost. Instead, more economical resources such as agricultural fertilizers are frequently used. In this viewpoint we studied the effectiveness of five different commercially available fertilizers individually and in combinations, so as to meet the equimolar concentration of microalgal nutritional requirement. This study has been segregated into two perspectives: i) biomass production, and ii) increasing the lipid content. The fertilizer combination that yields good results in laboratory scale will be selected to test in outdoor open circular pond (1000 gallons). Amongst the five different fertilizers used (names designated as FR1, FR2, FR3, FR4 and FR5), FR1 yielded higher biomass. The combination of FR1 & FR4 has been selected to test in outdoor based on the indoor results. The results revealed 21% higher biomass than that of commercially available F/2 medium, as well the production chemical cost is 1.21\$/kg and 2.56\$ for commercial grade F/2 medium. On the other hand, the same combination of fertilizers showed 23.25% higher growth while sparging flue gas. In addition, FR1 increased the lipid content upon modulating the nutrient content and feeding strategy.

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Screening of Microalgal Strains Grown on Swine Wastewater for High Lipid Production. B. Zhang*, L. Wang, R. Hasan, and A. Shahbazi, Biological Engineering Program, Department of Natural Resources and Environmental Design, North Carolina Agricultural and Technical State University, Greensboro, NC 27411.

Algae that are a promising third-generation biofuel feedstock offer many potential technical and economic advantages. Algae can use and sequester CO₂ from many sources and may be processed into a broad spectrum of products including biodiesel, green diesel and gasoline replacements, bioethanol, methane, heat, bio-oil and biochar, animal feed and biomaterials, etc. Swine wastewater contains high amounts of ammonia nitrogen and active phosphorus, which could be a suitable growth medium for microalgae. Therefore, the objective of this research is to identify fast growing microalgal strains locally to assimilate nutrients in wastewater for swine wastewater treatment and to produce higher lipid content. Approximately 100 algal strains were isolated from lagoons at the N.C. A&T farm. Algal strains were selectively cultivated on a medium containing the swine wastewater as the sole nutrient source. High lipid-producing algal strains were identified using BODIPY, a fluorescent dye, which stains neutral lipids, followed by analysis with a benchtop flow cytometer. The flow cytometer offers a high-speed, automated method for assessing lipid content as well as other characteristics of algae cultures including: cell numbers and culture densities, relative chlorophyll content, and potential lipid production. When comparing to the lipid content of *Chlorella vulgaris* (15-17% w/w in dry biomass weight), eight algal strains accumulated higher amount of neutral lipid and chlorophyll A. The isolated strains will further be characterized using 23S rRNA genomic sequence.

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Economics and Energy Efficiency of On-Farm Ethanol Production from Sweet Sorghum Using a Microfueler. M. Bomford*, J. Cambron, A. Silvernail, and J. Nelson, College of Agriculture, Food Science, and Sustainable Systems, Kentucky State University, Frankfort, KY 40601.

On-farm ethanol fuel production from farm waste could potentially reduce fossil fuel consumption and reduce fuel costs associated with small scale agriculture. During 2011 and 2012, Kentucky State University tested a small fuel ethanol plant, called a MicroFueler, designed to produce about 100 L of hydrous fuel ethanol weekly through fermentation and distillation of sugar solutions derived from biomass. Fixed and variable production costs were used to construct an enterprise budget for 1,000 L of ethanol fuel production from sweet sorghum (*Sorghum bicolor*) feedstock harvested on a small farm between September and November. Energy inputs were recorded for the lifecycle from seed to fuel. On-farm ethanol production offered a net energy return approximately 30% above energy invested. The process was not cost effective using this technology, resulting in a \$13 L⁻¹ net loss to the producer. Labor costs associated with feedstock production and milling accounted for 58% of total production costs; the fixed cost of the Microfueler apparatus, amortized over six years, accounted for 37% of these costs. Electricity used to power the apparatus accounted for less than 1% of total production costs. Although the Microfueler's energy efficiency shows promise for distributed ethanol production on small farms, its high fixed cost (\$30,000) precludes use by small farmers seeking to reduce costs through on-farm fuel production. More cost effective means of producing and milling sweet sorghum are also needed before the crop can be recommended for distributed ethanol fuel production on small farms.

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Adoption Of Winter Canola (*Brassica napus*) in Southeastern United States. R. Ward*, E. Cebert, and K. Ward, Department of Biological and Environmental Sciences, Alabama A&M University, Normal, AL 35762.

Production of canola in the United States has not kept pace with consumer demand. In 2010, 83% of the three billion pounds of canola the U.S. consumes annually was imported from Canada. Ninety percent of U.S. canola is produced in North Dakota and Minnesota. The strong demand for canola as food oil and biodiesel feedstock has spurred interest in canola farming in other parts of the country, particularly in the southeastern region where cold-hardy winter varieties are well-adapted. As feedstock for biodiesel production, canola is comparatively superior to soybean; canola seeds contain higher amount (40% vs. 20%) of oil and of better quality than soybean. It is also a more profitable farm crop; at 29 bu/acre yield, soybean can generate only 43 gallons of oil/acre, much less than canola, which yields 75 gallons/acre.

There is a great potential to significantly increase production of canola in the southeastern U.S. This presentation discusses early successes and current challenges to widespread adoption of canola as an alternative crop to winter wheat in the region.

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Characterization and Fractionation of Crude Glycerine from Biodiesel Production for Value-Added Reuse. M. Guo*, and P. Xiao, Department of Agriculture and Natural Resources, Delaware State University, Dover, DE 19901.

Crude glycerine is a major byproduct of biodiesel generation. To develop effective techniques for value-added reuse of this organic waste, studies were conducted to determine the chemical composition of crude glycerine and purify it by endeavoring fractionation procedures. Crude glycerines from biodiesel production using virgin soybean oil, used soybean oil and pork fat as feedstocks were characterized for quantitative presence of glycerine, methanol, soap, H₂O, free fatty acids, and glycerides through mass balance analysis. The crude glycerines were further fractionated into separate chemical components by a number of separation and purification methods covering distillation, precipitation, and solvent extraction. The results reveal that 14.4%, 15.7%, and 17.8% of the total feedstock mass were transferred to crude glycerine during generating biodiesel from virgin soybean oil, used soybean oil, and pork fat, respectively. Of the respective crude glycerine products, 20.3%, 16.9%, and 18.3% in mass was methanol and could be recovered by 150°C distillation. Adjustment of the distilled crude glycerine to pH 4.0 with concentrated H₂SO₄ followed by centrifugation separated the mixture into individual layers of coarse fatty acids (liquid), coarse glycerides (gel), coarse glycerine (liquid), and coarse salt (solid). Subsequent water washing of the coarse fatty acids yielded pure fatty acids that could be used for soap manufacturing or recycled for biodiesel production. Methanol extraction of the other layers generated pure Na₂SO₄ as a chemical, pure glycerides as biodiesel feedstock, and relatively pure glycerine. Finally methanol and glycerine were separated and recovered by distillation of the combined methanol washes.

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Agglomeration of Biochar for Agronomic Use. D. P. Patel*, and A. Hass, Agricultural and Environmental Research Station, West Virginia State University, Institute, WV 25112; H. W. Godwin, USDA ARS, Retired, Beaver, WV 25813; and K. Moss, Piedmont Bioproducts, Gretna, VA 24557.

Use of biochar, a carbonaceous co-product from fast pyrolysis of biomass for bioenergy production, is viewed as a beneficial soil amendment. As the pyrolysis feed material is finely ground to assure efficient extraction of energy, the resulting biochar is a lightweight, fine, dusty-type material. Surface application of biochar in its current form results in material losses as it is carried off site by wind and water, diminishing its agronomic impact while polluting air and water resources. We evaluated the use of several binders in agglomerating fast-pyrolysis biochar for its further use as soil amendment in a lab-scale disc agglomeration system. In addition, selected additives were used to enhance ball-shaped pellets physical properties and agronomic value. Initial criteria were to create a stable ball that will sink in water and will not disintegrate immediately upon immersing in water. Pellets were evaluated for shape, size and uniformity and were tested for additional physical properties (drop strength, specific density, and attrition test). Best performing ball pellets were further tested for nutrient content and availability, and liming potential. The results of this study showed that use of selected binders and additives can form ball pellets that are unlikely to pose environmental concerns when surface-applied to soil. Furthermore, incorporation of selected additives improved ball pellet physical properties, liming potential and nutrient availability.

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Response of Rice Cultivars to Arsenic Accumulation as Influenced by Arsenic Level and Water Management Practices in Soil. J. Yang*, and B. Hua, Department of Agriculture & Environmental Sciences, Lincoln University of Missouri, Jefferson City, MO 65102.

Arsenic (As) uptake by rice plants, which is induced by As-based herbicide, is of environmental and health concern. Bioavailability or mobility of inorganic As in soil has been reported to be significantly influenced by soil minerals such as iron (hydr) oxide, however, the interactions of organic As such as monosodium methanearsonate (MSMA) with soil minerals are little studied, thus largely unknown. In an effort to minimize the As uptake by rice and determine rice cultivar response to soil MSMA level, a field experiment was conducted on three rice cultivars grown in both MSMA-treated and untreated soils under continuous or intermittent flood water management practices. Results indicated that the grain yield was

cultivar-dependent and influenced by soil As level and water management practices. Arsenic-resistant cultivars yielded more and had lower grain As than the susceptible ones. Elevated soil As with continuous flood management significantly reduced the grain yield of susceptible cultivars by >89% due to substantially increased straighthead, which were induced by increased As content in grains. Yield reduction by MSMA treatment could be partially mitigated with intermittent floodwater practice. The As accumulation was found to be associated with soil iron redox transformation influenced by the water management. This study demonstrates that the selection of less As-susceptible cultivars and intermittent floodwater practice could be effective means to lower the As accumulation in grains and minimize the occurrence of the As-induced straighthead symptom and yield reduction.

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Soil and Plant Mineral Properties in Ramp and Black Cohosh Populations from Different

Appalachian Locations. L. K. Rutto*, S. Ren, and M. Brandt, Agricultural Research Station, Virginia State University, Petersburg, VA 23806; and J. Chamberlain, USDA Forest Service, Southern Research Station, Blacksburg, VA 24060.

Ramps (*Allium tricoccum*) and black cohosh (*Actaea racemosa*) are among plants of economic importance that are native to the Appalachian ecosystem. Valued, respectively, for their culinary and medicinal uses, the two species are facing increasing pressure from uncontrolled extraction to meet market demand. Virginia State University and the U.S. Forest Service are working collaboratively to identify and provide guidelines for sustainable harvesting from natural stands and managed cultivation on private holdings. The areas being addressed by the collaboration include ecological adaptation, phenology and soil-plant-microbe interactions. In this report, data will be presented on soil mineral and chemical properties, and temporal variation in plant mineral composition for four Appalachian locations (two each for ramps and black cohosh). Initial results show that soils associated with the two species are rich in trace metals and are highly organic. Mineral content in ramp and black cohosh shoot tissue declined over time, probably due to translocation of photosynthates to below-ground storage, and to reproductive organs. Of the two species, ramps recovered significantly more N per unit of biomass.

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Plant Response to Struvite Application in Appalachia Acid Soil.

A. Hass*, Agricultural and Environmental Research Station, West Virginia State University, Institute, WV 25112; H. W. Godwin, USDA ARS, Retired, Beaver, WV 25813; and J. M. Gonzalez, USDA-ARS-NSERL, West Lafayette, IN 47907.

Current technology enables one to precipitate, remove and recover phosphorus from animal waste as struvite mineral ($\text{NH}_4\text{MgPO}_4 \cdot 6(\text{H}_2\text{O})$). Use of struvite as P fertilizer for growing perennial rye grass (*Lolium perenne* L.) on Appalachian acid soil (Gilpin soil series) was tested in a pot study. Soil was used as is (pH 4.5) and at two liming rates to reach desired pH (5.5 and 6.5). Struvite and DAP (diammonium phosphate) were applied at three rates to the soil surface or in the seeding furrow. In addition to P, plants were fertilized with Hoagland solution minus P. Control treatment included full Hoagland solution with no DAP or struvite addition. Seed germination was recorded 10 days after seeding and aboveground biomass was harvested at day 30 and 60. Root mass was measured at the end of the experiment. Furrow placement resulted in higher plant growth compared to surface application for both fertilizers. This effect was more pronounced in initial growth during the first 30 days. Struvite application resulted in higher germination and root and aboveground biomass at the non-limed soil and at the low liming rate. At high lime application rate plant response to struvite was not significantly different from that of DAP. The results of this study suggest that struvite can be placed at the seed furrow without inhibiting seed germination, allowing more intimate placement of the fertilizer. This is likely to result in higher P use efficiency and to minimize P losses in surface runoff due to surface application of P fertilizers.

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Ascorbic Acid and Phenols in Kale and Collard Greens Grown in Sewage Sludge and Chicken

Manure Amended Soil. R. R. Hill*, and G. F. Antonious, College of Agriculture, Food Science, and Sustainable Systems, Division of Environmental Studies and Sustainable Systems, Kentucky State University, Frankfort, KY 40601; and M. B. Abubakari, and J. C. Snyder, Department of Horticulture and Landscape Architecture, University of Kentucky, Lexington, KY 40546.

Brassica vegetables contain significant amounts of bioactive compounds that provide desirable health benefits. Kale and collards, both members of the *Brassica* family, are easily grown but are not widely consumed in the U.S. Soil amendments used for growing vegetables might alter concentrations of bioactive compounds. The focus was to study the impact of soil amended with sewage sludge (SS) or chicken manure (CM) on concentrations of ascorbic acid and phenols in kale and collard greens. Plants were grown from seeds in summer 2012 at KSU Research Farm. At harvest, leaves were collected and used for extraction of ascorbic acid and total phenols using 0.04% oxalic acid solution and 80% ethanol, respectively. Concentrations of ascorbic acid and phenols were generally greater in kale than in collards. The greatest difference was for phenols concentration, 45% greater in kale compared to collards. Results indicated that soil amendments had a significant effect on concentrations of phenols and ascorbic acid, but the two crops responded differently to the soil amendments. For both crops, phenols and ascorbic acid concentrations were greatest for crops grown in CM soil. However, ascorbic acid concentrations were not significantly different among soil treatments for collards, as were phenols concentrations for kale. Soil amendments did have significant effect on total phenols concentrations in collard and on ascorbic acid concentrations in kale; lowest concentrations were associated with the sludge-amended soil. In general, both SS and CM tend to reduce phenols and ascorbic acid concentrations in kale and collards, compared to no-mulch native soil.

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Yield and Quality of Collard and Kale Greens. E. T. Turley*, and G. F. Antonious, College of Agriculture, Food Science, and Sustainable Systems, Division of Environmental Studies and Sustainable Systems, Kentucky State University, Frankfort, KY 40601.

Demand for food is ever increasing and much of future plant production systems will depend on the use of fertilizers. Investigation of natural products has become increasingly important due to the fact that synthetic amendments may cause ecological harm. Consumer and grower interest in safe alternatives to synthetic products has increased rapidly over the past years and is expected to continue. Organic matter and nutrients in municipal sewage sludge and chicken manure could be recycled and used for land farming to improve fertility and physical properties of soil. Three soil management practices were used at Kentucky State University Research Farm, Franklin County to study the impact of soil amendments on kale and collard yields and quality. The three soil management practices were: i) sewage sludge mixed with native soil at 15 t acre⁻¹, ii) chicken manure mixed with native soil at 15 t acre⁻¹, and iii) native soil (no-mulch) was used for comparison purposes. At harvest, collard and kale greens, *Brassica oleracea* L. var. *acephala* plants were graded according to United States Department of Agriculture (USDA) Standards for Grades of Collard and Kale Greens. Plants grown in chicken manure amended soil produced the greatest number of US No. 1 grade of collard and kale greens (fresh, fairly tender, fairly clean, well-trimmed and free from decay and damage). Total yield of kale and collard obtained from chicken manure amended soil was increased by 10.4% and 208.4%, respectively, over sewage sludge and no-mulch treatments.

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Enzymatic Activity and Half-Lives of Capsaicin, Dihydrocapsaicin, and Hexadecanoic Acid in Soil Sprayed with Hot Pepper Extracts. G. F. Antonious*, Kentucky State University, College of Agriculture, Food Science, and Sustainable Systems, Division of Environmental Studies, Frankfort, KY 40601.

Pest management is facing economic and ecological challenges in the U.S. and worldwide due to pest resistance and human and environmental hazards caused by use of synthetic pesticides. Crude extracts from the fruits of *Capsicum* species were prepared and tested for their insecticidal and acaricidal performance. Mortality was greatest (94%) when fruit extract of accession PI-593566 (*C. annuum*) was sprayed on larvae of the cabbage looper, *Trichoplusia ni* (Hübner) while crude extracts of accessions PI-241675 (*C. frutescens*) and PI-310488 (*C. annuum*) were repellent to the spider mite, *Tetranychus urticae* Koch. We investigated differences in chemical composition of the fruit crude extracts that might explain the observed mortality and repellency. Gas chromatography-mass spectrometric (GC/MS) analysis revealed that capsaicin (N-vanillyl-8-methyl-6-nonenamide) and dihydrocapsaicin accounted for an estimated 80%–95% of the naturally occurring capsaicinoids in peppers. According to the guidelines for approval of new agrochemicals, effects of pesticides on soil microorganisms and the enzymes they produce are required. Accordingly, the main objectives of this investigation were to: i) determine the half-lives ($T_{1/2}$ values) of capsaicin, dihydrocapsaicin, and hexadecanoic acid in soil; and ii) assess the impact of hot pepper extracts

on total soil enzyme activity. Analysis of soil sprayed with pepper extracts indicated that $T_{1/2}$ values of capsaicin, dihydrocapsaicin, and hexadecanoic acid were 7.3, 1.5, and 10.2 days, respectively, while total enzyme activities were increased by 57% in soil sprayed with hot pepper extracts.

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Testing Methyl Ketones for Development of an Organic Insecticide. K. L. Kamminga*, and G. F. Antonious, College of Agriculture, Food Science, and Sustainable Systems, Division of Environmental Studies and Sustainable Systems, Kentucky State University, Frankfort, KY 40601; and J. C. Snyder, Department of Horticulture, University of Kentucky, Lexington, KY 40546.

Four methyl ketones, 2-tridecanone, 2-undecanone, 2-dodecanone, and 2-pentadecanone have been identified in the glandular trichomes on the leaves of the wild tomato, *Solanum habrochaites*. These compounds have been shown to have toxic effects against insects and mites. To date, most of the research has been centered on testing the efficacy of 2-tridecanone or 2-undecanone on plant pests. This research has determined that 2-tridecanone mediates host plant resistance by antibiosis. The other methyl ketones are also known to be toxic, and may have additional anti-arthropod characteristics resulting in repellency and reduced fecundity. We are currently evaluating the use of trichome secretions from this wild tomato species as an insecticide to be produced for on-farm use. Thus, bioassays that closely mimic actual field use and application rates are of most interest. Additionally, bioassays that allow for evaluating a range of insect responses, such as mortality, avoidance, and rate of egg production, are most beneficial. One type of bioassay explored involved treating the leaves from green bean, *Phaseolus vulgaris*, plants with a range of rates of active ingredient. Leaf discs (1.6 cm diameter) were then cut and infested with 10 female spider mites, *Tetranychus urticae*. Mortality, repellency and fecundity were assessed at two time periods. Results from a leaf disc bioassays with 2-tridecanone determined that the LC_{50} is approximately 1.26 mmol and fecundity is greatly reduced at 0.25 mmol. The 2-undecanone bioassays indicated that the LC_{50} is approximately 11.74 mmol and reduced fecundity occurs at 1.17 mmol.

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A Survey of Pest Management of the German Cockroach in Child Care Centers in Selected Urban and Rural Areas of North Carolina. B. N. Dingha*, Department of Family and Consumer Sciences; and L. E. N. Jackai, Department of Natural Resources and Environmental Design, North Carolina Agricultural and Technical State University, Greensboro, NC 27411; and A. G. Appel, Department of Entomology & Plant Pathology, Auburn University, Auburn, AL 36849.

Exposure to both pests and pesticides in any environment and especially in childcare centers poses several health hazards. Many childcare centers rely solely on the use of pesticides for insect pest control. Integrated Pest Management (IPM) is a method of pest control that promotes reduced pesticide usage, use of least toxic pest control products and non-spray formulations to confined areas, thereby reducing the probability of human exposure. The study reported here sought to determine the knowledge of childcare center directors regarding pest problems and the use of IPM as a control measure. Data were collected from survey respondents from six rural and ten urban childcare centers and analyzed using descriptive statistics. In addition to the German cockroach, ants, flies and mosquitoes were also reported by most respondents. Fifty percent of respondents indicated pest control is done by themselves in conjunction with pest control personnel, while 25% use pest control personnel alone and 25% by self only. However, the use of pesticides was the main control strategy used in childcare centers in each case. Other methods of cockroach control used by some respondents included sanitation and cleaning to eliminate insect food source and water, building maintenance to prevent pests entering buildings, and monitoring of pest presence. The majority of childcare center directors were unfamiliar with IPM. Organizing an educational IPM program will increase awareness of IPM among childcare center directors and make implementation more likely and sustainable.

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Distribution Patterns of Invasive Exotic Species in Alabama. X. Chen*, Department of Biological & Environmental Sciences, Alabama A & M University, Normal, AL 35762.

Invasive exotic species (IES) cause environmental and economical problems. How to effectively manage a large area of IES is a challenge. Hypotheses about IES (such as the "human activity" hypothesis, the "biotic acceptance" and the "biotic resistance") have been proposed from numerous studies. The state of Alabama is used as a case study for characterizing the emergent patterns of IES. The results indicate that

most IES are located in metropolitan areas and in the Black Belt area that is a historically intensive land use area. There are positive relationships between the richness of IES and the change of human population, the species richness and the number of endangered species, as well as the total road length and farmland area across Alabama. This study partially supports the above three hypotheses and provides a general pattern of local IES. Based on possible processes related with IES, some implications for strategically managing local IES are discussed.

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Urbanization and Agricultural Land Loss in the North Alabama Region: a Remote Sensing and Geographic Information System Based Study. T. Gabre*, and C. J. Wilson, Department of Community and Regional Planning; and W. Tadesse, and M. Wagaw, Department of Biological and Environmental Sciences, Alabama A&M University, Normal, AL 35762.

The loss of prime agricultural land has become a major concern in the United States among policy makers and farmers. The North Alabama Region is facing the same concern as urbanization is expanding more and more rapidly in the region. To address this concern and direct our actions, long-term scientific information is essential. The objectives of this project are: to develop a geodatabase that helps to monitor periodic land use and land cover changes (LULCC) within the north Alabama region (1980-2010); identify major demographic, socioeconomic factors driving the urbanization; develop a predictive model to assess future loss of prime agricultural land based on demographic and socioeconomic factors. A key component for the assessment of land conversion is the assemblage and analysis of demographic data for the 13 counties inclusive in the study area. The timeframe for the analysis is 1980-2010 and preliminary findings indicate the Region's population has grown by 32.6%. Between 1982-2007, the Region's cropland acreage has decreased by 4.9%. The North Alabama Regional demographic and socioeconomic assessment with its accompanying geodatabase will be an asset to researchers, city planners, land managers and policy-makers, as decisions are made to guide growth and sustainable change in this Region.

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Green Infrastructure Analysis of Scott's Bluff, Louisiana. F. L. Namwamba*, and J. W. Magugu, Urban Forestry Program, Southern University Agricultural Research and Extension Center, Baton Rouge, LA 70813.

This research study is a practical application of the interaction of urban forestry and agro-forestry in the context of a green infrastructure master plan. The project was designed to actualize the use of GIS and remote sensing to produce a workable, implementable green infrastructure master plan for the rural-urban interface to yield the anticipated benefits and mitigate climate change and global warming. The study of the proposed area examines the change in tree cover, land use and infrastructure development in relation to the hydrological and environmental impacts. The objectives of this study were to: (1) explore the role of GIS and remote sensing in mitigating global warming and climate change, and (2) define the role of agro-forestry and urban forestry in green infrastructure and identify and address potential hazards of gray infrastructure. This scope includes the application of data acquired from aerial photography, Global Positioning System (GPS) Trimble, topographic maps, satellite images and groundtruthing. GIS is an appropriate tool for decision criteria because it paints a reality picture on the ground for assessment, justification and application. Results from the GIS and remote sensing data were used to develop a land use infrastructure map and for marking the potential areas for green space leisure and recreation. Overall visualization aided in assessing the connectivity of the green spaces with other natural and agro-forestry systems in the rural urban interface.

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Biomimetic Spider Silk: End Use Marketing Research. L. K. Crippen*, Department of Human Sciences, University of Arkansas at Pine Bluff, Pine Bluff, AR 71601.

Biomaterials are an important way to provide renewable resources and environmental stewardship. Scientists predict that spider silk, a biomaterial, will eventually be manufactured using biomimetic techniques through gene insertion into plants or animals. Extracted protein will be spun into a fiber. Initial fiber research on actual spider silk, *Nephila clavipes*, suggests unique physical properties, i.e. high strength with high modulus, high energy absorption, supercontraction, and biocompatibility. The objective of this research was to conduct marketing research that would then be used to prioritize product development areas. Marketing research was conducted at major trade shows including Industrial Fabrics Association

International (IFAI) and TechTextil U.S.A. This research included in-depth personal interviews with companies producing products in U.S.A and Europe and research scientists. The following market segments were defined from this research: aerospace, automotive and marine, ballistics, construction, industrial, medical, military and sports equipment. In addition, specific applications in each segment were investigated and prioritized. The three areas chosen for additional research include the following: peripheral arteries, high strength industrial cables, i.e. tethers reconnaissance balloons or space elevators, and ballistic applications including military ones such as vests, helmets and armored vehicles. These were determined by matching properties of spider silk with properties needed for specific applications. A discussion on the process for selecting these areas for additional research will be presented.

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Global Partnerships in Agriculture, Renewable Energy, Natural Resources, and Sustainable Environment. Z. N. Senwo*, College of Agriculture, Life and Natural Sciences, Alabama A&M University; C. K. Bonsi, College of Agriculture, Environment and Nutrition Sciences, Tuskegee University; Y. Wang, College of Agriculture, Life and Natural Sciences, Alabama A&M University; R. Ankumah, College of Agriculture, Environment and Nutrition Sciences, Tuskegee University; J. O. Bukenya, College of Business and Public Affairs, Alabama A&M University, Normal, AL 35762; and E. Bonsi, College of Agriculture, Environment and Nutrition Sciences, Tuskegee University, Tuskegee, AL 36088.

Study abroad programs have become a robust trend not only in American higher education but also in the higher education systems of several countries. Globalization matters more now than ever, and for our students to succeed and prosper in a global economy and interconnected world, they need international knowledge, intercultural communications skills and global perspectives in their educational pursuits and training. Internationalization of education is necessary to prepare college graduates to understand other societies, cultures, economies and labor markets. In recent years, global studies have gained momentum at universities in the United States as a means to expand students' education beyond their campuses and daily world. Building and expanding the international scopes at 1890 institutions is a necessity if faculty and students are to remain competitive and relevant in our changing global environment. We have developed research and education partnerships with institutions in Brazil, China, and Costa Rica. Our goal is to strengthen the global competence of students and faculty in food and agricultural sciences, expand their global awareness, and introduce them to new global visions. The specific objectives include: (1) building educational, research and extension partnerships with global institutions in some of agriculture's challenge areas to enhance faculty and students' professional and career opportunities; and (2) developing summer enrichment international scholar exchange, experiential learning, education, research and extension programs to promote awareness among faculty and students about the broad range of international opportunities in food, agriculture and related sciences. We will present faculty and students experience and our programs' impact to date.

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Enhancing Teaching and Learning in Natural Resources Conservation Engineering and the Geosciences. M. Gitau*, Biological and Agricultural Systems Engineering; C. Li, Electrical Engineering Technology; K. Milla, Center for Water and Air Quality, Florida A&M University, Tallahassee, FL 32307; A. Cooper, Sponsored Research, South Carolina State University, Orangeburg, SC 29117; and K. Rolle, Biological and Agricultural Systems Engineering, Florida A&M University, Tallahassee, FL 32307.

This work was initiated with the overall goal of improving teaching and learning in Biological and Agricultural Systems Engineering (BASE) at FAMU by providing students and instructor access to advanced instruction delivery systems and technologies. Recent feedback from our alumni, advisory board, and other collaborators has indicated the need for increased student exposure to techniques, skills, and modern engineering tools necessary for engineering practice. This project develops a fully functional and expandable mobile classroom environment and integrates a student rapid response system. Integration of the facility into the restructured course, ABE 2001L: Introduction to Computer Applications, has led to six students being trained, reflecting a success rate of 67 percent in the related learning outcome. Further, this system has been used successfully to teach courses at BASE, including non-point pollution modeling and water management systems design, and a recently developed numerical methods course. Feedback from BASE students indicate that they now feel more confident about their computing and technological abilities, which likely translates to improved performance in other related courses as seen from currently available data. Instructional delivery is now much improved as real time instruction and demonstrations are

now possible. We anticipate that the success rate will continue to increase with integration into additional courses, and even beyond the project period. The facility has also been used in a campus-wide GIS course, resulting in the ability of the College to expand its teaching of geospatial technologies by making it possible to teach a GIS course at remote locations.

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Experiential Learning Projects and Research to Address Contemporary Issues Related to Energy, Environment and Sustainability. A. Nagchaudhuri*, Department of Engineering and Aviation Sciences; and M. Mitra, Department of Natural Sciences, University of Maryland Eastern Shore, Princess Anne, MD 21853.

“The Bio-Fuel, Sustainability, and Geospatial Information Technologies to Enhance Experiential Learning Paradigm for Precision Agriculture Project” extends the environmental stewardship archetype of the preceding project on environmentally-conscious precision agriculture at the University of Maryland Eastern Shore (UMES). The initial phase of the project is to demonstrate the production of biodiesel using waste vegetable oil (WVO) from campus dining services; it has been successfully executed by UMES student and faculty teams. Under the supervision of the project leaders, the students: worked in teams to collect, dewater, and filter the WVO; supported the acquisition of supplies and installation of the biodiesel processor; performed necessary titration and laboratory tests on the WVO to determine appropriate amounts of chemicals (sodium hydroxide, methanol, and sulfuric acid) to be used with a batch of WVO in the processor for the esterification and transesterification reactions; and operated and monitored the 48-hour biodiesel production and washing cycle of the processor. Besides biodiesel, the process produces glycerin as byproduct. The glycerin has been used to produce soap. Students have also tested the ‘gelling’ tendency of different blends of biodiesel and are currently able to identify and appropriately modify farm equipment for biodiesel use. Some of the research and experiential learning activities were also incorporated in the one-week institute of bioenergy and bioproducts for STEM teachers and educators. Through discussions and hands-on experiences, the participants learned and designed projects related to biodiesel and bioproducts and were trained to incorporate research and educational materials in school and university classrooms.

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Sowing the Seeds for Future Globally Competent Scientists in Agricultural and Other Related Sciences: Research and Cultural Experience for Undergraduate and Graduate Students in China. Y. Wang*, Z. Senwo, X. Chen, E. Moss, and L. Gardner, College of Agricultural, Life, and Natural Sciences, Alabama A&M University, Normal, AL 35762.

Alabama A&M University (AAMU) received a 3-year grant from USDA-NIFA in 2009 to develop an exchange program with China to strengthen AAMU's ability to develop globally competent students and faculty through collaborative partnerships with higher education institutions in China, with a focus on agricultural and other related sciences. Our primary Chinese partner is Nanjing Forestry University (NFU), a comprehensive university with a tradition in forestry. In the summer of 2010 and 2011, 25 students and faculty participated in this program. The success of the grant led to a new 3-year program: Research Experiences for Undergraduates (REU) in China funded by National Science Foundation (NSF) in 2011. REU exposes undergraduate students with an interest in pursuing a graduate research degree in science to hands-on research experience. During the summer of 2012, 8 undergraduate students from 6 institutions across the nation, 4 AAMU graduate students, and 5 faculty and staff participated in the program. Students took language, cultural and history classes and were paired with mentors with similar interests to conduct research projects of diverse subject areas. Students learned to design research, collect and analyse data, operate research equipment, and communicate research results with peers. They experienced the culture, history, people, and a whole host of new foods. Upon return, each student completed research and cultural reports, created an individual website, and presented their findings at a symposium. Faculty and students in the program are still reeling from the experience that has significantly broadened their research, educational, cultural and language experiences.

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Prevalence of Metabolic Syndrome and Individual Criteria in Students Attending a Historically Black University. A. M. Topè*, and P. F. Rogers, Division of Food and Animal Science, Kentucky State University, Frankfort, KY 40601.

There are limited data on the prevalence rate of Metabolic Syndrome (MetS) among young African Americans (AA). We report the prevalence of and gender differences in the components of MetS in a predominantly young AA sample population from a Historically Black College and University (HBCU). First-year college students (average age 19.8 years) (n = 218 females and 158 males) attending Kentucky State University, Frankfort, with no prior diagnosis of illness participated in the cross-sectional study. Anthropometric screenings included measurement of height, weight, waist circumference, and body mass index (BMI). Clinical screenings included the measurement of blood pressure and the determination of fasting lipid and glucose concentrations. MetS was defined using the National Cholesterol Education Program's Adult Treatment Panel III (NCEP ATP III) definition. Analysis of variance (ANOVA) scores on the Means procedure were used to examine differences between genders for all the screening parameters. Fisher's exact chi-square tests were used to analyze the point prevalence of MetS criteria. The most prevalent criteria observed were low levels of high-density lipoprotein cholesterol (37.3%) and elevated fasting glucose (22.1%). Statistically more males were found to have elevated fasting glucose and high blood pressure than females while more females had high waist circumference. The overall prevalence of MetS in the total sample was 12%. HBCUs offer a unique opportunity to monitor and to address the risks for MetS in a predominantly young AA population. Peculiar gender differences in glucose function and blood pressure management need to be addressed in the designing of intervention strategies.

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Self-Perception of Body Weight Status and Willingness to Adopt Healthy Eating and Activity Behaviors Among Kentucky Adults. C. Wang*, L. Huang, and C. Butler, Division of Food and Animal Science, Kentucky State University, Frankfort, KY 40601.

Visitors to the 2011 Kentucky State Fair were recruited to complete a questionnaire before they were given a free analysis of their body composition (body fat %) with a Tanita TBF-521 body composition analyzer. Sixty percent of overweight men considered themselves normal, and 77% of obese men considered themselves only overweight. 15% of normal weight women considered themselves overweight, but only 21% of overweight women considered themselves normal with 51% of obese women putting themselves in the overweight category. 80% of the participants would choose vegetables or fruits and nuts for snacks, but 30% of the obese group would choose chips for a snack. 70% of the participants would learn to prepare vegetable dishes on their own, but only 14% would do so by attending free workshops. 72% of participants were willing to add physical activities to their daily life such as walking, but only 10% were willing to join a free club for exercise with 10% of the obese willing to pay for an exercise program. 60% of the obese group was willing to eliminate soft drinks; 50% of the normal weight and overweight individuals were willing to drink only water. In conclusion, self-perception of body weight tended to lower the severity of weight problems in both men and women. Furthermore, self-perception of body weight status could affect the willingness to adopt healthy eating and activity behaviors.

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Resistant Starch as a Prebiotic Ingredient in Functional Food Development. Y. Xu*, Agricultural Research Station, Virginia State University, Petersburg, VA 23806.

Starch is the most important carbohydrate in human diet and accounts for 60–70% of total dietary energy intake. Historically, starch has been disparaged as an underlying cause of weight gain and obesity because it was considered to be fully digestible and absorbable in the small intestine. However, recent studies indicate that a starch fraction, termed 'resistant starch', is indigestible in the small intestine and enters the large bowel where it is fermented by human colonic bacteria to short-chain fatty acids. As a fermentation substrate for colonic bacteria, it has the potential to prevent colon cancer, diabetes, atherosclerosis, and obesity-related complications. The amount and type of resistant starch in food can be greatly influenced by different crops and varieties, as well as food processing. The objectives of this study were to evaluate resistant starch content in different crops and to extract resistant starch for characterization. It was found that legumes (chickpea and mungbean) and potatoes had higher resistant starch contents than cereal starch. The proportion of resistant starch increased after isolating starch from the other components. Resistant starch contents in the extracted starches were determined not only by amylose content but also by size and structure of starch granules. White resistant starch powder was prepared through gelatinizing, α -amylase hydrolyzing, pullulanase debranching, and retrogradation. Amylose content, relative crystallinity, gelatinization temperature, and enthalpy of produced-resistant starch increased when comparing those to native starch.

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Comparison of Fatty Acid Composition and Antioxidant Contents of Grape Seed Oils from Some Grape Cultivars Grown in North Carolina. J. Yu*, and I. Smith, Department of Family and Consumer Sciences; and B. Holmes and J. Carver, Department of Natural Resources and Environmental Sciences, North Carolina Agricultural and Technical State University, Greensboro, NC 27411.

Grape seeds are a valuable by-product of the wine industry. In addition to health promoting polyphenols, grape seeds contain significant amounts of oil. In this study, the fatty acid composition of grape seed oils (GSOs) extracted from the seeds of two Muscadine cultivars and two Cabernet cultivars were determined by GC. Results showed that Cabernet Sauvignon and Muscadine Nobel seeds had the highest and lowest total lipid contents. Free fatty acid contents of Muscadine seed oils were lower than that of Cabernet seed oils. GSOs of Muscadine Nobel and Scuppernong showed the lowest and the highest total fatty acid contents. Regardless of cultivars, major fatty acids in GSOs were linoleic (C18:2), oleic (C18:1), palmitic (C16:0), and stearic acids (C18:0). The total unsaturated fatty acid content was 82.72-86.66% of the total fatty acids, depending on the cultivars; the linoleic acid dominated the unsaturated fatty acids. The polyphenol contents of GSOs from different cultivars were in the range of 170-512 µg/ml. The high unsaturated fatty acid content made GSO a good choice for food products that need to be in the liquid form at room temperature. Polyphenols in the oil fraction of grape seed can serve as natural antioxidants to delay or slow down lipid oxidation during storage and processing.

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Insertion Sequences of 16S rDNAs of Fecal Indicator Bacteria are Useful Genetic Markers for Fecal Source Tracking. Z. Shen, M. Farley, and G. Zheng*, Cooperative Research Programs, Lincoln University, Jefferson City, MO 65101.

The goal of this study is to identify and to use insertion sequences (ISs) within 16S rDNAs of fecal indicator bacteria as genetic markers for identification of the sources of fecal contamination, which is important to reduce outbreaks of foodborne / waterborne diseases. Sequences of 16S rDNA are frequently used as genetic markers in fecal source tracking, but not without limitations, as they have little power to differentiate subgenus-level bacteria associated with different host species. In our study, ISs within 16S rDNAs of *Faecalibacterium*-like bacteria were found to be host specific and to be useful for tracking poultry and swine fecal pollution in water through polymerase chain reaction (PCR) assays. Currently, we have analyzed host specificities of over 1,000 ISs within 16S rDNAs of standard/alternative fecal indicator bacteria *in silico*, using the approaches and tools of bioinformatics, and have verified the host specificities for selected ISs, using PCR assays with fecal DNA extracted from 10 different host species including human, beef cattle, dairy cattle, chicken, turkey, swine, horse, deer, duck, and goose. Our preliminary study suggests that some of the ISs are useful genetic markers for fecal source tracking in food and water systems.

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Residual Amounts of Tetracycline in the Milk of Alpine, Nubian, and La Moncha Goats After Treatment.

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The objective was to determine the residual amounts of tetracycline in milk of treated goats of different breeds. According to the FDA regulations, the tolerance limit of this antibiotic is 300 ppb. It is essential to determine the safe withdrawal period of tetracycline in lactating goats. Five does were selected from each breed of Nubian, Alpine, and La Moncha at the International Goat Research Center. The selected animals were treated with this antibiotic, and 12 hours later the milk of each animal was collected for analysis. Five milliliter of each sample was deproteinized by HCl and acetonitrile. The supernatant of this mixture was filtered through glass wool and the filtrate was evaporated using Rotovapor under reduced pressure at 36°C until less than 1 ml remained. The sample was quantitatively transferred to a graduated tube and adjusted to exactly 1ml with distilled water. The samples were then filtered through 0.45 µm polyvinylidene fluoride and placed into sample vials for HPLC analysis. Fifty microliters of each sample were injected into reversed-phase HPLC using isocratic procedure. A Wakosil II C₁₈ column was used with mobile phase (35%:65%) Decansulfonate-acetonitrile at the rate of 1 ml/min, using UV detector at 380 nm.

This HPLC technique which is capable of detecting tetracycline residues less than the tolerance limit showed that milk withdrawal period for these goats was 86 hours. These results indicated that the depletion rate of tetracycline was faster in milking goats than the 96-hour withdrawal period that is used for lactating cows.

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Rural Community Members Engaged in a Cancer Awareness and Prevention Program. N. L. Dawkins*, Department of Food and Nutritional Sciences; and V. L. Carter, and B. Howard, Bioethics Center, Tuskegee University, Tuskegee, AL 36088.

Bullock County, Alabama is one of 17 Black Belt Counties characterized as a rural, acute problem of poverty, low education level, and poor health. It has one of the highest cancer rates in the state, as well as the nation. Mortality rate for this county is 229.9 compared to the state (216.9) and the nation (188.6). The purpose of this was to assess health knowledge, status, and behaviors of participants engaged in a cancer prevention program. Two instruments were designed: 1) a fact-finding questionnaire, and 2) a health behavior questionnaire that consisted of four sections: demographic information, health knowledge, health behaviors and health status. Both instruments revealed reliability of 0.80 and 0.83. Results indicated that 86% of respondents were female, 33% were college graduates, and 80 percent earned an average annual income of \$11,000 to \$35,000. Participants (95%) were willing to take part in a community-based cancer prevention program. Responses to health questions indicated that 71% associated moderate exercise and healthy diet with disease prevention; only 69% believed that consuming five servings of vegetables a day could lower blood pressure. Approximately 50% rated their health as good while 71% indicated that their mental health was either fair or good. Community-based intervention is paramount to the prevention of cancer and other chronic diseases. This research is supported by the U54 Cancer Research Partnerships, NCI.

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The Application of Performance Measures for Assessing Food System Sustainability. R. J. Fricano*, and S. Collins, Department of Community and Regional Planning, Alabama A&M University, Normal, AL 35762.

A food system consists of networks of producers, processors, distributors, consumers, and disposal operations. The traditional food system relies on a predominance of large corporate farms and long distance food transport. Concerns over resource depletion, air pollution, energy consumption, access to nutritious and locally grown foods, and impacts on small farms are changing the traditional food system paradigm. The new paradigm places priorities on food security, organic, locally-grown, and produced nutritious foods. In discussing a sustainable food system, two inter-related issues of concern are food miles and the plight of small farms. A previous study in Europe developed 9 categories for food system performance: efficiency, flexibility, responsiveness, product safety and health, product quality, product reliability and convenience, process quality and production system characteristics, environmental aspects, and marketing. These categories were further broken down to 33 performance indicators. The researchers surveyed participants in a food supply change and asked them to rate the importance of the 33 performance indicators. While the European study focused on operational criteria, the assessment of sustainability factors was not given as much attention. This research seeks to develop and to expand the use of sustainability indicators to evaluate the operations of food-chain participants. These indicators will be tested with input from food planning organizations.

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Student Incorporation of Nutrition Education and Exercise Both in School and at Home: a Holistic Approach. K. R. Grimes*, and A. Tope, College of Agriculture, Food Science, and Sustainable Systems, Kentucky State University, Frankfort, KY 40601; and A. Deli-Hoofnagle, Elkhorn Middle School, Frankfort, KY 40601.

Over the past two decades physicians, researchers, Extension professionals, and educators in the United States have been struggling to address the obesity epidemic that only seems to worsen by the year. Specifically since 2005, the South has witnessed a dramatic shift in overweight and obese populations, more severely impacting lower income and minority population. Kentucky State University's (KSU) Center for Family Nutrition and Wellness Education (CFNWE) seeks to encourage healthy lifestyles by promoting nutrition and exercise in Kentucky. The CFNWE has begun implementing an innovative student curriculum

that combines nutrition, education, and fitness in Central Kentucky schools, churches, libraries, and other community organizations. The goal is to develop a program in which students not only participate through organized functions (i.e. gym class or recess) but also are encouraged to extend their education to the home through family involvement. Initial pilot testing has demonstrated encouraging results. Following pre/post evaluation and Body Mass Index (BMI) analysis, initial results indicated that 23% of students improved their nutrition knowledge over the course of nine weeks. No significant differences in pre-tests between students below the 85th percentile and those above were determined. In addition, educator responses have suggested that students are actively incorporating nutrition and fitness tools in their home and family life. This initial study demonstrates that a curriculum integrating nutrition and physical activity education can improve foundational knowledge for behavior change. These results suggested that childhood obesity may be influenced more by behavior, family life, and/or genetics rather than lack of knowledge.

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Current Perspectives on Microbial Food Safety of Fresh Produce: Pathogen Survival and Persistence in Soil, in Water, and on Fresh Produce. F. M. Hashem*, C. P. Cotton, R. B. Dadson, A. L. Allen, and L. E. Marsh, University of Maryland Eastern Shore, Princess Anne, MD 21853; and P. Millner and M. Sharma, USDA-ARS, Beltsville, MD 20705.

Improving food safety and reducing foodborne illnesses are USDA-NIFA's high priority areas. Ongoing research at the University of Maryland Eastern Shore (UMES) in collaboration with USDA-ARS, Beltsville, MD, focuses on addressing avenues leading to fresh produce contamination with pathogenic microorganisms: *E. coli* 0157:H7, *Salmonella*, and *Staphylococcus*. Irrigation water, insects, manure, run-off water, farm machinery and practices, and bioaerosols generated from farm operations are potential avenues leading to fresh produce contamination. Our main objective is to minimize microbial contamination of fresh produce at the farm level. Our bioaerosol studies revealed that while generic *E. coli* traveled up to 50 feet, *Staphylococcus* traveled to more than 600 feet from the litter-handling site; therefore, *Staphylococcus* could be used as a marker in bioaerosol studies. Our rain simulation studies, where soils were amended with poultry litter, poultry compost, and dairy and swine manure, showed that poultry manure enhanced growth of bacteria more than any other manure. Similar findings were found in our field studies where soil was amended with various manure types and inoculated with non-pathogenic strains of generic *E. coli* and attenuated *E. coli* 0157:H7. An irrigation study where field-grown tomatoes were inoculated 10 days before harvest with bovine manure examined the persistence of generic *E. coli* and total coliforms; bacterial populations fluctuated in response to weather events within the 10-day sampling period. Several studies in these topic areas are also being conducted to gain quantitative insights about pathogen survival and persistence in field production of fresh produce.

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Effects of Purple Sweet Potato Powder and Dietary Calcium Intake on Body Weight of Ovariectomized Rats. L. Huang*, C. Butler, and C. Wang, Division of Food and Animal Science, Kentucky State University, Frankfort, KY 40601.

The objective of this study was to determine whether dietary intake of purple sweet potato powder (PSPP) and calcium would affect body weight of ovariectomized rats. Female SD rats (6 month old) were either ovariectomized or sham-operated before assignment into 6 treatment groups. Groups A and C were fed the AIN93M diet; group E was fed the AIN93M diet containing 10% PSPP. Group B was fed the AIN93M diet with calcium content limited to 0.25% of the diet. Group D was fed the same as Group B with 10% of the cornstarch of the diet replaced by PSPP. Group A was fed ad lib; other groups were fed at the average intake of Group A. Body weight was obtained weekly. The rats were fed their assigned diets for 8 weeks before they were killed. The uterus of groups B, C, D, and E was much smaller than for the baseline and sham-control. Liver weight was higher for the baseline and the sham control than for the groups fed diets containing 10% PSPP, regardless of the calcium intake. Visceral fat mass was larger for the sham control group and groups fed diets low in calcium. The final body weight for the groups fed diets adequate in calcium was lower than the sham control group, and those fed diets low in calcium. These results indicated that adequate calcium intake was important in preventing weight gain after ovaries were removed, but inclusion of PSPP in the diet did not affect the body weight.

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Effectiveness of Garlic in Prolonging Shelf-Life of Chevron Treated with Rosemary and Vitamin E.

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This project is evaluating innovative ways to improve shelf-life and microbial safety of chevon (goat meat) using natural herbs and spices. In this regard, the combination of proven natural plant antioxidants and antimicrobials (vitamin E, garlic, and rosemary) was applied to ground goat meat. In this preliminary experiment, eight treatments made of combinations of Vitamin E (0, 0.0125, and 0.025% levels) with rosemary (0, 0.025%, and 0.050%) and garlic (0, 0.025%, and 0.050%) were used. Non-treated ground meat was used as control. Microbial mesophilic total counts using 3M Petrifilm Aerobic count plates and color using a colorimeter (Konica Minolta CR-400) were performed. Results showed no difference in microbial total counts among the different treatments for 12 days with treatment with the antimicrobial garlic at 0.050% showing numerical reduction in total aerobic counts at Day 3; microbial shelf-life was between 6 and 9 days for all treatments. There was a decreased in redness at Day 3 with treated samples having less redness than the control. At days 6 and 9, treated samples kept their redness better than the control. In view of the results, the decision was made to increase the level of the antimicrobial garlic up to 2% in the subsequent experiments, as long as it does not affect consumer acceptance.

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A Review of the Oxidative Capacity of a Variety of Brand Cooking Oils. V. McWhinney*, and Y. S.

Jun, Cooperative Agricultural Research Center; L. Doore, Department of Agriculture and Nutrition Ecology, Prairie View A&M University, Prairie View, TX 77447; and D. McWhinney, Department of Biology and Nutrition, Houston Community College, Houston, TX.

Significant efforts have focused on the production of quality healthy cooking oils. Part of oils' quality is defined by the inherent stability of oils, i.e. fatty acid composition. Oxidation of non-conjugated fatty acid is a major deterioration factor and can negatively impact the health benefits of oils. The adulteration of olive oils with canola oil was recently discovered in brands of olive oil. An examination of the oxidative capacity of the brands of extra virgin olive oils was performed to identify this adulteration. The current study was similar to this study in that it was undertaken to examine the oxidative potential of different brands of oils sold in the communities in close proximity to Prairie View, TX community; a community that is disproportionately affected by many of the disparities associated or correlated with health and wellness. The oxidative values for the unheated and heated oils (180°C for 12 hours) were within reported values. The peroxide values for the oils indicated mild to moderated oxidation. Higher peroxide values would be expected under conditions of the frying of foods using the different oils. Vegetable and corn oils are oils purported for frying. But, these oils more often showed higher peroxide values among the different brands than canola, extra virgin olive, and blends oils. The recommendation for discontinuing the home-use of cooking oils after two day is valid; in some instances, one day's use may be better. The inclusion of this recommendation in extension programs focusing on nutrition and disease may be beneficial.

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Assessing School Personnel Knowledge of Wellness Policies. S. L. McWhinney*, and A. E. McDonald, Prairie View A&M University, Prairie View, TX 77446; and E. J. McKyer, and C. Outley, Texas A&M University, College Station, TX, 77845.

Wellness policies were formulated to assist schools in promoting student health and wellness, to prevent and to reduce childhood obesity, and to assure that school nutrition guidelines meet the minimum standards. To be effective, school personnel must know and implement these policies. The objective was to determine whether teachers, principals, nurses, and food service directors are knowledgeable about the wellness policies federally mandated in public schools. A purposive sampling technique was used to select school stakeholders from rural economically disadvantaged communities to participate in this qualitative research. A mixed method approach employing qualitative and quantitative techniques was used to collect data. Research questions were developed and validated by the research team based on previous focus group sessions. Structured interviews were conducted with responses audio recorded, transcribed, and analyzed using Atlas Ti. Two or more similar responses were determined to be a theme. Participants indicated that

nutrition and wellness policies and practices were promoted primarily in the physical education classes and through the schools' cafeteria programs. Most were aware that policies related to wellness were mandated but did not know what these policies entailed. School personnel overwhelmingly indicated that teachers, parents, community members, and experts in nutrition should be involved in the policy-making decisions. This study revealed that although many schools have wellness policies, not all personnel were knowledgeable about the details or the implementation process. School districts should educate administrative and teaching personnel on the wellness policies thus making it easier to implement at the local school levels.

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Efforts to Mitigate Climate Change Repercussions on Oyster Populations and Natural Oyster Recruitment in Delaware Inland Bays. G. Ozbay*, B. Reckenbeil, and F. Marengi, Department of Agriculture and Natural Resources, Delaware State University, Dover, DE 19901.

Oyster restoration efforts are increasingly challenged by anthropogenic influences such as run-off, sea-level rise, decreased salinity and pH, and other factors. Populations of Eastern oysters, *Crassostrea virginica*, along the Atlantic coast of the US, are only 1-3% of historic population levels, and further declines would be catastrophic. Oysters are essential as a "keystone species" that provide habitat and spawning substrates, stabilization of sediments, and a natural filtration system to clarify waters. They can tolerate a wide range of salinity, temperature, turbidity, and dissolved oxygen. Oysters occur where annual temperature can range between -2 to 36°C. Large, long-term populations are found at salinities between 5 and 40‰. In an attempt to enhance the oyster populations and to improve water quality conditions in Delaware, an oyster gardening restoration program was initiated. A variety of culturing techniques including a sub-tidal modified rack and bag aquaculture, oyster cages, Taylor floats, and created oyster reefs have been used to investigate ecological and biological impacts of these efforts. Oyster survival looked promising, ranging from 100% to 74% survival. Natural recruitment of oysters have been observed on oysters in floats and nearby riprap, which may be a promising sign that oysters in the gardening program are reproducing within the Delaware Inland Bays. The timing and magnitude of deleterious effects of climate change on aquatic systems have yet to be determined. However, precautions to mitigate repercussions must be undertaken now if we have any hope of protecting this valuable natural resource.

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The Effect of Chilling on Persistence of *Salmonella serovars* on Chicken Carcasses. S. Parveen*, and T. Mohamed, Department of Agriculture, University of Maryland Eastern Shore, Princess, Anne, MD 21863; and S. Zhao and D. G. White, Division of Animal and Food Microbiology, Laurel, MD 20708.

As little is known about whether commercial chilling has any effect on the persistence of *Salmonella serovars* on chicken carcasses, 309 *S. typhimurium* and *S. kentucky* recovered from pre-and post-chill whole broiler carcasses were characterized for genetic relatedness using pulsed field-gel electrophoresis (PFGE) and associated virulence factors using PCR and bioassays. Two hundred eighteen sulfisoxazole and ceftiofur resistant *S. typhimurium* and *S. kentucky* isolates were further tested for the presence of class-I integrons and *bla*_{CMY} genes by PCR. All ceftiofur-resistant *S. kentucky* and *S. typhimurium* possessed *bla*_{CMY} genes. Class-I integrons were not detected in any sulfisoxazole resistant *S. kentucky* isolates but were detected in 5.5 % of sulfisoxazole resistant *S. typhimurium* isolates. The PFGE analysis revealed the presence of genetically diverse populations within the recovered isolates, but clusters were generally concordant with serotypes and antimicrobial resistance profiles. At a 100% pattern similarity index, 36% of the undistinguishable *S. typhimurium* and 22% of the undistinguishable *S. kentucky* isolates were recovered from the same chilling step. All isolates possessed the *invA* and *pagC* genes, but only 1.4% possessed *spvC*. Overall, 30.7% of the isolates were aerobactin producers, and 41.1% were colicin producers. There was a significant difference in the production of aerobactin and colicin between *S. typhimurium* and *S. kentucky*. These results indicated that chilling had no effect on class-I integrons, *bla*_{CMY} genes, and virulence factors but had an effect on PFGE patterns.

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Systems Based Approach to Childhood Obesity Prevention. M. D. Ravola*, and O. Pittman, Department of Human Sciences; and V. Njiti, Department of Biotechnology, Alcorn State University, Lorman, MS 39096.

Prevalence of childhood obesity especially among preschool children is a serious concern due to the well established negative health and psychosocial consequences. Studies continue to prove that ethnic and socioeconomic disparities are high risk factors for obesity. Children especially in head start programs are either overweight or obese. Efforts to lower childhood obesity should target settings such as home, school, and community. The closest of environments to children next to home are child-care settings. Child-care settings are ideal environments in shaping children's nutritional behaviors. The project, "My Body Matters", was an initiative to address obesity among preschool children in Head Start programs through environmental interventions. The objectives of this study were to do the following: 1) enhance vegetable consumption among preschool children; 2) increase physical activity among preschool children; and 3) decrease sedentary behaviors among preschool children. A multi-pronged approach which encompasses physical activity, healthy eating, and caregiver involvement has been employed in the program. The study employed the experimental research design in conjunction with the Human Ecological Theory. The study included 560 preschool children, 560 parents, and 28 teachers in Adams and Jefferson counties in Southwest Mississippi. Data on BMI, socioeconomic, and familial correlations of children's health and eating behaviors were gathered. The results would provide directions to propose recommendations for children early in their lives for active lifestyles and healthy nutritional choices. The benefits of addressing childhood obesity are likely to impact areas affected by obesity such as learning, health, economic burden of health care, and absenteeism from school.

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Exploratory Research Involving Consumer Preferences for Organic and Local Food Products in North Carolina. K. Y. Jefferson-Moore, R. D. Robbins*, and D. J. Johnson, North Carolina Agricultural and Technical State University, Greensboro, NC 27411.

Consumer preferences for local and organic food in North Carolina have been steadily growing over the past decade. In order to measure the attitudes and preferences associated with the decision to select organic over local or vice versa, we first must use qualitative methods to gain more knowledge in potential factors that affect consumers who patronize farmers' markets, the most utilized sales outlet by North Carolina organic and local farmers. We began this process through the use of focus groups. These focus groups were selected from five locations throughout the state; the regions included the following: Coastal (Wilmington), Piedmont (Charlotte, Greensboro, and Raleigh), and Mountain (Asheville). Therefore, the objective of the study is to evaluate the perceptions of consumers' choices for organic and locally-grown food available at farmers' markets in three regions of North Carolina. The availability of locally and organically-produced foods in several supermarkets, specialty grocery stores, consumer cooperatives, farmers markets, and community-supported agriculture initiatives will be presented. Target participants for the focus groups are representative of consumers of organic food products as indicated by the Organic Trade Association. 74% Caucasian, 13% African American, 8% Hispanic, 2.7% Asian, and 1.6% Other make up all the organic consumers. The primary implications of the preliminary findings include the following: (1) consumers appear indifferent to locally-produced foods over organically-produced foods; and (2) consumers are willing to pay for food products that are perceived to have healthy, affordable, quality (taste/color) and local economy attributes.

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Food Supply Chains and Emergence of Organized Retailing: A Case of Indian Food Industry.

S. P. Singh*, and P. Illukpitiya, Department of Agricultural and Environmental Sciences, Tennessee State University, Nashville, TN 37209.

In many developing countries including India, the agriculture is shifting from a supply-driven economy to a driven economy. The agriculture sector in India is undergoing rapid change, and there is growing evidence that organized food supply chains in the form of backward integration of food supplies will act as an alternative strategy for domestic firms as well as multinational companies. Organized retail in India is also expanding rapidly especially in the food and grocery sector. While total food and groceries account for nearly 60% of total retail sales, food and grocery sales by organized sector firms account for only 10% of total organized sector retail sales. This indicates ample opportunities in food and grocery retailing. Within this context, the paper has discussed food supply chain management (SCM) (attributes, features and needs) in India. The paper further examines food retailing, emergence of organized retailing, and the impact of SCM on organized retailing in India. Food supply chains are complex entities that serve many functions. India's food supply chains are characterized by strict regulations and a large number of

intermediaries leading to a number of inefficiencies, or lower shares of farmers in the consumer rupee. The entry of India's corporate sector and of multinationals into food retailing, though moving ahead at a rather fast pace, is facing many problems. It is partly due to existing policies, lack of infrastructure, and political, social sensitivities. There is a need for policy changes and institutional strengthening. More effective market institutions can contribute to the development of more efficient domestic markets and further improve the climate for both domestic and foreign investment in India's agriculture and food sector.

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Lending Profiles of African-American Families in North Carolina: the 2006 and 2009 HMDA Data. S. Lee*, V. L. Giddings, and R. Robinson, Department of Family and Consumer Sciences, North Carolina Agricultural and Technical State University, Greensboro, NC 27411.

A high homeownership rate in North Carolina influenced housing affordability or foreclosure issues. The subprime foreclosure rates in North Carolina increased three fold from less than 17,000 in 1998 to 50,000 in 2007; and the proportion of 2006 home loans to African-American families that were subprime was 43%. Therefore, it is important to explore lending profiles, particularly among African-American families in North Carolina in the late 2000s when the United States experienced both a housing boom and a housing crisis. The purpose of this study was to identify lending profiles of African-American families in North Carolina in the late 2000s. The 2006 and 2009 Home Mortgage Disclosure Act Loan Application Register (HMDA LAR) data were employed. Each 2006 and 2009 sample showing only loans originated for African-Americans in North Carolina ($N = 50,509$ and $N = 24,344$, respectively) was developed to produce a descriptive profile. Results revealed that the percentage of those having conventional loans decreased from 89% to 42%, while those having FHA-insured and VA-guaranteed, and FSA/RHS loans increased. Loan purpose showed different patterns in that the percentage of refinancing loans increased from 38% to 58% while that of home purchasing decreased from 56% to 39%. Differences in purchaser type were also found in that Ginnie Mae, Fannie Mae, and Freddie Mac involved more purchasers in 2009, compared to that of 2006. The 2009 sample showed smaller loan amounts and applicant incomes compared to those of 2006. However, similar patterns were shown in property type, preapproval, applicant sex, and urbanicity characteristics.

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Race and the Delivery of Municipal Services in Small Towns in South Carolina. W. M. Legette*, Department of Social Sciences, South Carolina State University, Orangeburg, SC 29117.

Small municipalities provide essential services to promote the public's interests. Municipal governments are responsible for infrastructures such as public road systems, water and sewer systems, fire departments, and street maintenance. Many municipalities provide health care, housing, and elderly and youth facilities and services. Small town municipalities also play an important role in community and economic development that affect citizens' quality of life. Small town municipalities, with variant levels of success, promote public enlightenment, happiness, domestic tranquility and general welfare. Municipal officials in small towns in South Carolina like the south in general have historically denied black citizens a fair distribution of municipal services. Therefore, this presentation discerns the relation between race, municipal officials' satisfaction with municipal services, and municipal officials' role in public deliberation and decision making regarding municipal services distribution and community development. The presentation discerns the factors that influence the level of services provided in small towns and what municipal officials perceive as affordable and are willing to support. The presentation focuses on five small towns in South Carolina. The presentation provides an analysis of the extent to which municipal officials attempt to provide a fair distribution of services to all neighborhoods. It discerns the extent to which race plays a role in the distribution of municipal services. The data for this presentation come from a survey of municipal officials, interviews with municipal officials and community leaders, and a content analysis of city council minutes.

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Lessons Learned Field Testing a Low-Cost High Tunnel with Growers in West Virginia. B. E. Liedl*, Gus R. Douglass Institute, Agricultural and Environmental Research Station, West Virginia State University, Institute, WV 25112; and T. Wilson Hudson, Hudson Farms, Charleston, WV 25312.

High tunnels protect, accelerate and expand the season for specialty crops and permit growers to continue field activities during inclement weather. Limited adoption of this technology in WV by growers

was due to lack of exposure to the concept and uses of a high tunnel, as well as cost and transportation of materials to rural areas. A local grower who built his own high tunnel inspired us to develop an alternative solution to “off-the-shelf” kits that could be constructed with mostly locally available materials for other growers to see if a high tunnel fit into their operation. Our project included requesting applications, conducting site visits with growers at the sites, constructing high tunnels to field-test the concept and developing a construction manual to produce a 20’ x 48’ tunnel for under \$1,000. Applications were reviewed and sites visited before the first tunnel was built in 2010. Finding suitable sites was a challenge in a mountainous state. Some growers were more motivated than others to help with construction and/or put the structure to use. Growers differed in what seasons they use the structure based on their markets. Others that helped with construction or have seen the structures have been inspired build their own. We also developed a demonstration version to use in workshops that could be converted to a small greenhouse. Additional education on high tunnels is necessary but our project has raised grower’s exposure to high tunnels allowing them to expand locally produced food in their markets.

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Measuring Parental Satisfaction to Improve Family and Youth Outcomes in a Campus Childcare Center. D. Long*, Child and Family Development Center, University of Maryland Eastern Shore, Princess Anne, MD 21853.

The yearly implementation of a formal measurement tool to assess parental satisfaction in early educational settings is an effective means to assure the continuous improvement of services. Quality childcare settings with developmentally appropriate program features and effective administrative leadership foster improved outcomes for young children and their families. Increasing the quality of the service delivery model in childcare settings requires a thorough examination of the program and administration, the identification of strengths and areas for improvement, an action plan to address improvement areas, a method to collect facts and evidence that demonstrate growth, and a means of communicating improvement efforts to families. A parental satisfaction survey created and revised by the researcher and the center’s lead teaching staff, utilizing the program’s mission statement, philosophy, and goals, was implemented January 2012 in a rural campus childcare center to identify parental satisfaction in two areas: program services and administration. Thirty-nine of the 77 families utilizing the services of the childcare center completed the survey, a 51% response rate. The survey instrument included a rating scale and four open-ended questions. Survey results were used to develop an action plan to systematically implement improvements and establish on-going communication efforts of improvements to families. A follow-up survey instrument will be implemented January 2013. In this presentation, a comparison of the outcomes of the two parental satisfaction surveys will be provided, and the researcher will demonstrate through a case study review the process undertaken to achieve increased parental satisfaction in order to improve outcomes within the program.

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Impact of the Influx in Hispanic Population on Usage of Social Services Programs in South Carolina. C. C. Mathis, Jr.*, and S. Choudhari, 1890 Research & Extension, South Carolina State University, Orangeburg, SC 29117.

As a result of a rapid increase in the Hispanic population and growing needs of social services for their well-being in South Carolina, the 1890 Evans-Allen Research program funded a study. The research was conducted to assess the participation of Hispanics in selected South Carolina counties over a period, from 2000-2003, in several social services programs such as Food Stamps, Temporary Assistance for Needy Families (TANF), Medicaid, and Woman-Infant-Children (WIC) programs. The original research was conducted in 23 counties with a Hispanic population of 1,000 or more in South Carolina. This research paper assessed only those counties that had a Hispanic population above 5,000, according to the 2000 Census data, including Greenville, Spartanburg, Richland, Florence, Beaufort, Charleston, and Horry counties. Results of the assessments are presented in the graphs to give comparisons and to show trends in the densely populated Hispanic communities. This research will be helpful for state agencies to provide assistance to the growing needs of Hispanic families, as well as for the 1890 Extension Program in providing outreach efforts toward Hispanic population.

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Assessing the Fit of Garments Using 3D Virtual Draping. G. N. Namwamba*, Southern University Agricultural Research and Extension Center, Baton Rouge, LA 70813.

American consumers continue to demand higher quality garments at affordable prices. Intrinsic apparel quality indicators such as fiber content, workmanship, and fit are very important factors for consumers in apparel selection. Garment fit, however, is one of the most important and has always been a major factor for consumers. Standard patterns do not always provide a good fit of clothing for most consumers because of diversity in body conformation. New developments in technologies make it possible to address issues of fit through creation of customized garments with a better fit. Demand Flow Manufacturing (DFM), the process of making garments on demand, is perceived to be the future of apparel manufacturing and retailing. Technologies that support DFM include 3D Body Scanning and 3D-2D software. The purpose of this study was to assess the fit of garments made from patterns derived from 3D body scanning data using 3D virtual draping software. Body scan data were obtained using a TC² 3D Body Scanner. Customized patterns were undraped using TC² 3D-2D software. Patterns were edited and garments were stitched virtually using Modaris software. A virtual mannequin was created in Modaris 3D and the virtual garment was draped onto it. Garment fit was assessed visually and quantitatively by measuring parameters such as draping among others. The same virtual mannequin was also dressed with a virtual garment made from a scanned standard pattern and fit was assessed. Findings indicated that the customized patterns from 3D data had a better fit than standard commercial patterns.

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The Effect of Experiential Food Science Activities on the Attitudes of Middle School Children Towards Stem Subjects. C. Newman*, and N. A. James, Food Science Program, College of Agriculture and Food Sciences, Florida A&M University, Tallahassee, FL 32307.

The need for more students to enter into the STEM fields has been stressed by public officials at both the Federal and State levels. This lack of students in STEM areas has been characterized both as a national security and economic risk to the nation, which should be addressed as soon as possible. Many studies have shown that the middle school years is the period when many students forsake the STEM fields. The reasons are varied but a lack of hands on application has been cited as a potential reason for students not aligning their futures with STEM areas. The purpose of this exercise was to use experiential activities related to the science of food, a material that all students were familiar with, to promote activities in the various stem fields. Middle School Students in afterschool programs in the Big Bend area were exposed to a four-week program involving experiential food science activities. The students' attitudes towards the value of STEM, their knowledge of potential STEM careers, and their perceptions of their STEM abilities were evaluated before and after the four weeks of experiential activities. The results were compared with students not exposed to this activity. The results from students exposed to the activity were also compared across socioeconomic, location, gender, and age to determine those who were most at risk and those who benefitted most from this intervention.

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Internet Access and Economic Development in Africa: Problems and Possibilities. Z. Olorunnipa*, and A. B. Lorenzo, Division of Agricultural Sciences, College of Agriculture and Food Sciences, Florida A&M University, Tallahassee, FL 32307.

Africa, with an estimated population of 1.07 billion, is the second largest continent in the world with considerable potential to contribute to global economic activities in terms of production, consumption, imports, exports and other activities. However, this potential has been hampered by a myriad of economic, social and political problems such as poverty, food shortages, high population growth rate, runaway inflation, wars, strife, corruption, etc. The way the Internet is revolutionizing the world offers a ray of hope that, potentially, it can be harnessed to promote economic development in Africa. Many of the problems militating against sustainable economic development in Africa can be tackled by various applications of the Internet technology. For example, a World Bank statistics shows that in developing countries every 10% growth in broadband access results in 1.4% growth in GDP and every 1,000 new subscribers of broadband Internet result in the creation of 80 new jobs. Furthermore, Internet usage is gaining an alarming growth rate in Africa. Between year 2000 and June 2012 Internet usage increased by 3606.7%, the largest increase among all the continents of the world. How may this potential be harnessed to accelerate agricultural and economic development in Africa? What are the challenges and possibilities? What factors can influence

access to Internet in the continent? These and many other issues are examined in this paper using descriptive statistics and regression analysis. The findings can be very useful for policy makers and development agents for promoting sustainable economic development in Africa.

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Stomp, Rattle and Roll: Celebrating A Legacy of Excellence” at FAMU’s 12th Annual Grape Harvest Festival. B. R. Phills*, S. Leong, V. Colova, G. Umar, M. Sheikh, J. Lu, R. Zhongbo, A. Harper, D. Kambiranda, and A. Ananga, Center for Viticulture and Small Fruit Research, College of Agriculture and Food Sciences, Florida A&M University, Tallahassee, FL 32317.

The 12th Annual FAMU Grape Harvest Festival was a really good year for grape production wine tasting, and public visitation. This year's festival theme was “Stomp Rattle and Roll: Celebrating A Legacy of Excellence” and it truly held up to its theme. The festival is the 'hook' through which we use to showcase the research and extension programs in the Center and throughout the College. The Festival has become a university-wide event with significant community involvement via displays and exhibits, and public participation. The Festival is chaired by FAMU's First Lady and is gaining statewide acceptance as the largest Grape Harvest Festival in Florida. This year's attendance reached a record of 4000 participants. We also had over 70 university and community displays/exhibits, a First Lady 5K Vineyard Run/walk, and a Community Health Fair coordinated by the FAMU College of Pharmacy. Our University President finished 3rd in his age group for the Vineyard Run among some 150 runners, and the First Lady finished 1st among the walkers. The festival is designed to highlight and promote the 18 Florida Farm Wineries and for the first time, we secured a permit for the sale of their wines. Other festival attractions included wine tasting, grape picking and eating, sampling, pony rides, hula hoops, aquarium exhibits, trailer ride and guided tours throughout the Center. All in all, this year's festival was a really good year. We hope to see you next year - August 24, 2013 beginning at 7:00 a.m.

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Establishment of Precollege Summer Institute: in Search of the Next George Washington Carver. G. S. Phills*, Office of Academic Programs, and B. R. Phills, and G. Umar, Center for Viticulture and Small Fruit Research, College of Agriculture and Small Fruit Research, Tallahassee, FL 32317

The FAMU CAFS Precollege Summer Institute, In Search of the Next George Washington Carver initiative was established out of the need to unify under one umbrella, all precollege programs regardless of funding sources so as to maximize financial and human resources, and streamliner and strengthen the exposure options that are offered to students participating in the annual precollege summer programs. In any given year, there are from 9 to 11 precollege programs. These programs are primarily of two types: residential and day programs. Residential programs range from 1 - 4 weeks and the Day program allow students to reside at home and commute each day for FASTEM exposure and experiential training. Programs are sponsored generally through USDA Capacity Building Grants, but may also be sponsored through specialty/focused grants from USDA agencies such as Cooperative Extension, Forestry, or NIFA base programs. The Day programs (8) are more restrictive in that they generally only allow for locally based student participants whereas residential programs (5) allow students to come from throughout the USA. In most cases, the residential programs, because of its draw from a broad selection base will allow for greater selection of students meeting a higher level of academic achievement. The Institute has allowed for greater administrative oversight coordination of program structure, program offerings, and allows for joint program travel, lectures, a student summit offering guest speakers and a highlight of student experiences via student presentations. The Institute also allows for greater use of a limited summer faculty and staff.

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Demand Analysis of Agricultural Education and Training in Sub-Saharan Africa: the Case of Ghana. S. L. Tubene*, Department of Agriculture, Food, and Resource Sciences, University of Maryland Eastern Shore, Princess Anne, MD 21853.

The demand for qualified agricultural professionals is progressively growing in Sub-Saharan Africa (SSA). This growing demand is due in part to the need for developing economies to improve their agricultural sector, the engine for a sustained economic growth. This paper explored the determinants of Agricultural Education and Training (AET), which was identified using a wide variety of literature on AET in SSA combined with a critical analysis of AET in Ghana and a key informant survey conducted in Ghana. AET systems in SSA encounter many challenges, including lack of infrastructure, poor quality of faculty,

lack of institutional support, and lack of innovation. This study indicated that SSA's AET system is undergoing some degree of reform in response to changing scenarios in agricultural policies and markets. However, very few of these reforms seem to capture the key principles of the innovation systems perspective. Ghana's economy has been largely dependent on agriculture, and its growth is the key to overall economic growth and development. Such growth can be spurred through appropriate reform of the Ghana's AET system including: (1) building the capacity of the public and private agricultural sector by staffing these institutions with qualified personnel, (2) aligning AET system to the real needs of stakeholders and sectors and not to the needs of political leaders, (3) developing and implementing a communication strategy to improve activities and projects coordination, (4) creating framework for synergy among various projects, and (5) bridging the gap between technically qualified and experienced personnel and the academically educated professionals.

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Community Capital and Economic Development Efforts in Rural Alabama. A. A. Zekeri*, Department of Psychology and Sociology; R. Zabawa, and T. Hargrove, George Washington Carver Agricultural Experiment Station, College of Agriculture, Environment and Nutrition Sciences, Tuskegee University, Tuskegee, AL 36088.

Actions by local groups and leaders constitute an essential but poorly understood element of many rural economic development efforts. Previous studies suggest that local development efforts can influence community changes, but questions remain about why localities differ in mobilization to achieve development goals. Drawing upon community capital theory, this study uses data from forest dependent communities in Alabama's Black Belt to examine the argument that community capital can contribute to a higher probability of local mobilization than would be predicted by ecological characteristics alone. Hierarchical regressions support this argument for some local actions such as promotion to recruit business and industry - a keystone of rural development.

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Food Insecurity Among Women Living with HIV AIDS in Alabama's Black Belt. A. A. Zekeri*, Department of Psychology and Sociology; and R. Zabawa, George Washington Carver Agricultural Experiment Station, College of Agriculture, Environment and Nutrition Sciences, Tuskegee University, Tuskegee, AL 36088.

Food insecurity has been associated with several negative health outcomes, yet little is known about the prevalence and correlates of food insecurity among women living with HIV/AIDS. We examined the prevalence of factors associated with food insecurity among HIV-infected women accessing antiretroviral therapy in Alabama's Black Belt Counties. This study was conducted in two southeastern Alabama clinics that provide medical and social support services to HIV-positive persons. We used multiple regression to determine socio-demographic and behavioral factors associated with food insecurity, which was measured using the USDA Household Food Insecurity Scale. Among the 300 women living with HIV/AIDS, 40% were food insecure. We found that those who experienced food insecurity had significantly lower income levels, less education, and were more likely to be single and African American than women from food secure households.

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CURES: Authentic Course-Based Undergraduate Research Experiences. A Potential Tool in STEAM Education. A. D. Alexander*, Department of Agricultural and Environmental Sciences, College of Agriculture, Environment, and Nutrition Sciences, Department of Pathobiology; College of Veterinary Medicine, Nursing and Allied Health, Tuskegee University, Tuskegee, AL 36088

Keeping students engaged in Science, Technology, Engineering, Agriculture, and Math (STEAM) fields is a constant challenge. One research tool that might be helpful is the infusion of authentic research experiences in core courses. This allows students to get hands-on research experiences, which tend to reinforce course concepts, improve retention of course content and offer the students the additional benefits of data for use in on campus seminars (i.e. senior seminar) as well as for applying for travel awards to science meetings. The CURES also allow students to gain authorship on research publications, improve their public speaking skills, improve their writing ability and to gain experience in poster, powerpoint and manuscript development. CURES offer faculty the opportunity to incorporate what they do in their labs in the courses they teach. CURES reduce the need to develop standard lab exercises and give faculty,

especially those with a high teaching load, the opportunity to increase research productivity and publication. Using a pilot experience in two new/renewed courses as a model, this presentation will introduce/reintroduce the audience to course-based authentic research and discuss the challenges and triumphs that a par for the course.

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Developing Garden Skills as a Transition Tool from Prison to Community. Y. Ghebreyessus, and M. Berhane*, Southern University Agricultural Research and Extension Center, Baton Rouge, LA 70813.

Model prison gardening experience provides valuable horticultural skills that could help prison inmates find focus for their lives post-release. In addition to increasing job opportunities, garden produce could improve nutritional intake of inmates as well as reduce violence and improve participants' physical and mental health. A trial project was conducted with the cooperation of St. Landry Parish Government in Opelousas, Louisiana. The major objectives of the project were to train inmates with valuable gardening skills that would facilitate job opportunities upon their release; to develop a garden operated by inmates so that they would have fresh supply of nutritious food for themselves and extra to share; and to use the garden as model demonstration garden for communities and students in the St. Landry Parish. A training workshop was conducted in a classroom format that included gardening activities starting from seedbed preparation up to harvesting and marketing strategies. With funds obtained from the St. Landry Parish Government, a garden (150' x 100') was established with full participation of male prisoners. The crops grown for spring were tomatoes, green beans, peppers, sweet corn, parsley, and hibiscus. Fall crops were mustard greens, turnips, cabbage, collard, parsley and onions. A total of 2,164 Kg of vegetable produce was harvested and at two dollar per kilogram rate, and the cost saving to St. Landry Parish government was \$4,327. Prisoners gained hands-on experience, enjoyed outdoor fieldwork and expressed their desire to start vegetable farming upon their release. A similar project is in progress with Baton Rouge Juvenile Correction Institute.

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The Tuskegee University AgDiscovery Summer Program: Increasing Minority Participation in Agriculture and Related Areas. O. Bolden-Tiller*, Department of Agricultural and Environmental Sciences, Tuskegee University, Tuskegee Institute, AL 36088.

Approximately 13% of the American population is African American (AA); however, only approximately 3% are represented in science, technology, engineering, agriculture, and mathematics fields despite the increased gains over the past several decades. Interestingly, 50% of BS degrees in agriculture awarded to AAs are conferred from HBCUs. In a recent report, Tuskegee University ranked eighth among all universities awarding BS degrees in agriculture to minorities. In 2011, AgDiscovery was launched at Tuskegee University (one of several sites in 2011); the two-week residential summer outreach program exposed students (ages 14-17) to research and agriculture-related careers. The program was hosted at Tuskegee University in conjunction with USDA-APHIS (2011 and 2012) and USDA-Forest Service (2011). Here we report on the findings of program for Summers 2011 and 2012. A total of 32 youth gained valuable educational and career information through leadership training and experiential learning about various careers related to agricultural sciences, such as Forestry, Wildlife Biology, Chemistry, Animal Science, Biotechnology, Plant/Soil Sciences, Veterinary Medicine, Agricultural Economics, and Engineering. Participants took part in wet labs, workshops, site visits and presentations all with an emphasis on agriculture. Reflective journals and surveys revealed that students showed gains in self and career awareness. In conclusion, the TU AgDiscovery program was successful in raising awareness about educational and career opportunities in agriculture.

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Head Start on Healthy Start by Kindergarten (HS-HS by K) Program. E. Bonsi*, R. Zabawa, P. Doamekpor, and Y. Allen, Cooperative Extension Program, Tuskegee University, Tuskegee, AL 36088; and K. Tajeu, Cooperative Extension System, Auburn University, Auburn, AL 36083.

Childhood obesity is of concern to many members of the community. Through the Community Enhancing Head Start/Healthy Start by Kindergarten (HS/HS by K) Program, Cooperative Extension has taken an ecological approach to preventing childhood obesity in a local Head Start and its community. Through a series of assessments of behavior, the environment, and specific local factors, this approach helps to diagnose the underlying causes of excessive weight gain in children. An intervention based on this

approach is more likely to be effective because it focuses on changes needed at the local level to support healthy eating and active living. With collaborative community efforts, the program co-constructs opportunities for learning, skill-building, and behavioral applications for preschoolers and their caregivers. Results of a pretest survey administered to parents and caregivers to assess knowledge in nutrition, involvement in physical activity, and use of computers to access the internet for supplementary information indicated that: a majority of respondents admit there are no barriers to physical activity in their community and that they are somewhat knowledgeable about children's physical activity. On the other hand, very few respondents thought they knew a lot about children nutrition, and a minority reported they have a lot to learn about children nutrition. Self-efficacy with computers was rated high among the respondents, with a majority agreeing to the statement: 'working with computers makes me nervous.' The program successfully implemented technology use to allow teachers reinforce preschooler's nutrition concepts in the classroom, and develop critical skills in coordination, and computer usage.

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The 'RATLR Program Model' - An Innovative Recruitment Approach to Attracting, Retaining and Graduating Students. J. Bourne Smothers*, and G. S. Phills, Office of Academic Programs, and B. R. Phills, Center of Viticulture and Small Fruit Research, College of Agriculture and Food Sciences, Florida A&M University, Tallahassee, FL 32317.

One of the most difficult tasks in recruiting and retaining high academic achievers in the Food and Agricultural Sciences is to entice them to take a first look at potential degree options as viable career paths. Secondly, to get them to expand this look over a four year matriculation period as an undergraduate major. With this backdrop, the RATLR (Raising Agriculturally and Technologically Literate Rattlers) program was conceived and instituted. The primary premise of the program is that students, especially gifted minorities, are not sufficiently knowledgeable of the broad array of rewarding career opportunities available through matriculation in food and agricultural sciences (FAS) as satisfying and challenging undergraduate disciplinary majors. The second premise is that if students were adequately exposed to FASTEM disciplines across the FAS professional spectrum in an intense experiential hands-on perspective they would develop an interest in and willingness to pursue a degree in one of the FASTEM disciplines. Since the inception of the RATLR program, FAMU has proved that these hypotheses are worthy of acceptance. The operative words that lead to the success of the RATLR recruitment model are 'intensive exposure'. We have demonstrated that if high academic achievers kept an open mind and became intensely involved through hands-on exposure in a multitude of mentor focused disciplines, they would soon learn what FAS can offer an acceptable rewarding professional career. This basic concept has led the college to continually recruit, retain and graduate students who otherwise would have never even considered a major in FAS.

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Partnerships to Internationalize Faculty and Student Training in Sustainable Agricultural Systems: Lessons from the Africa Summer Internship Program. J. O. Bukenya*, and E. Ohene-Nyako, College of Business and Public Affairs, Alabama A&M University, Normal, AL 35762

Over the last decade, the United States has witnessed unprecedented growth in the number of American students receiving academic credit for their overseas academic experience. In spite of this growth; only one-percent of U.S. undergraduate students participate in a study abroad program during their degree program; and the numbers are significantly lower for minority students. For example, in a survey of 53 Historically Black Colleges and Universities, the National Association for Equal Opportunity in Higher Education shows that during 2009-2010, only 4.7% of the approximately 270,000 U.S. students who studied abroad were African Americans compared to 78.7% Caucasians, 6.4% Hispanics, and 7.9% Asian students. It is against this background that a project was developed to prepare globally competent individuals with comprehensive and actionable sets of knowledge, skills, and attitudes necessary to deal with the cultural, economic, political, and business issues associated with international food and agricultural systems, international business and economic development, cultural and the political climate of other countries. The emphasis of the project was to expose and broaden minority students' international experience through a global internship program. This paper shares the experiences from the first cohort of students who participated in a three week global internship program in Ghana. The overall findings indicate that the program provided a variety of opportunities for participants to increase their awareness and appreciation of cultural diversity, personal growth, and to develop skills and attitudes that would allow them to function successfully in an interdependent world.

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Regional Tourism at the Cross-Roads: Perspectives of Caribbean Tourism Stakeholders. C. S. Christian*, Department of Biological & Environmental Sciences; and B. Herbert, Department of Community Development and Urban Studies; College of Agricultural, Life & Environmental Sciences, Alabama A&M University, Normal, AL.

The tourism industry is recognized as a major development strategy for countries and regions worldwide. This industry is considered vital to tackling global economic challenges. Despite the unpredictability of the global economy, international tourism continues to grow, albeit, at different regional rates. The Region served by the Caribbean Tourism Organization (CTO) has experienced considerable fluctuations with many of the small island-nations of that Region being highly vulnerable to socio-political, environmental, and economic changes. CTO contends that this Region is more dependent on tourism than any other in the world. Indications are that globalization has left these countries with limited economic alternatives. The result is that tourism has emerged as the largest employer and the foremost foreign exchange earner in the Region. This study, which explored three research questions, identified the Region's strengths, assets, and issues as perceived by stakeholders at the CTO's 2010 Sustainable Tourism Conference. People, culture, and favorable weather were identified as strengths. However, critical issues such as the absence of clear political and policy directions, loss of biodiversity and natural resources, need for more efficient zoning and land use planning for integrated tourism development, and insufficient stakeholder involvement were characterized as challenges that must be addressed. Possible strategies to address these are proposed.

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Seasonal and Spatial Variations in Demand for Frozen and Chilled Finfish Products in the United States: an Analysis of Fourteen Unbreaded Products Based on Market-Level Scanner Data. M. M. Dey*, K. Singh, and P. Surathkal, Aquaculture/Fisheries Center, University of Arkansas at Pine Bluff, Pine Bluff, AR 71601.

This paper focuses on consumers' preference for frozen and chilled finfish products in the U.S. supermarkets. The study used weekly market-level scanner data acquired from A. C. Nielsen Inc. for 52 U.S. markets for the period of June 19, 2005 to June 12, 2010. We have extended the Almost Ideal Demand System by incorporating the seasonal and spatial dimensions, and have estimated the own price elasticity (percentage change in demand for a product due to one per cent change in price of the same product), cross-price elasticity (percentage change in demand for a product due to one per cent change in price of another product) and expenditure elasticities (percentage change in demand due to one per cent change in expenditure) of demand for 14 unbreaded frozen/chilled finfish products in the U.S. The results show that own- and cross-price elasticities as well as expenditure elasticities of demand for different finfish products varied significantly across species and divisions. Seasonal variations are less important than spatial variations in the quantity demanded and the elasticities of demand for finfish products in the U.S. The cross-price elasticity estimates for different divisions show that one finfish product is substituting product for another finfish in one division and complementary to the same product in other division. The analysis further shows that not only the degree of competition among finfish product varies over the divisions, but also the competing products change. These results highlight the importance of studying consumer demand behavior at species level, across seasons and space.

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Teens as Agents of Change to Deliver Childhood Obesity Prevention Programs: a Strategy for Effective Youth Programming. P. K. Doamekpor*, E. Bonsi, and R. Zabawa, College of Agriculture, Environment and Nutrition Sciences, Tuskegee University, Tuskegee, AL 36088.

The prevalence of obesity among children is high and it is increasing, and in spite of the recent national attention directed to prevent obesity, obesity rates have continued to rise. To curtail this issue, the delivery of nutrition education is essential in promoting lifelong healthy eating and increased exercise behaviors. In June 2010, forty-six 7th to 9th graders were recruited through their schools, churches and other community organizations to train as Youth Extension Paraprofessionals. Using the experiential learning model, participants were trained in essential life skills including, teen leadership, volunteerism, citizenship and civic engagement and core competencies linked to positive youth development. Content delivery was through week-long summer camps, one-day refresher camp, and afterschool settings. Pre and post training

surveys were administered to assess participant's skills in caring, personal values and social consciousness, critical thinking, decision-making and competence for civic action. Participants' self-efficacy for healthy eating and physical activity were also assessed. Paired t-test comparison of selected participants' skills before and six months after training showed statistically significant improvement in caring, critical thinking, decision-making, and self-efficacy for healthy eating behaviors. Seventy percent trainees improved their skills in decision-making, 61% in critical thinking, and 63% in self-efficacy for healthy eating. Thirty-three percent self-reported being physically active two days or less per week. Over a third spent three or more hours watching television. However, 62% played video games or used computers for non-school related activities two hours or less per day.

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CYPRESS: a Capacity Building Grant Concept Funded by USDA-NIFA. C. C. Mathis, Jr., 1890 Research & Extension, A. McCrary Quarles, Department of Health Sciences and Physical Education; and M. A. Fields*, 1890 Research & Extension, South Carolina State University, Orangeburg, SC 29117.

Combining Youth, Passion, and Resources for Environmental Science Studies (CYPRESS) is an integrated, three-year project designed to expose and promote natural resource, agriculture, and environmental science careers to students in Orangeburg, South Carolina. CYPRESS is a year-round educational outreach program that targets middle school students and concentrates on raising awareness and building interest among youth in agricultural career fields. By introducing agricultural career fields at the middle school level, the team hopes to create a pipeline for students to continue their interests by taking high school agricultural courses at the technology center and pursuing agricultural majors in college. To enhance lessons learned during the academic year, CYPRESS also hosts a summer residential camp for middle school students at SC State University. This past summer, campers traveled to various locations in South Carolina where they learned how to care for injured birds, the skills needed to operate a zoo, and how sod is made. Our project also provides agricultural speakers and field experiences for high school students enrolled in the agricultural educational track at the technology center; "Ag in the Classroom" workshops for science teachers; curriculum revision; and agricultural career workshops for parents.

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Spatial Analysis of Small Farmland Productivity in Southeastern United States. B. R. Gyawali*, A. Assibey-Mensah, K. Bates, B. May, M. Simon, and K. Andries, College of Agriculture, Food Science, and Sustainable Systems, Kentucky State University, Frankfort, KY 40601; and O. Joshi, College of Forest Resources, Mississippi State University, Starkville, MS 39762.

U.S. agriculture has been characterized by a shift toward fewer and larger farms in the last two decades. Landowners, who are mostly underserved minority landowners, own or manage small acreages of land in the southern United States. Inefficient allocation of resources (labor and capital) and increased costs of production hinder agricultural modernization. The farm-productivity decline rate has been much higher for minority-operated farms compared to all farms. There is a need for programs on survival strategies for small farmers and to increase the safety net and profitability of farms. Sustainability of the agricultural food system depends on how we make small lands more productive and resilient. This effort needs optimal decision-making framework for securing multiple-use value of lands. Information on minority population dominant counties and farms owned by minority and small farmers were obtained from Agriculture Census 2007 and government and state agencies. Geo-database representing size of ownership, soil type, value of land, proximity to population centers, proportion of land in agricultural or forestry use to other usages, proximity to market was created. Spatial analysis was applied to examine correlation between farm productivity and geographic, farm, market and farm attributes. GIS based cluster and spatial autocorrelation and zonal and neighborhood statistics were computed and various maps were created showing farm productivity indices. The results can be used to develop alternate farm-productivity enhancement options and models suitable to underutilized, marginal and fragmented agricultural lands operated by small farmers in the southern United States.

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Examining Constraints on Economic Growth: Selected Counties in Southwest Mississippi. T. Hargrave*, W. L. Whittaker, and V. Igbokwe; Agricultural Economics Program, Department of Agriculture, Alcorn State University, Alcorn State, MS 39096.

Economic growth is widely considered a precursor to economic development. Both concepts construe the process whereby the real per capita income of a country or region increases over a period of time—subject to the conditions that the number of people below the “absolute poverty line” decreases and general economic well-being improves. Even with downturns in the business cycle, many communities in the United States and in Mississippi have experienced sustained economic growth; notwithstanding, the same cannot be said of several counties in Southwest Mississippi. Counties such as Jefferson, Claiborne, Franklin and others have experienced persistent poor economic and social conditions that relegate them to be considered as some of the poorest and least developed counties in the State. This paper assesses likely factors that have been impinging on the growth potential of counties in Southwest Mississippi. Of interest, are the relationships between per capita income and various indicators of development, such as, changes in business development, human capital development in the form of education, levels of poverty, high school graduation rate and other factors. Using inferential as well as descriptive methods to analyze secondary data, preliminary results show extremely interesting trends. Some counties are experiencing high rates of unemployment, far above the national average, extremely high rates of poverty, and they continue to be classified nationally, as persistently impoverished counties. Clearly, Southwest Mississippi, by several measures of economic well-being, lags behind both the national economy and several urban economies in the state.

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The Impact of iPad Utilization and Integration in the Work Place. P. M. Johnson*, O. Oluwagbemiga, Y. Jung, S. L. McWhinney, and A. McDonald, Cooperative Agricultural Research Center, Prairie View A&M University, Prairie View, TX 77446.

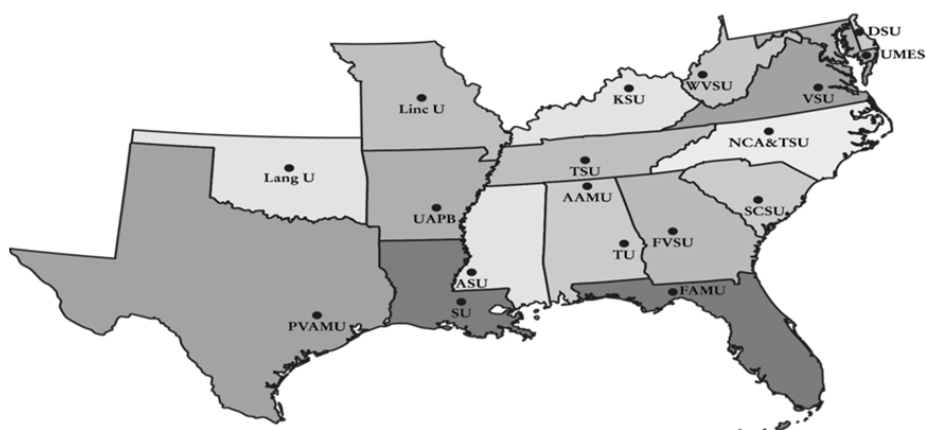
Mobile devices have become engrained in today’s society and their uses continue to escalate among the general population, particularly the younger generation. Incorporating the use of this technology in a formal teaching and service environment may be one way of enhancing teaching and instruction. One hundred twenty employees in the College of Agriculture and Human Sciences were issued an iPad to help determine the impact of its use in education and extension. Each recipient was trained on the use of the device and selected applications (apps), which were useful in their everyday work. These included apps for email, Microsoft Word, Excel and PowerPoint, iAnnotate PDF, PDF Viewer, idea sketch, Skype, Password keeper, Facetime, iPad Calendar, iPad Camera, Google Goggle, and iBooks. All individuals were introduced to Cloud technology through the use of (1) Dropbox, (2) Google Doc, (3) SkyDrive (4) Huddle. A survey developed to examine the perception and utilization was administered at 6 and 12 months. The results indicate the use of the iPad between Gender, Job Classification and programs.

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The Impacts of Regional Free Trade Agreements and Exchange Rate Volatility on World Vegetable Trade Flows: a Gravity Model Analysis. D. Karemera*, and C. Diop, Department of Accounting, Agribusiness and Economics, and L. Whitesides, 1890 Research & Extension, South Carolina State University, Orangeburg, SC 29117.

Economic theory suggests that good trade flows and directions are normally based on the principles of comparative advantage in a free market system. However, commodity trade flows are often affected by government trade policies in both origin and destination countries and by exchange rate volatility among other factors. Therefore, the actual determinants of commodities such as vegetable and fruit trade flows are subject to much uncertainty. Thus, the objectives of this study are to evaluate major factors affecting trade flows of selected vegetables and fruits and to analyze specifically the effects of major Regional Free Trade Agreements (RFTAs) on global vegetable trade flows. Using data from 1999 to 2008, the results show that per capita income, population, and production capacity were seen as significant determinants of vegetable and fruit flows. While exchange rate uncertainty significantly reduces trade in the majority of commodity flows, there is evidence that both short and long-term volatility have positive effects on trade flows of specific commodities. This study also presents trade effects of the RFTAs such as the North American Free Trade Agreement (NAFTA), the Association of South East Asian Nations (ASEAN), the European Union (EU), and the agreement among a few South American Nations (MERCOSUR). The RFTAs are used to evaluate and to identify the extent to which membership leads to trade expansion among members through creations and trade diversions.

Abstracts of Poster Presentations



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Effects of Gender and Breed on Chevron Quality and Sensory Attributes. A. Andrews*, L. Paschal, O. Bolden-Tiller, and C. Okere, Department of Agricultural and Environmental Sciences, and N. L. Dawkins, Department of Food and Nutritional Sciences, Tuskegee University, Tuskegee, AL 36088.

Goat (*Capra hircus*) meat is a healthy alternative to beef, chicken, and pork; however, its acceptance as a source of muscle protein in the United States is limited. Furthermore, goat production is more cost effective compared to that of beef and chicken, which would provide more economic viability for limited resource producers. This study utilized intact and/or castrated purebred Boer, Kiko, and crossbred Boer x Kiko goats managed under intensive management system in southeast Alabama to test the hypothesis that breed and gender will influence sensory, palatability and other meat eating attributes of chevon (goat meat). The animals were slaughtered and the carcass was fabricated into primal cuts, which were frozen and stored for further analysis. Leg (semitendinosus) muscles were cut into cubes and served to a consumer panel, which consisted of faculty, students, and staff from Tuskegee University. Chevron from castrated goats had higher consumer likeness scores for flavor, tenderness, juiciness and overall acceptability compared with meat from intact animals. The results from this study indicate that chevon eating quality is reliant on a complex interaction between breed and gender. The results also indicate that management strategies such as semi-intensive production system, while being effective in reducing cost of production, also have the potential to have a positive impact on chevon quality.

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Carcass Yield and Composition of Meat from Goats Artificially Infected with *Haemonchus contortus*. K. Ashton*, and A. B. Yousuf, Agricultural Research Station, Virginia State University, Petersburg, VA 23806.

Carcass yield and composition of two breeds of meat goats (Myotonic and Spanish) artificially infected with the gastro intestinal nematode parasite *Haemonchus contortus* (HC) larvae (L_3) were compared. Sixteen intact bucklings of each breed similar in age and weight (119 days old and 16 and 17 kg) were randomly selected. The buckling were assigned to sixteen pens (two per pen of same breed) and balanced by weight and breed. Half of each breed type were assigned to the control group and received no larvae and the other half were trickle infected at a rate of 1500 L_3 per a week. The animals were maintained under stall-fed conditions for three, three-week periods. Throughout the study, the animals were maintained on *ad libitum* complete feed (50:50 alfalfa pellet, corn and soy based ration). Amounts of feed offered andorts recovered were weighed and recorded daily. Live weight change, FAMACHA (anemia score), Packed Cell Volume, and Fecal Egg Counts were recorded weekly. Comparative slaughter was performed on samples of buckling and bucks, nine (5 Spanish and 4 Myotonic) at the beginning and ten (5 each of Myotonic and Spanish) at the end of the experiment. Data were recorded for carcass and non-carcass (head, hide, internal organs and fat and blood) and chemical analysis performed on the two pools. At the end of the experiment, the goats had higher slaughter weight, hot carcass weight and dressing percentage. The study showed that there was some difference in chemical composition between the two treatments.

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Fatty Acids Composition in Intact or Castrated Boer, Kiko and Boer x Kiko Meat Goats (*Capra hircus*) Under Intensive Management System. S. Baltimore*, Department of Chemistry; L. Paschal, School of Veterinary Medicine; and O. Bolden-Tiller, and C. Okere, Department of Agricultural and Environmental Sciences, Tuskegee University, Tuskegee, AL 36088; and C. L. Bratcher, Department of Animal Science, Auburn University, Auburn, AL 36849.

Studies from other meat animals species indicates that fatty acid composition of muscles are influenced by breed, age, and whether the animal is male, female or castrated. This study utilized intact and castrated purebred Boer, Kiko, and crossbred Boer x Kiko (B x K) goats managed under intensive management system in southeast Alabama to test the hypothesis that breed and gender will influence fatty acid composition in the *longissimus thoracis* muscle. Results showed that neither breed nor gender significantly influenced the total saturated fatty acid (SFA) composition. However, gender affected total unsaturated fatty acid (UFA) profiles. For polyunsaturated fatty acids (PUFA), significantly higher levels were found in castrates of all breeds, suggesting that the *longissimus thoracis* muscle of castrate meat goats contained higher amounts of desirable fatty acids. The fatty acid profiles found in this study were similar to previously published values for meat goats. Castration more than breed contributed to some important changes in fatty acid profiles resulting in higher amount of unsaturated fatty acids. This is considered

beneficial for humans consuming meat from castrated goat buck, because consumption of high amounts of PUFAs aids in reducing serum cholesterol as opposed to consuming high amounts of SFAs.

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Growth Rate and Parasite Burden in Lambs of Two Hair Sheep Breeds of Different Sex Classes. V. M. Brunson*, E. J. Chozu, and S. Wildeus, Agricultural Research Station, Virginia State University, Petersburg, VA 23806.

Hair sheep perform well on forage diets and have the potential to be finished on pasture. A trial was conducted evaluating the performance of weaned Barbados Blackbelly and St. Croix hair sheep lambs managed under a rotational grazing system. Sixty weaned lambs equally representing the two breeds (20 ewe and 40 rams lambs) were placed in a rotational grazing system following a stabilization period after weaning. Half of the ram lambs were surgically castrated immediately following weaning. Lambs were grazed as one group and moved according to pasture biomass availability. In Phase 1 of the trial (44-day duration), ewe, ram and wether lambs were grazed and supplemented with a corn/soybean supplement (16% crude protein) at 2% bodyweight. In Phase 2, ewe lambs were removed from the group and replaced by alpacas to maintain grazing pressure, supplementation level was reduced to 1% body weight, and the trial continued for another 90 days. Fecal egg counts were determined in periodic intervals. In Phase 1, growth rate was higher in ram (128 g/d) than ewe (100 g/d) and wether (97 g/d) lambs. Fecal egg counts were lower in ewe lambs than in both male groups. In Phase 2, growth rates were again higher in rams (99 g/d) than wethers (73 g/d), and higher in St. Croix (94 g/d) than Barbados Blackbelly (77 g/d). St. Croix lambs had lower mean fecal egg counts than Barbados Blackbelly lambs. Data indicate that growth rates of hair sheep on pasture are influenced by breed and sex class.

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Supplementation of Hair Sheep Fed Forage Diets of Plant-Derived Agro-Byproducts. J. S. Davis*, S. Wildeus, Agricultural Research Station, Virginia State University, Petersburg, VA 23806.

With increasing costs of both hay and energy supplements such as corn, the use of agro-byproducts becomes a viable alternative for the economical supplementation of small ruminants. Two trials were conducted evaluating the inclusion of increasing levels of either soyhull and corn gluten feed in diets of hair sheep lambs fed orchard grass hay in pens. Supplement was provided at 0, 1, 2, and 3% of bodyweight. Thirty-six Barbados Blackbelly and St. Croix ram lambs were allocated to 12 pens (3 animals/pen; 3 pens/diet). Hay was chopped for feeding and fed separately from supplement for the two 56-day feeding trials. Growth rate (animal basis) and feed intake (pen basis) was determined. In soyhull-supplemented lambs, daily gain increased linearly from 121 to 224 g/d as soyhull supplementation increased from 0 to 3% bodyweight. Total dry matter intake increased from 3.45 to 4.16% as soyhull inclusion increased, while hay intake decreased from 3.45 to 1.48%. Corn gluten feed-supplemented lambs showed a similar increase with increasing levels of supplementation, but growth rates were lower (60 to 152 g/d). Total dry matter intake increased from 3.55 to 4.48% as corn gluten feed inclusion increased from 0 to 3%. Results suggest that soyhull holds promise as a supplement to improve growth performance of forage-fed lambs.

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The Use of Nematophagous Fungi as Biological Control Methods against Parasitic Nematodes.

A. Donaldson*, and L. H. B. Kanga, College of Agriculture and Food Sciences, Florida A&M University, Tallahassee, FL 32307.

The use of the nematophagous fungi (*Duddingtonia flagrans*) as a biological control for a gastrointestinal parasitic nematode (*Haemonchus contortus*) of cattle, goats, sheep and horses is a promising alternative to anthelmintics. A laboratory bioassay was developed to evaluate the effectiveness of *Duddingtonia flagrans* against the *Haemonchus contortus*. There is a resistance to the dewormers currently on the market to control nematode parasitism in goats. Resistance is due to dewormer's frequent use and rotation. Therefore continued usage of the dewormers will increase resistance, eventually creating a population of "superworms" that can no longer be controlled. Therefore, reliance on the use of dewormers has become limited resulting in a serious need for alternative methods of control for the parasites. This study provided valuable information for the development of alternative control strategy against *H. contortus*.

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Growth and Back Fat Thickness of Berkshire (*Sus scrofa*) Reared Outdoors. K. Esparza-Harris*, F. McElveen, K. Bell, and S. H. Oh, Department of Animal Sciences, North Carolina Agricultural and Technical State University, Greensboro, NC, 27411.

Berkshire is known as one of the famous swine breeds that have good meat quality but lower growth rate. Outdoor production sometimes causes more adverse effects on economically important traits than indoor production. The objective of this study was to examine if outdoor pork production alters growth performance in the Berkshire breed. A Berkshire population has been developed at North Carolina A&T State University Farm since 2011 for the selection experiment. Ten sows were naturally mated with three boars and gestated outdoors in order to view growth performance and back fat thickness of offspring. Pigs were farrowed outdoors in farrowing huts, weaned at 4 weeks of age, and reared within deep-bedded hoop houses (15m x 30m) after that. The deep bedding, generally straw, corn stalks, or hay, was spread approximately 34-45 cm thick and provided a comfortable environment for the animals, allowing for rooting and other natural behaviors. Piglets were weighed every four weeks from birth to twenty weeks, when back fat was measured. There were a total of 89 piglets born to the ten sows for an average of 8.9 piglets born per sow. At the 20-week weight, 43 pigs were measured to have an average daily gain of 0.27 ± 0.037 kg and an average back fat of 7.5 ± 0.80 mm. Fifty-three piglets were weaned with a 50.6% mortality rate due to several contributing factors. The average individual birth weight and weaning weight were 1.41 ± 0.28 kg per piglet and 7.61 ± 1.30 kg.

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The Effect of a Small Ruminant Farm Operation and Sustainable Farm Practices: Run-Off and Soil Quality at Hickory Hill Farm, Delaware. J. Ferguson*, R. Khatiwada, D. J. O' Brien, and G. Ozbay, Department of Agriculture and Natural Resources, Delaware State University, Dover, DE 19901.

This project was designed to evaluate the effect of management practices at Hickory Hill farm on the surrounding environment by measuring water and soil quality at three different sites. Three pastures were chosen as soil sampling sites. Site G recently housed goats and sheep, site C cattle, and site N was without any animal activity. Plant species were identified to determine the range of vegetation on the sites. Water samples were taken after Hurricane Sandy, when enough run off had accumulated in the irrigation channel. Water quality parameters pH, salinity and dissolved oxygen were measured. Water samples were also analyzed for nutrient concentrations (i.e. ammonia, nitrate, soluble reactive phosphorus). Soil quality parameters pH, soil texture, organic level, soil salinity, and soil nutrient concentration were determined. The soil pH ranged from 5.35-7.98 and 6.39-6.60 for water. Site G averaged a pH of 5.8 i.e. the most acidic study site. The cation exchange capacity, organic matter percentage and Mehlich 3 phosphorus amount of the soil were higher at the sites with higher animal activity. The soil had moderately coarse to sandy clay texture and was relatively consistent at all the study sites.

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Effects of Feeding a Pelletized Diet Containing Pumpkin Seeds on Hematocrit (Percent Packed Cell Volume) of Wether Goats. E. N. Escobar, J. Rodriguez, A. N. Gideon*, V. Purnell-Cropper, and H. Taylor, University of Maryland Eastern Shore, Princess Anne, MD 21853.

This investigation was conducted to evaluate the effect of a pelletized diet containing 21% ground pumpkin seeds (PS) (*Cucurbita* sp.) on hematocrit (percent packed cell volume). Hematocrit is a parameter measured to evaluate and manage *Haemonchus contortus* burden in goats. The wether goats were naturally infected with *H. contortus* and the average FEC was 840 eggs/g at the beginning of the experiment. A pelletized commercial 15% crude protein diet was used as the control (CTRL) diet. The treatment (TRT) diet was formulated with the same ingredients in the CTRL diet plus 21% PS. Meat goat wethers (n = 13), average body weight 55 kg, were trained to each enter an individual stall to eat the experimental diets and were kept in two separated groups. Six wethers were fed the CTRL diet and seven wethers were fed the TRT diet. The piece of equipment used to individually feed the wethers restrained them until an operator released them; this action assured researchers that each goat was eating the allotted feed amount only. Twice daily for 6 weeks the wethers were fed up to 400 grams of the experimental diets. Weekly, the wether goats were restrained to collect blood samples to determine percent of packed cell volume (PCV) in whole blood using micro-hematocrit tubes and a hematocrit centrifuge. After 6 weeks of feeding the experimental diets, there was no significant difference between the CTRL and TRT wether goat groups for PCV (26.8 vs. 25.0, respectively).

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Performance and Behavior Measurements by Fall Born Calves Fenceline Weaned With or Without Companion Goats. E. G. Goose*, J. D. Caldwell, B. C. Shanks, A. N. V. Stewart, H. A. Swartz, C. A. Clifford-Rathert, E. A. Backes, K. R. Ness, A. K. Wurst, C. L. Boeckmann, and C. A. DeOrnellis, Department of Agriculture and Environmental Sciences and Cooperative Research Programs, Lincoln University, Jefferson City, MO 65101.

Weaning of beef calves is usually abrupt and associated with exposure of calves to a range of social and environmental stressors. However, there are anecdotal reports that placing a companion or trainer cow with calves at weaning may reduce weaning stress. Therefore, the objective of our study was to determine if the presence of companion goats affects the performance and behavior of fenceline weaned fall-born calves. Commercial fall-born Angus calves ($n = 20$) were stratified by body weight and sex, and allocated randomly to 1 of 4 groups. Groups were assigned to treatments consisting of 1) traditional fenceline weaning without goats (WOG; 2 replications) and 2) fenceline weaning with goats (WG; 2 replications). Four mature Boer does were placed into each WG replication at time of weaning. Calves from both treatments had constant fenceline contact with their respective dams for the duration of the study. Calf 14-day post-weaning weight, ADG, and calf gain (14 days) did not differ ($P \geq 0.31$) across treatments. Percentage of calves vocalizing, walking rapidly, running, standing, and lying down did not differ ($P \geq 0.59$) across treatments. However, a time effect ($P = 0.01$) was observed for vocalizing, with calves vocalizing more at 12 hours compared with 48 and 72 hours post-weaning. Therefore, based on these data, the presence of companion goats did not improve calf performance or behavior of fenceline weaned calves. However, further research is warranted.

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Performance by Crossbred Wether Lambs Grazing Oat and Turnip Pastures in Late Spring through Early Summer Using Either Continuous or Rotational Grazing Schemes. J. K. Hanlin*, J. D. Caldwell, B. C. Shanks, H. A. Swartz, A. N. V. Stewart, E. A. Backes, K. R. Ness, G. T. Otto, R. A. Boeckmann, R. I. DeOrnellis, E. C. Boeckmann, and D. K. Sommerer, Cooperative Research Programs, Lincoln University, Jefferson City, MO 65101.

Rotational grazing has grown in popularity but has not been well evaluated for small ruminants. Cool-season annuals and brassicas, which fit well into rotational grazing systems, are most commonly sown in late summer to provide a quick and abundant feed source with high digestible energy and protein when pastures are typically limiting or low in quality. However, their value as a spring planted and late spring or summer grazed forage has not been well documented. The objective of this 2-year project was to determine the performance by crossbred wether lambs grazing mixed oat (*Avena sativa*) and turnip (*Brassica. rapa* L. subsp. *rapa*) pastures from late spring through early summer using either continuous or rotational grazing schemes. Crossbred wether lambs ($n = 50$; 38 ± 1.1 kg initial body weight) were stratified by body weight and allocated randomly to one of nine 0.20-ha paddocks representing three treatments: 1) continuous (C), 2) two-cell rotation (2R), or 3) three-cell rotation (3R). Both 2R and 3R paddocks were rotated based on available forage. Lambs grazed 23 days in year 1 and 27 days in year 2 at a stocking rate of 15 lambs/ha. Final body weight, ADG, and total body weight gain did not differ ($P \geq 0.44$) across treatments. However, final FAMACHA® scores were lower ($P = 0.03$) from 2R and 3R compared with continuous grazing. Therefore, two-cell and three-cell rotational grazing schemes may not improve performance of crossbred wether lambs, but may lower FAMACHA® scores when compared with continuous grazing.

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Retention of Sperm Motility in Cooled Ram Semen Stored for Up to 24 Hours. B. J. Jacques*, E. J. Chozu, and S. Wildeus, Agricultural Research Station, Virginia State University, Petersburg, VA 23806.

Cryopreservation of ram semen results in damage to the sperm cell during freezing and subsequent thawing, and severely limits its use for artificial insemination unless the sperm is deposited directly into uterus close to the site of fertilization. As part of an artificial insemination project with short-term, liquid-stored semen, sperm motility was evaluated with a computer-assisted sperm analyzer (CASA system) to determine the percentage of motile sperm. Semen was extended in a simple skim milk/egg yolk extender and packed into 0.5 cc straws for storage at 5°C. Semen was analyzed at the time of insemination. Data were collected as part of five insemination trials conducted either during March, July, October and December of different years. In semen collected in October and March, motility was higher after 12 hours

of storage than in semen immediately after extending (85.6 vs. 75.6%, and 88.4 vs. 82.8%, respectively). In two different collection sessions in July and October, there was a marginal decline in motility following storage from 12 to 24 hours (80.6 to 77.0%, and 78.1 to 76.9%, respectively). In a final trial in December, semen pooled from several rams was analyzed at 0, 12 and 24 hours of storage, and motility declined slightly from 67.9 to 61.4 and finally 58.5%. Data suggest that the decline in pregnancy rates observed when semen is used for artificial insemination after 12 and 24 hours of storage compared to fresh extended semen is not immediately associated with sperm motility.

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Performance and Behavior by Dorper-Katahdin Crossbred Lambs Using Fenceline and Traditional Weaning Methods. M. A. Jaster*, J. D. Caldwell, B. C. Shanks, T. Wuliji, E. A. Backes, K. R. Ness, A. N. V. Stewart, A. L. Bax, C. A. Clifford-Rathert, A. K. Wurst, and J. J. Markway, Cooperative Research, Lincoln University, Jefferson City, MO 65101.

Alternative methods to traditional weaning may ease the negative performance and stress associated with weaning, particularly in cattle; however, little research has been published on weaning methods for hair sheep. The objective of our study was to compare the performance and behavior by Dorper-Katahdin crossbred lambs using either fenceline or traditional weaning methods. Dorper-Katahdin crossbred ewe and intact ram lambs ($n = 72$; 70 ± 1.1 days of age) were stratified within litter, body weight, and sex, and were allocated randomly to 1 of 6 groups, 6 days prior to weaning. Groups were assigned to treatments consisting of 1) Fenceline weaned (3 replications), or 2) Traditional weaned (3 replications). Weaning weight, 14-day post-weaning weight, weaning ADG, gain through the weaning period (14-day), total ADG, and total gain (43-day) did not differ ($P \geq 0.64$) across treatments. Percentage of lambs walking rapidly, standing, or lying down did not differ ($P \geq 0.13$) across treatments. However, a weaning method by time interaction ($P < 0.05$) was observed for percentage of lambs vocalizing and running. Also, a time effect ($P < 0.01$) was observed for percentage of lambs standing and lying down with a lower percentage of lambs standing at 24 hours compared with 12, 48, and 72 hours after weaning and a higher percentage of lambs lying down 24 hours compared with 12 and 48 hours after weaning. Therefore, weaning method may not impact lamb performance, but may have some influence on behavior following weaning.

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***Capra hircus* (Boer goats) Performance on a Silvopasture System.** S. R. Kelly*, A. Bell, and O. U. Onokpise, College of Agriculture and Food Sciences, Florida A&M University, Tallahassee, FL 32307.

Capra hircus (Boer goats) are large framed animals resembling the Nubian goat developed in South Africa in the early 1900's for meat production. The Boer goat is fast growing and has excellent carcass qualities, making it one of the most popular breeds of meat goat in the world. Boer goats have a high resistance to diseases, when crossed with the Spanish breed and can tolerate a wide range of environmental conditions, and perform under adverse climatic conditions in which most breeds could not survive. This study was to evaluate the growth rate of the Boer goats under a silvopasture system. Silvopasture is the intentional combination of trees, for age and livestock, managed as a single integrated practice. Typically, silvopasture practice includes perennial grasses and/or grass-legume mixes planted between rows of trees for livestock pasture. The split-split plot experimental design was used for this research, in a randomized complete block design. The total acreage used for this research was 1.62 ha of land: 0.8 ha shaded and 0.8 ha unshaded. Both shaded and unshaded areas were further sub divided into four 0.2 ha experimental units. Each unit will be sub-divided into 0.05 ha paddocks.

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Estimation of Body Weight from Body Measurements in Meat Goats. C. McGill*, and A. B. Yousuf, Agricultural Research Station, Virginia State University, Petersburg, VA 23806.

A total of 400 monthly body weight and body measurement (body length, heart (chest) girth, withers height, chest depth, hip height, hip width, width of tuber coxae, pin height, pin width and cannon circumference) records of two meat goat breeds (Myotonic and Spanish) collected over a two year period at Virginia State University were analyzed. The correlation coefficients between body weight and body measurements at all ages were high. Body weight predictions based on the coefficient of determination (R^2) of the regression equations varied among body measurements, sexes and ages. There was a good correlation between body weight and some of the body measurements. The correlation between some of the body measurements and body weight at different ages was different. In addition, prediction of body weight

using body measurement was better among the males while the efficiency improved with age. An equation for predicting body weight from body measurements is developed. It could be concluded that some of the body measurements alone or in combination can be used to predict body weight in all age categories. Body weight of meat goats can be estimated in the field using morphometric measurements taken with a tape.

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Growth and Feed Intake of Piglets Born of Sows that Consumed Diets Supplemented with Yeast Culture or Oat. M. McKnight*, K. Locke, and R. C. Minor, Department of Animal Sciences, North Carolina Agricultural and Technical State University, Greensboro, NC 27411.

The Minor lab seeks to identify alternatives to antibiotic growth promoters that promote health. Research indicates that diets of mothers affect growth and health of their young and probiotics. Furthermore, prebiotics are known promote health. Therefore, we investigated whether inclusion of yeast culture (YC) (a probiotic) or oat (a prebiotic source) into sows' diets would affect her piglets' growth and feed intake. Sixteen sows were fed one of four diets (1) control diet, (2) control + YC (5g/kg), (3) control + oat (15%), (4) control + YC + oat, during the last 30 days of gestation and lactation. Weights at birth and weaning were taken and post weaning weight gain and feed intake were monitored until day 14-post weaning. We found that piglets born of sow's that consumed oat, but not YC, weighed more at birth, lost less weight during the two weeks post weaning and had insignificant differences in feed intake. This suggests feeding sows oat and not YC may be beneficial to growth of piglets.

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Performance by Fall-Calving Cow/Calf Pairs Rotationally Grazing Either Chicory or Toxic Tall Fescue in the Spring. G. T. Otto*, J. D. Caldwell, B. C. Shanks, T. R. Higgins, A. N. V. Stewart, E. A. Backes, K. R. Ness, C. L. Boeckmann, and C. A. DeOrnellis, Cooperative Research Programs, Lincoln University, Jefferson City, MO 65101.

Chicory (*Chichorium intybus* L.) is a relatively short-lived perennial cool-season forb that has the potential to provide a high plane of nutrition for grazing cattle in the spring. The objective of our study was to determine the performance by fall-calving cow/calf pairs grazing chicory or toxic tall fescue [*Lolium arundinaceum* (Schreb.) Darbysh; E+] pastures in early spring. Commercial Angus cow/calf pairs (n = 20) were stratified by body weight, BCS, sex of calf, and calf body weight, and allocated randomly to one of four 0.9-ha pastures representing two treatments: 1) chicory (two replications), or 2) E+ (two replications). Starting on April 17, 2012 pastures were rotationally grazed for 13 days at a stocking rate of five cow/calf pairs/ha. Animals were rotated between pastures based on available forage. Cow weight, BCS, and fecal egg count at the end of the study and BCS change and fecal egg count change from the start to the end of the study did not differ ($P \geq 0.16$) across treatments. Cow gain and ADG tended ($P = 0.08$) to be greater from chicory compared with E+. Calf weight, ADG, gain, and fecal egg count at the end of the study and fecal egg count change from the start to the end of the study did not differ ($P \geq 0.52$) across treatments. Therefore, grazing fall-calving cow/calf pairs on chicory for a short duration in the spring may influence cow gain and ADG, but may not impact calf performance.

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Evaluating Pellet and Mash Myceliated Grain Diets on Performance of Young Broiler Chickens.

M. Paylor*, W. Willis¹, O. S. Isikhuemhen², and F. Anike², ¹Department of Animal Sciences, and ²Department of Natural Resources and Environmental Sciences, North Carolina Agricultural and Technical State University, Greensboro, NC 27411.

A 21-day experiment was conducted to evaluate the physical form of feed with and without fungus myceliated grain (FMG) on the performance of young broiler chickens. One hundred eighteen day of hatch broiler chickens were assigned to one of four treatment groups, replicated three times with 12 chicks per replicate in floor pens as follows: 1) Control Mash-No FMG; 2) Control Pellet-No FMG; 3) Experimental Mash with FMG and 4) Experimental Pellet with FMG. A 5% combined mushroom mixture was incorporated into the diet. Body weights, mortality, feed intake and conversion were determined at 21 days of age. Statistically significant ($P < 0.05$) increase in average body weights were observed in treatment 2 (0.894) and 4 (0.895 kg) when compared to treatments 1 (0.724) and 3 (0.725 kg). Feed conversion was slightly improved with the pelleted diet and mortality did not vary with diets. Overall body weights were improved with broilers consuming the pelleted diets and no significant effect was observed with the addition of FMG.

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Effects of Feeding a Pelletized Diet Containing Pumpkin Seeds on Nematode Fecal Egg Counts of Wether Goats. E. N. Escobar, J. Rodriguez, A. N. Gideon, V. Purnell-Cropper*, and H. Taylor, University of Maryland Eastern Shore, Princess Anne, MD 21853.

This investigation was conducted to evaluate the effect of a pelletized diet containing 21% ground pumpkin seeds (PS) (*Cucurbita* sp.) on fecal egg counts (FEC) to manage *Haemonchus contortus* burden in goats kept in the pasture as they would have been kept by goat producers. The goat wethers were naturally infected with *Haemonchus contortus* and the average FEC was 840 eggs/g at the beginning of the experiment. A pelletized commercial 15% crude protein diet was used as the control (CTRL) diet. The treatment (TRT) diet was formulated with the same ingredients in the CTRL diet plus 21% PS. Meat goat wethers (n = 13), average body weight 55 kg, were trained to each enter an individual stall to eat the experimental diets and were kept in two separated groups. Six wethers were fed the CTRL diet and seven wethers were fed the TRT diet. The piece of equipment used to individually feed the wethers restrained them until an operator released them; this action assured researchers that each goat was eating the allotted feed amount only. Twice daily for 6 weeks the wethers were fed up to 400 grams of the corresponding experimental diet. Weekly, the wether goats were restrained to collect rectal fecal samples to determine fecal egg counts (eggs/g) using the modified McMaster procedure. No significant difference was determined between the wethers eating the CTRL diet (FEC= 623.4) and those eating the diet containing 21% ground pumpkin seeds (FEC= 515.3) when the fecal samples were analyzed and the FEC calculated.

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Excess Estrus in Meat Goats. B. A. Schulte*, L. S. Wilbers, J. D. Caldwell, C. Clifford-Rathert, and A. K. Wurst, Cooperative Research Programs, Lincoln University, Jefferson City, MO 65101.

Excess estrus (EE) occurs when animals exhibit behavioral estrus, or standing heat, after conception. EE can occur frequently in some domestic farm animals; however, information regarding its frequency in goats is limited. The causes and effects of EE on the reproductive cycle and pregnancy in goats have not previously been studied. The specific aim of this project was to determine the frequency of excess estrus in meat goats. Hormone profiles during pregnancy as well as embryonic and fetal losses were recorded to determine if animals displaying EE may be more prone to reproductive dysfunction. In Winter 2011, ultrasonographic examination was used to determine pregnancy in 132 bred Boer and Boer-cross does on approximate days 25, 40, 60, and 110 post-breeding (Day 0 = estrus). One vasectomized buck with a marking harness was placed with the does following time of breeding. Does were checked for breeding marks daily. Preliminary results of this study indicated that of 101 confirmed pregnant does, 22 (22%) showed EE. On day 40 of pregnancy, progesterone concentrations were lower in does that showed EE than Does that did not show EE ($P < 0.05$; 8.72 vs. 11.09 ng/mL, respectively). Does with EE had greater kidding rates than does that did not show EE ($P < 0.05$; 2.1 vs. 1.7 kids per doe kidding, respectively). These results suggest that EE occurs in a significant portion of pregnant meat goats and may be associated with differences in the reproductive functions of these animals.

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Identification of Novel Caprine Uterine Epithelial Cell Apical Plasma Membrane Proteins Carrying the H-type 1. S. D. Schuman*, G. R. Newton, and L. Dangott, International Goat Research Center, Prairie View A & M University, 77446; and Protein Technology Core Facility, Texas A & M University, College Station, TX 77840.

The objective of this experiment is to define the role of the H-type 1 (HT1) carbohydrate antigen on the cellular interactions that initiate placentation in the goat (*Capra hircus*). Our working hypothesis is up-regulation of HT1 antigen expression within the apical membrane of uterine epithelial (UE) cells, and binding to lectin receptors on embryonic trophoctoderm, is an important component in the sequence of events that initiates formation of the placenta and results in maintenance of pregnancy. We conducted a biochemical analysis of the UE cell apical plasma membrane proteome that carries the HT1. Uteri were collected on day 5 of the estrous cycle from normally cyclic goats. UE cells were isolated and cultured. Apical membrane proteins were biotinylated, purified and separated using SDS PAGE. Representative gels were Coomassie stained and sent to Protein Technology Core Facility at Texas A & M University for the identification of major bands via MALDI TOF Mass Spectroscopy. A comparative analysis of this data against national databases was conducted to determine homology with known sequences and determine candidate proteins. Other SDS PAGE gels were used for Western blotting with a lectin that recognizes

alpha 1-4 linked fucosylated glycoproteins. Immunoreactive proteins were subjected to MALDI TOF Mass Spectroscopy to identify proteins carrying HT1. Our results revealed a common banding motif amongst all samples. These bands have shown immunoreactivity and have exhibited homology with known proteins involved in other adhesion pathways.

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The Influence of Two Timed Artificial Insemination Protocols on Pregnancy Rates in Angus Cows and Heifers. J. G. Scott*, D. J. O'Brien, S. Dulin, R. A. Barczewski, and D. A. Sutherland, Department of Agriculture and Natural Resources, Delaware State University, Dover, DE 19901.

Thirty-two purebred Angus cows (581.6 ± 20.8 kg) and 13 heifers (339.7 ± 15.3 kg) were used in this experiment to determine the influence of two timed-artificial insemination (TAI) protocols on pregnancy rates. All females in the Co-Synch ($n = 24$; 17 cows and 7 heifers) and Ov-Synch groups ($n = 21$; 15 cows and 6 heifers) were administered 2 ml of Factrel® intravenously and CIDRs® (Eazi-breed™) were inserted vaginally on day-7. On day 0, Lutalyse® was administered intramuscularly to all females and CIDRs® in both treatment groups removed. In the Co-Synch group, on day 2, 2 ml of Factrel® was administered and TAI conducted at approximately 66 and 54 hrs following Lutalyse® administration, in cows and heifers, respectively. In the Ov-Synch group, on day 2, 2 ml of Factrel® was administered and TAI conducted at approximately 12 hrs later in both cows and heifers (approximately 48 hrs after Lutalyse® administration). TAI was performed by two trained AI Technicians. Trans-abdominal ultrasound was conducted to determine pregnancy rates at 62 days after breeding in both treatment groups. Overall, there were no significant differences in the pregnancy rates in all females between treatments. In addition, there were no differences between the percentage of cows and heifers pregnant within each treatment group. In conclusion, under the conditions of this study, both TAI protocols were effective and producers should consider other factors, such as cost and labor, when deciding which protocol to use on their beef farm.

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Performance by Different Meat Goat Breeds Grazing Woodlands at Lincoln University Busby Farm – One Year Summary. J. S. Stiefferman*, C. A. Clifford-Rathert, M. D. Schulte, J. A. Pennington, J. D. Caldwell, and B. C. Shanks, Lincoln University, Jefferson City, MO 65101; and T. A. Gipson, and S. P. Hart, Langston University, Langston, OK 73050.

The meat goat industry has experienced rapid growth in rural Missouri. Due to the unique grazing behavior of goats, underutilized woodlands may provide alternative grazing in conjunction with increased forest production; however, more evaluation is needed to determine which breed performs better in these environments. The objective of this project was to evaluate breed performance in woodland areas. Boer (B), Kiko (K), Savanna (S), and Spanish (Sp) goats ($n = 12$ per breed) were allocated randomly within breed to one of three groups. Each group was assigned to a 2.8-ha paddock that was further subdivided into seven, 0.4-ha cells that were rotationally grazed. Body condition scores, FAMACHA® scores, nematode counts, coccidia counts at the end of the study, ADG, total gain, and coccidia count change from beginning to end of the study did not differ ($P \geq 0.15$) across treatments. Ending weight tended ($P = 0.07$) to be greater from S compared with K and Sp. Change in BCS from beginning to end of the study was greater ($P = 0.04$) from Sp compared with S and B; and K was greater ($P < 0.05$) than B. Change in FAMACHA® scores from beginning to end of the study tended ($P = 0.09$) to be greater from Sp and S compared with B. Change in nematode counts from beginning to end of the study were greater ($P = 0.01$) for K compared with S and Sp. Therefore, hardier goat breeds grazing woodlands may have increased performance; however, further research is warranted.

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Effects of Protein-to-Energy Diets on Bluegill (*Lepomis macrochirus*) Juveniles Growth with Observations on Sexual Dimorphism. K. Vandeloecht*, G. Dudenhoeffer, Y. Zhang, and T. Omara-Alwala, Department of Agriculture and Environmental Sciences, Lincoln University, Jefferson City, MO 65101.

Bluegill is a promising aquaculture species in the Midwest. Males are typically larger than females. However, there is little or no information on nutritional differences between sexes and protein-to-energy ratio. The objective of this study was to characterize the protein-to-energy ratio in juvenile bluegill with observations on gender differences. Bluegill (20-30 g) were fed diets consisting of 35% protein with

14, 16, and 18% lipids and 38% protein with and 12, 14, and 16% lipids. Four replicates of 12 fish each were fed the diets for 16 weeks. Terminal mean body weights, lengths, liver weights, visceral weights, hepatic somatic indices (HSI), and visceral somatic indices (VSI) were recorded. No differences were found in the mean body weights, lengths or visceral weights among diets. Increased liver weights, HSI, and VSI were observed in treatments with 35% protein. The study revealed sexual dimorphism in body weights, lengths, HSI, VSI, and visceral weights. When data were compared by sexes there were more differences and patterns than among diets compared by the overall means. This study found limited growth differences among fish fed different diets. Liver characteristics of fish fed the 35% diets could indicate future fish growth problems. The study indicated a need for further investigation of the effect of gender on feeding trials.

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Determination of Sex-Hormone Binding Protein Expression in the Goat Testis. R. C. White*, A. Reyes-Ordóñez, and O. Bolden-Tiller, Department of Agricultural and Environmental Sciences, Tuskegee University, Tuskegee, AL 36088; and A. Badea, Robert E. Lee High School, Montgomery, AL 36107.

Sex-hormone binding protein (SHBG) is a globulin that facilitates the transport of steroid hormones in the bloodstream. In the testis, this globulin is produced by Sertoli cells and regulates the delivery of testosterone to its target tissues. Because testosterone is produced throughout the life of the male, this protein could potentially be used as a marker to aid in the study of testicular development and function. The objective of this study was to determine the expression pattern of SHBG protein in the goat (*Capra hircus*) testis during different developmental stages. Testes from neonatal, pre-pubertal and adult goats were analyzed by Western Blot and visualized by enhanced chemiluminescence. SHBG was present in all stages, and quantification (densitometry) revealed no significant differences between the three groups, suggesting that SHBG may be an ideal candidate as a constitutively expressed marker in the goat testis.

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Spring Stopover Ecology of Migratory Birds on a Barrier Island in Apalachicola, Florida.

M. Gutierrez-Ramirez*, L. A. Lester, and C. M. Heckscher, Department of Agriculture and Related Sciences, Delaware State University, Dover, DE 19901.

The populations of many Nearctic-Neotropical migratory birds have experienced precipitous declines. A series of possible causes of these declines have been identified, including added anthropogenic stresses (e.g. loss or degradation of habitat, collision with structures) during the migratory period. While the quickest and most direct route, trans-gulf migration is physiologically stressful and riskier for birds. For birds using a trans-gulf migration strategy, barrier islands in the northern Gulf coast may provide critical stopover habitats to rest and replenish energy reserves. A complex of four barrier islands is found on the outer bay of Apalachicola, Florida. Not much is known about what species of migratory landbirds use these barrier islands during migration. In this study, we aim to determine the energetic importance of Apalachicola, Florida barrier islands during spring migration for nearctic-neotropical migratory birds. Migrating songbirds will be captured using standard size mist-nets and marked with individually numbered aluminum bands. The physical condition of birds, including body mass, amount of subcutaneous fat reserves, and unflattened wing chord, will be determined upon arrival. The subsequent recapture of these birds will provide information on the average length of stopover time and rate of fat reserve deposition. Using geolocator technology, an additional goal of this study is to determine the carry-over effects of a stopover in Apalachicola on the reproductive performance of Veery (*Catharus fuscescens*) at White Clay Creek State Park, Delaware. Understanding the role of Apalachicola barrier islands during migration is important in directing management and conservation efforts of declining Neotropical migratory birds.

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Isolation of Aerobic and Anaerobic Bacteria from Footrot Infections in Sheep and Goats.

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Thirteen sheep farms in Missouri, one in Oregon, and one in Maine were inspected for footrot. In total, 196 animals (sheep = 182 and goats = 14) were inspected and those with symptoms of footrot were graded for footrot lesion scores (0 = no infection; 4 = severe infection). Swabs were collected in transport media tubes from infected toe or interdigital skin lesions. Swab samples were inoculated on either Blood

agar or Nutrient broth based plates, and incubated in anaerobic jars at 37°C and in an aerobic incubator at 32°C. The primary isolates were examined under a microscope on Gram-stained smear slides and were identified for bacteria genus and species with the Sensititre AP-90 and AP-80 Gram Identification Systems. From 419 aerobic and anaerobic isolates, 143 were anaerobes (dominantly *Prevotella* spp.) and 276 were aerobes (primarily *Proteus mirabilis*). From animals (n = 15) with footrot scores of 4, 40 anaerobe isolates and 38 aerobic isolates were identified. Sixty-eight anaerobic and 104 aerobic isolates were identified from animals (n = 38) with footrot scores of 3 and 35 anaerobic and 113 aerobic isolates from those (n = 38) with footrot scores of 2. In animals with footrot scores of 1 or 0, no significant ($P \geq 0.05$) growth of anaerobic bacteria was observed, although 21 aerobic species were isolated. There were no differences ($P \geq 0.05$) between anaerobe and aerobe isolates among score groups 2, 3, and 4. However, more severe footrot infections are associated with increasingly dominant anaerobe isolates from footrot lesions.

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Development of a Cell Biological Tool for Genetic Modification of Goats. V. N. Degala*, X. Ma, E. Amoah, and M. Singh, Animal Science Division, Fort Valley State University, Fort Valley, GA 31030.

Precise introduction of desired traits using somatic cell nuclear transfer technology requires proliferative cells that can last in cultures for a long time. Longevity of the cells in culture ensures efficient genetic modification, which usually requires several rounds of selection. Embryonic stem cells can be cultured indefinitely but are difficult to establish and maintain. Fetal fibroblasts are shown to have more population doublings compared to adult fibroblasts, can last longer in *in vitro* cultures, and thus are the cell types of choice. Here we show establishment of a fetal fibroblast cell line from an early stage (~35dpc) fetus. The fetus was procured from an abattoir, washed twice with DMEM media supplemented with 10% fetal bovine serum and penicillin-streptomycin solution, chopped into 2-3 mm² pieces (n = >50), and adhered onto four 60 mm dishes. The explants were cultured at 37°C at a 5% CO₂. It was observed that the fibroblast-like cells began to appear within 24 h and reached confluence by day 6 of culture. Secondary cultures were subsequently established by serial passaging of primary cells. A growth curve generated from passage 3 cultures by daily counting a subset of cells for 12 days revealed standard lag, log and stationary phases of a typical mammalian cell. In conclusion, we have developed a highly proliferative fibroblast cell line from early stage fetuses in goats, which is a potential tool to introduce and characterize desired traits/modifications in the goat genome before the genetically modified nucleus is used for nuclear transfer to ensure success.

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Replacing Corn with Brewers Rice in Swine Diets and Effect on Performance and Carcass Quality of Growing-Finishing Pigs. T. Dokes*, and O. Gekara, Department of Agriculture, University of Arkansas at Pine Bluff, Pine Bluff, AR 71601.

The objective of this study was to determine the effect of replacing corn, with brewers rice which is a by-product of rice milling, in swine diets on performance and carcass of growing-finishing pigs. Sixteen Yorkshire x Duroc x Hampshire crosses BW = 75 ± 6 kg were randomly assigned to either corn/soybean meal (CSM; control) or brewers' rice/soybean meal (BSM) diet. The two diets were isonitrogenous. The experiment lasted 32 days and the average BW of finished pigs was 97 ± 6 kg. Variables determined included ADG, fecal DM output, apparent total tract digestibility (ATTD) of N, G:F, cost of gain, back fat thickness and carcass quality (yield, LEA, and fat depth). Replacing all corn with brewers rice had no ($P > 0.10$) significant effect on G:F, back fat thickness, and carcass quality of growing-finishing pigs. Compared to pigs on corn diet, pigs fed brewers rice diet gained faster ($P < 0.01$; 0.712 vs. 0.581 kg/day), had lower ($P < 0.001$) fecal DM (0.171 vs. 0.322 kg/day) and N (0.006 vs. 0.012 kg/day) output, greater ($P < 0.001$) ATTD (91.6 vs. 84.1%), and lower ($P < 0.05$) cost of gain (\$1.23 vs. \$1.88/kg gain). Brewers rice can replace all corn in diets for growing-finishing pigs and greatly reduce fecal loss of N without compromising pig performance and carcass quality.

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Insecticide Resistance Management in the Ectoparasitic Mite, *Varroa destructor*, of Honey Bee, *Apis mellifera*, Populations and Susceptibility of this Invasive Alien Pest to Fungal Pathogens.

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The honey bee, *Apis mellifera*, is critical for honey production and crop pollination. The ectoparasitic mite, *Varroa destructor*, is currently the most serious threat to beekeeping, and infested bee colonies can perish within a few weeks. More than 40% of honey bee colonies have died within the last four years due mainly to Varroa mite and diseases. Further, populations of Varroa mite have developed resistance to the conventional miticides used for control, and there is an urgent need for alternative control strategies. This study was carried out to monitor for resistance to conventional and new generations of insecticides in Varroa mite populations, and to assess the pathogenicity of Varroa mite to fungal isolates. Thus, cadavers of Varroa mite were collected from an Apiary located in Quincy, FL and brought to the laboratory in Tallahassee, FL for bioassays. The infected cadavers were surface-sterilized and plated on Petri dishes containing Sabouraud maltose agar supplemented with 1% yeast extract. The Petri dishes were sealed with parafilm prior to incubation (at $27 \pm 1^\circ\text{C}$, 85% RH, and 13:11 (L:D) h photoperiod) and they were examined daily for the presence of external fungal hyphae. Data indicated that populations of Varroa mite were resistant to Fluvalinate, Coumaphos, Malathion and Cypermethrin but susceptible to neonicotinoid (imidacloprid, acetamiprid), pyrazole (fenpyroximate) and pyrole (chlorfenapyr) groups of insecticides. DNA fingerprinting techniques used to identify unknown fungal identification revealed the presence of saprobes and two pathogenic fungal isolates related to *Metarhizium anisopliae* and *Beauveria bassiana*. Overall, this study provides useful insights in the development of an environmentally friendly management strategy for Varroa mite.

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Effect of Dietary Supplementation of Ferrous Sulfate on Feed Intake, Growth, and Carcass

Characteristics of Finishing Lambs. J. Howard*, and G. Abdelrahim, Department of Food and Animal Sciences, Alabama A & M University, Normal, AL 35762.

The objective of this study was to evaluate the effects of including elevated levels of FeSO_4 in lamb's diet on dry matter intake (DMI), growth, and carcass characteristics. Twenty-four Gulf Coast wether lambs (26.3 ± 3.63 kg initial body weight (BW), and 8 to 9 months of age) were assigned to one of 2 blocks based on their BW and randomly allocated to 1 of the 3 dietary treatments, giving 8 lambs per treatment. Animals were grouped in 2 pens per treatment (4 lambs/pen) with pen serving as the experimental unit. Treatment diets containing supplemental FeSO_4 at 0, 75, or 150 mg/kg of dry matter (DM) were fed lambs. Treatment diets consisted of dry-rolled corn, soybean meal (SBM), and fescue/bermudagrass hay and were formulated to be isonitrogenous and isocaloric and to meet or exceed the National Research Council (NRC) requirements of a finishing lamb. Lambs were slaughtered, and data were collected after a 48-h chill. Both growth and carcass quality data were analyzed using the Generalize Linear Model (GLM) procedures. Dry matter intake, final BW, and average daily gain (ADG) were not different among treatments ($P = 0.5$, 0.9 , and 0.7 , respectively). Also, no differences were observed in hot carcass weight (HCW) ($P = 0.9$), CCW ($P = 0.8$), body wall fat ($P = 0.6$), 12th rib fat ($P = 0.9$), kidney and pelvic (K&P) fat ($P = 0.9$) and rib-eye area (REA) ($P = 0.7$) among treatments. These results support our hypothesis that the addition of 75 or 150 mg FeSO_4 /kg in finishing lamb diets do not impact DMI, growth rate, and carcass characteristics of meat sheep.

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Molecular Analysis of TRPC1 in Goats Pasture-Exposed to *Haemonchus contortus*. L. M. Judd*, M. M. Corley, School of Agriculture, Virginia State University, Petersburg, VA 23806.

Transient receptor potential (TRP) channels are cation permeable channels found in mammalian species. The transient receptor potential cation channels (TRPC) allow membrane depolarization and entry of calcium into the cell, thereby resulting in smooth muscle contraction. *Haemonchus contortus*, the blood-sucking gastrointestinal nematode (GIN), costs the global livestock industry millions of dollars per year in lost production and anthelmintic drug costs. *H. contortus* infection in goats results in blood loss as well as death. Gut expulsion of a variety of mammalian nematodes requires mechanisms that enhance gut contractions and glycoprotein hyper-secretion in order to allow detachment of the nematode from the gut wall. The TRPC4 in mice controls smooth muscle contraction and has been shown to reduce gastrointestinal motility in TRPC4-deficient mice. The TRPC1 gene has not been detected in goats (*Capra hircus*), therefore the purpose of this study was to identify and characterize TRPC1 in goats. Total RNA was isolated from abomasal and intestinal tissue and homogenized. Reverse-Transcriptase Polymerase Chain Reaction (RT-PCR) was performed using primers designed from human, bovine, mice and rat species alignments. Agarose gel electrophoresis was performed using a 1.5% gel. The expected goat

TRPC1 cDNA base pair (221bp) product was observed. Identification and characterization of genes (TRPC1) involved in gastrointestinal motility and neuromuscular contraction can help to elucidate the role they may play in gut expulsion of GIN and more specifically resistance to *Haemonchus contortus* infection in small ruminants.

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Effect of Different Types of Fat on Performance and Organ Weights of Cornish Rock Broilers.

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Fat is an important ingredient in poultry diets. Moreover, the use of oils and fats in the diet of broilers may influence the performance as well as the composition and quality of the carcass. In birds, body fat composition is similar to fat from the diet because dietary fats generally remain unchanged. Therefore, this study was conducted to evaluate weight gain, feed intake, feed efficiency, dressing percentage, and non-carcass components (internal organs, feet and neck) of broiler chickens fed different types of fat. This study utilized 180 one-day-old Cornish Rock male broiler chicks, wing-banded, weighed and randomly assigned to one of four dietary treatments (diet A=poultry fat, diet B=peanut oil, diet C=vegetable oil, diet D=canola oil). Each treatment group consisted of 45 birds with 3 replications of 15 birds. Body weights and feed intake were recorded weekly. After 49 days, birds were slaughtered and non-carcass components harvested and weighed. Results showed no significant differences among treatments for total feed intake, average daily intake, total body weight gain, average daily gain, and feed efficiency. Dressing percentage and non-carcass components were not significantly different among treatments. Based on these results, the different types of fat did not impact broiler performance and non-carcass components. Further carcass evaluations (fatty acid profile, cholesterol, nutrient composition) will be conducted.

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Gene Expression of Interleukin 9 in Goats Pasture-Exposed to *Haemonchus contortus*. S. Nettles*, and M. M. Corley, School of Agriculture, Virginia State University, Petersburg, VA 23806.

Cytokines such as interleukin-9 are known to aid in the gut expulsion of *Haemonchus contortus*. *H. contortus* is a gastrointestinal nematode (GIN) that affects small ruminants such as goats (*Capra hircus*) by attaching to the abomasum and surviving from the hosts' blood. This GIN costs the global livestock industry millions of dollars per year in lost production and anthelmintic drug costs. *H. contortus* in goats results in blood loss as well as death. Elevated levels of IL-9 are exhibited during infection and believed to increase worm expulsion in other GIN-infected mammalian species. The IL-9 gene has not been studied in goats with respect to *H. contortus* infection. This study assessed the involvement of IL-9 in goats naturally exposed to *H. contortus* through identification and characterization of IL-9 in goats. Total RNA was isolated from whole blood. Reverse-Transcriptase Polymerase Chain Reaction (RT-PCR) was performed using primers designed from human and bovine nucleotide sequence alignments. Agarose gel electrophoresis was performed using a 1.5% gel. The expected RT-PCR results showed that the expected goat IL-9 cDNA base pair (335bp) fragment was observed. Identification and characterization of genes involved in gut expulsion of *H. contortus* can help to elucidate the role they may play in immunity to GIN infection and more specifically resistance to *H. contortus* infection in small ruminants.

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Isolation and Characterization of Prosaposin from Milk of Goat Breeds. A. Robertson-Byers*, and M. Worku, School of Agricultural and Environmental Sciences, North Carolina Agricultural and Technical State University, Greensboro, NC 27411.

Scientific studies on the nutritional, functional and biological activities and health benefits of goat milk will help promote goat milk farming and production of innovative nutraceuticals. Prosaposin, the precursor of the sphingolipid proteins, is important in development and maintenance of the nervous system. Saposins are small lysosomal proteins required for the hydrolysis of sphingolipids. Genetic variation may impact milk prosaposin by altering the biological function of bioactive peptides and antigens. The objectives of this study were to detect prosaposin and the sphingolipid activator proteins in milk from different breeds of goats. Milk and blood were collected from Alpine, Spanish, Boer, Spanish x Boer, Kiko, Lamanché, and Oberhasli goats and from a Holstein Friesian cow. DNA was isolated from FTA cards, and the prosaposin gene amplified using traditional PCR and primers constructed from the human prosaposin gene sequence. Milk whey fractions were separated by centrifugation. Extracts were analyzed by

electrophoresis and immunoblotting with anti-prosaposin and anti-saposin antibodies. Specific proteins were identified using a tetramethylbenzidine substrate. Multiple proteins were observed in whey fractions from all animals tested. A 65-70 kDa prosaposin band and a 12-14 kDa Saposin C band were detected. Prosaposin and saposins are present in milk from different breeds of goats. Amplified bands (500,872 bp) may indicate heterogeneity in the prosaposin genes of goats. Human specific reagents recognized goat protein and cross-hybridized with DNA. These studies will contribute to our knowledge of the therapeutic benefits of goat milk and aid in understanding the biology of prosaposin production among breeds and species.

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Effects of Feeding a Pelletized Diet Containing Pumpkin Seeds on Nematode Fecal Egg Counts (FEC), and Blood Hematocrit (PCV) in Lambs. E. N. Escobar, J. Rodriguez*, A. N. Gideon, V. Purnell-Cropper, and H. Taylor, University of Maryland Eastern Shore, Princess Anne, MD 21853.

This investigation was conducted to evaluate the effect of a diet containing ground pumpkin seeds (*Cucurbita* sp.) on *Haemonchus contortus* infections in lambs (*Ovis aries*). To minimize feedstuff selection, ground pumpkin seeds (PS) were incorporated into the pelletized mixture. Twenty 4- to 6-month-old Katahdin female and castrated male lambs, with average body weight 21.5 ± 2.7 kg, were used. Following a 2-week adjustment period, the lambs were assigned to individual pens (1.9 x 2.3 m) with slotted floors. The lambs were dewormed with albendazole (Valbazen® 10 mg/kg) and Cydectin® (0.2 mg/kg). After a 21-day dewormer withdrawal period, all lambs were orally inoculated three times, every other day, with a larval inoculum containing 1,450 L3 *H. contortus*. A pelletized commercial 15% crude protein diet was used as the control (CTRL) feed (n = 10 lambs). The treatment (TRT) feed was formulated with similar ingredients as the CTRL diet plus 21% ground PS, and it was calculated to be similar in protein and energy content (n = 10 lambs). The experimental diets were fed for 9 consecutive weeks. Weekly the lambs were weighed, and rectal fecal and blood samples collected. The Modified McMaster Technique was used to determine fecal egg counts (FEC, eggs/gram), and hematocrit (PCV) was determined in whole blood. After 9 weeks, there was no significant difference between the CTRL and TRT groups on PCV or FEC (31.01 vs. 31.58 and 380.8 vs. 502.3, respectively). Ground PS incorporated into pelletized feed at a rate of 21% failed to reduce *H. contortus* burden in lambs as expressed in FEC and PCV.

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The Major Histocompatibility Complex and Genetic Resistance of Small Ruminants to the Gastrointestinal Nematode *Haemonchus Contortus*: Evaluation of the DRB1 Locus. A. Savage*, and M. M Corley, School of Agriculture, Virginia State University, Petersburg, VA 23806.

A major problem in the small ruminant meat industry is *Haemonchous contortus*, a gastrointestinal nematode (GIN). In the meat goat industry, millions are spent on treatments for this GIN. There are treatments that can rid the goat of this GIN, yet these treatments must be administered continuously. Besides the apparent cost it takes to distribute these treatments, *H. contortus* has begun to develop immunity to anthelmintics. Therefore a low-cost genetic-based alternative treatment, such as selective breeding, would be a welcome achievement for meat goat suppliers. The Major Histocompatibility class I complex plays an extremely important role in *H. contortus* resistance. A mutation in the DRB1 gene of the MHC II has been found to cause genetic resistance to *H. contortus* in sheep. Evaluation of the DRB1 gene and the role it plays in *H. contortus*-infected goats had not been addressed. The purpose of this study is to identify and evaluate expression of the DRB1 gene in goats and to determine existence of any correlation with *H. contortus* resistance. RNA was isolated from whole blood and RT-PCR (Reverse-Transcriptase Polymerase Chain Reaction) using primers designed to target the conserved regions of the human and sheep DRB1 genes. Agarose gel electrophoresis was performed and the expected cDNA products were observed at 173bp and 201bp of the targeted DRB1 region. By examining the DRB1 gene we anticipate finding a correlation between this gene and genetic resistance to *H. contortus* that can possibly be used further for selective breeding.

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Comparison of Tilapia *Oreochromis niloticus* Growth, Water Quality and Microbial Community Structures in Indoor Biofloc Systems Supplemented with Either Organic or Inorganic Carbon Sources. R. C. Shultz*, Z. Kupchinsky, S. Coyle, L. A. Bright, and J. H. Tidwell, College of Agriculture,

Food Science, and Sustainable Systems, Aquaculture Research Center, Kentucky State University, Frankfort KY 40601.

One of the most significant challenges to stability and efficiency of production in heterotrophic biofloc systems relates to management of carbon and nitrogen inputs. This experiment investigated tilapia (*Oreochromis niloticus*) growth, water quality and microbial community structures in indoor biofloc systems supplemented with either inorganic or organic carbon sources. A floating 35% protein, 5% fat feed (3.2 mm) was used during the experiment and fed twice daily to 177-L tanks containing ten tilapia each. We evaluated sucrose application rates of either 0% (C:N = 9.2), 25% (C:N = 12.4) or 40% (C:N = 15.4) of the daily feed rate with feed application rates being reduced proportionally. Each treatment had three replicates. During the trial, feed was delivered at 4-5% of body weight and adjusted bi-monthly according to sample weights. Alkalinity was maintained at 100 mg/L by daily sodium bicarbonate additions in all treatments; with the 0% sucrose treatment serving as the inorganic carbon treatment. TSS levels were maintained at ≤ 700 mg/L by bag filtration. After 10 weeks, there were no significant differences in average weight or survival of tilapia between treatments. There were also no significant differences in average TSS or waste-solids harvested between treatments. FCR and average dissolved oxygen concentrations were significantly lower in the 40% sucrose treatment; possibly indicating a benefit to the reduced feed rates and/or a disadvantage of the increased sucrose application. It appears that either organic or inorganic carbon can be used to satisfy the carbon requirement of heterotrophic bacteria in zero water-exchange biofloc systems.

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Cortisol and Thyroid Hormones in Dairy and Meat Goats of Different Ages. L. Touray*, B. Kouakou, D. R. Marable, and G. Kannan, Agricultural Research Station, Fort Valley State University, Fort Valley, GA 31030.

Management practices are generally not the same when it comes to the different types of goats (meat and dairy). Dairy breeds are usually handled more often than meat type animals. The stress associated with these management practices, as well as age, can influence the level of circulating hormones in these animals. This experiment was undertaken to assess the level of cortisol, thyroxine (T4) and triiodo thyronine (T3) in mature (2 years old) lactating dairy (n = 10) and meat (n = 10) goats, and 2-week old dairy (n = 10) and meat (n = 10) goat kids. Samples (5 ml each) were collected at 08:00 AM on two different dates by jugular venipuncture into vacutainers containing K2EDTA. Plasma was harvested and assayed for cortisol, T3 and T4 using a Coat-A-Count (Diagnostic Product Corporation, Los Angeles, CA, USA) RIA commercial kits. Data were analyzed as a repeated measure analysis using SAS. Cortisol concentrations were lower in dairy compared to meat goats. Within breed, younger animals had lower ($P \leq 0.05$) cortisol than older animals. Triiodothyronine levels were higher ($P \leq 0.05$) in dairy animals than in meat type goats and within breed, mature goats had higher T3 compared ($P \leq 0.05$) to kids. Mature meat goats had higher ($P \leq 0.05$) T4 than meat goat kids and the dairy animals regardless of their age. These results suggest that level of circulating hormones may be related to breed differences or management type associated with breed.

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Growth Performance Characteristics, Mitochondrial Enzymatic Activities and Relative Expression of Mitochondrial and Nuclear-Encoded Genes in Rainbow Trout: Diet and Family Effects.

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A 2 x 3 factorial experiment design was conducted to evaluate the effects of rainbow trout full-sibling families (designated as 120 or 136) and practical diets (40/10, 40/20 or 40/30% protein/fat) on the performance, FE and mitochondria function. From the result, dietary composition had a significant main effect on weight gain, FE and SGR with fish fed diet 40/30 having a significantly lower weight gain, FE and SGR when compared to those fed diets 40/10 and 40/20. However, family type had no significant effect on weight gain, feed intake, FE and SGR. In terms of nutrient utilization efficiencies, there was no difference between family 120 and family 136 but those fed diet 40/10 had a significantly better LPV and LER when compared to those fed diets 40/20 and 40/30. There were significant interaction between diet and family for mitochondrial state 3 and state 4 respiratory control ratios. Significant differences were also seen between the rainbow trout families and the different diets in terms of mitochondrial respiratory chain enzyme activities and there were variations in the mitochondrial complex enzyme activities in different

tissues. There were significant interactions between the diet and family for five mitochondrial genes (NDI, CYTB, COX1, COX2, ATP6) in the liver, muscle and intestine, and five nuclear genes (UCP2 α , UCP2 β , PPAR α , PPAR β , PGC) in the liver and intestine, and four nuclear genes in the muscle. Fish family with fast growth and high FE (136) had significant up-regulation of the five mitochondrial genes in the liver and muscle.

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Birdies, Eagles, and...Bats? Unexpected Public Outreach Opportunities for Bat Conservation on Golf Courses. M. Wallrichs*, and K. Vulinec, Department of Agriculture and Natural Resources, Delaware State University, Dover, DE 19901.

Public outreach is an important component of science, specifically for wildlife conservation. The need for scientists to reach out to the public to transfer knowledge and excitement for conservation is imperative to implement important conservation milestones, such as protective legislation. Seeking out new ways to reach the public can broaden scientists' impacts. Conventional outreach methods include pre-organized activities with K-12 classes, community lectures, field trips, etc. However, we suggest that it is necessary to be an advocate for science anytime researchers are in the public eye. While conducting field work for my Master's thesis focused on bat activity on golf courses, we were able to interact with and educate an unexpected demographic: golfers and those living in golf communities. Golf courses have often been under scrutiny for management practices that are detrimental to the environment. Studies have also shown golf courses' potential to serve as wildlife refuges for certain species. While a golfer's primary reason for being on a course is to golf, in my experience most people I encountered were genuinely interested in the work I was doing, often leaving the conversation with new information about bats-an often misunderstood animal. Here we present generalized guidelines for public outreach meant to assist scientists in encounters with the public during fieldwork.

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The Effect of Divergent Selecting Parent Population Boer Does for High and Low Parasite Resistance on Subsequent Parasite Resistance, Survival Rate, Reproductive Efficiency, and Kid Performance: 1-Year Summary. L. S. Wilbers*, B. C. Shanks, J. D. Caldwell, M. J. Singer, A. N. V. Stewart, C. A. Clifford-Rathert, A. K. Wurst, K. L. Basinger and R. L. Weaber, Cooperative Research Programs, Lincoln University, Jefferson City, MO 65101; and Kansas State University, Manhattan, KS 66506.

Goats are popular with small landowners and fit well into forage-based production systems. However, goats are particularly susceptible to intestinal parasites, and arguably, parasitism is the most serious economic restriction affecting goat production. The objective of this study was to evaluate the effect of divergent selecting parent population Boer does for high and low parasite resistance on subsequent parasite resistance, doe survival rate, reproductive efficiency, and kid performance. Mixed-age Boer does (n = 146) were assigned to one of two selection lines: 1) high line (HL; n = 74) to be selected for high resistance to internal parasites or 2) low line (LL; n = 72) to be selected for low resistance to internal parasites. Parasite resistance Expected Progeny Differences were used to rank and sort does into each corresponding line. After allocation, fecal egg counts, FAMACHA[®] scores, and packed cell volumes were measured periodically and were utilized to determine if an animal required deworming. Number of times dewormed, survival rate, kidding rate, kidding date, and litter size did not differ ($P \geq 0.20$) across treatments. Kid birth weight and weaning weight did not differ ($P \geq 0.49$) across treatments. However, male kids weighed more ($P < 0.05$) at birth and at weaning than females. Therefore, initial assignment of does to high and low lines based on parasite resistance may not impact number of times dewormed, kidding and survival rates, and subsequent kid performance; however, this research is part of a long-term selection project and is ongoing.

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Efficacy of Anti-Inflammatory Synthetic Peptides in a Murine Model of Ulcerative Colitis: IL-10 Deficient Mice. E. Andrews*, Occupational Therapy Program, Department of Allied Health, College of Veterinary Medicine, Nursing and Allied Health; P. Gorrell, Department of Chemical Engineering; J. Koester, Mississippi State University; J. McNeilly, and K. Pickett, Department of Agricultural and Environmental Sciences, College of Agriculture, Environment and Nutrition Sciences; and A. D. Alexander, Department of Pathobiology, College of Veterinary Medicine, Nursing and Allied Health, Tuskegee University, Tuskegee, AL 36088.

Interleukin 10 or IL-10 is an anti-inflammatory cytokine that is produced by both monocytes and lymphocytes. It down regulates the expression of Th 1 cytokines, MHC class II antigens, and co-stimulatory molecules on macrophages. IL-10 may also act as an immuno-regulator in the intestinal tract. IL-10 knockout mice develop colitis that serves as a good model for ulcerative colitis, Crohn's disease, and inflammatory bowel disease. These inflammatory diseases can lead to colon cancer (30% of cases) when left untreated. The synthetic peptide, 2A21-10N, has been shown to have anti-angiogenic activity and anti-inflammatory properties that might reduce or prevent inflammation and decrease colon cancer incidence. We sought to determine if 10N peptide therapy could abrogate the development of ulcerative colitis in our mouse model. 129SvEv wild-type and knock-out mice were divided into treatment groups (sham, control, prophylactic and frank), and were administered 10N treatments at 0.5 mg/kg body weight/week for 10 weeks. The mice were observed daily and maintained using IACUC-approved husbandry practices. After the 10-week experiment, the mice were euthanized with carbon dioxide and dissected. Spleen, colon, small intestine, cecum and stomach tissue were removed, fixed in 10% Neutral Buffered Formalin, embedded in paraffin, sectioned into 6 mm sections, stained with hematoxylin and eosin and observed under a light microscope. Histopathological changes were marked and characterized using a predetermined scale. Statistical analysis was done using the ANOVA test, SAS Inc. Genetic background, husbandry conditions and 10N treatment all affected experimental outcomes.

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Develop a Comprehensive Laboratory Medium for the Routine Enumeration of *Bifidobacterium* in Probiotic Samples. A. A. Ayad*, R. Gyawali, S. H. Abu Hafs, D. A. Gad El-Rab, and S. A. Ibrahim, North Carolina Agricultural and Technical State University, Greensboro, NC 27411.

Most of the media reported in the literature are either not sufficiently selective for bifidobacteria or inhibit their growth, resulting in inaccurately low counts. Therefore, the purpose of this research was to develop a comprehensive laboratory medium for the routine enumeration of *Bifidobacterium* in various samples. A comprehensive medium was prepared consisting of: 10 g/L pancreatic digest of casein, 14 g/L agar, 5 g/L yeast extract, 4 g/L dextrose, 8 g/L beef extract, 10 g/L proteose peptone #3, 5 g/L sodium chloride, 1 g/L glucose, 3 g/L lithium chloride, 2 g/L sodium acetate, 0.5 g/L cysteine, 0.5 g/L magnesium chloride, 0.25 g/L manganous sulfate, 0.10 g/L calcium chloride, 2.0 g/L ammonium phosphate, 2.0 g/L dibasic potassium phosphate, and 0.25 g/L zinc sulfate. To enhance the selectivity of this medium, four selective agents (dicloxacillin, 0.2 g/100mL, Mupirocin 0.1 g/L acetic acid 2 mL/L and propionic acid, 4 mL/L) were added after the medium was autoclaved at 121°C for 15 min. Samples (yogurt, probiotic supplements, fecal and pure cultures) were diluted, and appropriate dilutions were surface plated on the developed enriched medium. Inoculated plates were then incubated for 3 days in anaerobic conditions at 37°C. Our results show that the new medium with selective agents was able to recover more viable cells in all tested samples when compared to the media without these agents. The bacterial count ranged, on average, between 10^5 - 10^7 log CFU/g using the enriched medium. In conclusion, the medium developed in this assay has shown great potential for use in detection of viable bifidobacteria strains in different types of samples.

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Consumer Evaluation and Shear Force of Retail Domestic Grain-Finished, Imported New Zealand Grass-Finished, and Missouri-Produced Grass-Finished Lamb Racks. K. L. Basinger*, B. C. Shanks, J. D. Caldwell, E. A. Backes, S. Ahuja, D. K. Sommerer, E. D. Groose, G. T. Otto, and K. R. Ness, Cooperative Research Programs, Lincoln University, Jefferson City, MO, 65101; and J. J. Hollenbeck, and J. K. Apple, University of Arkansas, Fayetteville, AR, 72701.

There appears to be increased consumer demand for grass-finished products and an elevated preference for locally produced foods. Therefore, our objective was to evaluate consumer acceptability and shear force from retail domestic grain-finished (D), imported New Zealand grass-finished (N), and Missouri-produced grass-finished (M) lamb racks. Lamb racks (n = 58) were purchased from three different retailers located in Missouri. After purchase, racks were stored frozen at -20°C for three weeks. Racks were then thawed at room temperature and fabricated into 2.54-cm thick chops, which were trimmed to include only the longissimus muscle (LM). Three LM chops from each rack were stored at 1.6°C for two days prior to consumer panel evaluation and two chops from each rack were refrozen (-20°C) for Warner-Bratzler shear force determination. Consumer panel LM chops were cooked to an internal temperature of 71.1°C and panelists (n = 98) were asked to evaluate each sample on a nine-point hedonic scale (1 = dislike

extremely to 9 = like extremely) for each consumer acceptability trait. Overall acceptability, tenderness, juiciness, flavor, and leanness acceptability ratings from D were greater ($P < 0.05$) compared to M and N. Racks from M and N were rated leaner ($P < 0.05$) than D. Shear force values from D and N were lower ($P < 0.05$) compared to M. Therefore, racks from grass-finished lamb may not be evaluated as favorably as racks from grain-finished lamb, but depending on origin, may be as tender as racks from domestic grain-finished lamb.

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Nutritional, Textural, and Microbiological Quality Attributes of Fresh Water Prawn,

***Macrobrachium rosenbergii*, Grown in Virginia.** S. Bragg*, Y. Xu, E. Sismour, S. Pao, and A. Atalay, Agricultural Research Station, Virginia State University, Petersburg, VA 23806.

Aquaculture has been promoted to Virginia farmers as one option for income diversification and enhancement. The freshwater Malaysian giant river prawn, *Macrobrachium rosenbergii*, is suitable for small-scale aquaculture production, and efforts to establish production of *M. rosenbergii* in Virginia have been made. However, quality attributes of Virginia-grown *M. rosenbergii* are not well-documented. The objective of the present study was to evaluate nutritional, textural and microbiological quality attributes of *M. rosenbergii* grown at two commercial farms and at Virginia State University's (VSU) Randolph Farm. Size of the prawns varied between locations, though yields of tail meat were similar. *M. rosenbergii* grown at VSU were characterized by darker and more colorful pigmentation whereas those from the commercial producers were generally pale except for the claws. Proximate and amino acid compositions as well as microbial profiles were comparable between producers. *M. rosenbergii* evaluated in the present study were high in digestible protein and low in lipid, ash and carbohydrate. The microbiological quality of tested *M. rosenbergii* was considered acceptable as no *Salmonella* spp., *Escherichia coli*, or *Listeria monocytogenes* were found.

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Effects of Tissue Culture and Mycorrhiza Applications on Phenolic Contents and Antioxidant Capacities in Ginger Rhizome and Leaves from Organic Farming (*Zingiber officinale*).

K. Brathwaite*, B. Min, and L. E. Marsh, Department of Agriculture, Food and Resource Sciences, University of Maryland Eastern Shore, Princess Anne, MD 21853.

The utilization of healthy plant materials and natural fertilizers are important in organic farming. Tissue culture and mycorrhiza applications can be beneficial for organic farming by developing healthy plant sources and by improving nutrient absorption, respectively. Ginger (*Zingiber officinale*) is a natural source rich in phenolics, having health-beneficial potential. This study investigated effects of tissue culture and mycorrhiza applications on solvent-extractable (free), and cell-wall-bound (bound) phenolic contents and antioxidant capacities (DPPH (2,2-diphenyl-1-picrylhydrazyl), the radical scavenging capacity (DDPH), the oxygen radical absorbance capacity (ORAC), and the iron-chelating capacity (ICC)) in ginger rhizomes from organic farming. Free phenolic contents and antioxidant capacities were also determined in ginger leaves. Treatments were tissue culture-derived ginger and mycorrhiza applications alone or in combination. Non-tissue cultured ginger without mycorrhiza application was used as a control. No treatment effect was observed for free and bound phenolic contents and antioxidant capacities in ginger leaves and rhizome. Free phenolic contents and antioxidant capacities in ginger leaves were higher than those in ginger rhizome. Interestingly, free phenolic contents and ICC were lower than bound ones, but free DPPH and ORAC were higher than bound ones in ginger rhizome. This result suggests that a profile of free phenolics may be different from that of bound phenolics. Bioavailability of bound phenolics has been reported. To our best knowledge, this is the first report about the presence of significant amounts of cell-wall-bound phenolics and antioxidant capacities in ginger rhizome, indicating that antioxidant contents and capacities in ginger rhizome may have been underestimated.

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Microfluidic Sensor for Rapid Diagnosis of Multiple Myeloma Cancer. S. Butler*, Y. Jones, S. Barnes, and A. Singh, Department of Chemistry and Physics, Alcorn State University, Alcorn State, MS 39096.

Multiple myeloma is the second deadliest cancer. Though there are established protocols for diagnosis of the disease, there is a need for new technologies that enable more rapid, cost effective and less invasive detection protocols for diagnosis, prognosis, and monitoring of the disease. This project investigates the development of detection devices for multiple myeloma protein markers. A small

microfluidics device is described that can be used to rapidly detect the presence of the protein markers for multiple myeloma. The design and fabrication of the device and use with color based sensing probes is discussed. Such a device could improve diagnosis and monitoring of the disease.

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The Correlation Between a Soccer Coaches' Perception of Players' Strength and Endurance Using Standardized Measures. R. Dale*, and B. A. Frishberg, Department of Health Sciences and Physical Education, South Carolina State University, Orangeburg, SC 29117.

For most competitive athletes, fitness is key to their level of performance. It is, therefore, important for the coach to be able to determine the level of fitness that the athlete has achieved. In the United States, the amount of time training for college student athletes is strictly regulated by the organization, NCAA. Thus, it is crucial for the coach to make the best of the time he or she has by using high intensity fitness and technical drills. This study was conducted in order to compare the coach's perception of the athletes' fitness with standardized measures. The tests were conducted on the South Carolina State University's intercollegiate women's soccer team before and after its two-week intense preseason training. The participants were females between the ages of 17-21 and of mixed ethnicity. The testing on the volunteers was conducted using the HUMAC NORM, focusing on the dynamic (isokinetic) contractions of two major joints in the leg: the knee and hip joints. Using the fatigue index and the torque index established from the testing protocol, we were able to compare the results of the standardized tests with the coach's evaluation of fitness. The results may show a correlation between the two evaluations of fitness; thus, it will help coaches and other fitness personnel to establish possible training or health plans for athletes in need of an increase of strength and endurance.

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Antioxidant Capacities of Whole Black and White Peppercorns. D. A. Elder*, J. M. Kirven, and A. Mora-Gutierrez, Cooperative Agricultural Research Center, Prairie View A&M University, Prairie View, TX 77446.

The growing problem of obesity in society may be minimized by increasing energy expenditure. Altering energy expenditure by food is likely to benefit humans in achieving energy balance. Capsaicin found in whole black and white peppercorns may increase thermogenicity principally by way of effects on the vascular system. Many spice constituents act as antioxidants, thereby reducing the risk of diseases associated with obesity. The objective of this study was to determine the antioxidant activity of whole black and white peppercorns. Whole black and white peppercorns were extracted with 50% acetone and 80% methanol, and evaluated for their radical scavenging activities against ABTS, DPPH, and peroxy (ORAC) radical. For each extract, total phenolic content (TPC) was also determined. The extracts of black and white peppercorns showed significant radical scavenging capacities and TPC. The 80% methanol extract of white peppercorn had the highest ABTS radical scavenging capacity of 201 μ moles TE/g and the greatest ORAC value of 1252 μ moles TE/g on a per weight basis. The 50% acetone extract of black peppercorns showed higher ABTS, ORAC and TPC values and lower DPPH value compared with the 80% ethanol extract of black peppercorns. The data indicate that black and white peppercorns are potential dietary antioxidant sources for health promotion and disease prevention.

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The Effect of Different Extracting Solvents from Mushroom and *Sophora flavescens* (Ku Shen) Root on the Antiproliferation of HT-29 Human Colon Cancer Cells. T. Flournoy*, H. Li, and J. Parry, Virginia State University, Petersburg, VA 23806.

The effect of two different extractions from an unknown mushroom and the root of *Sophora flavescens* (Ku shen) on the anti-proliferation of human HT-29 colon cancer cells were evaluated. HT-29 colon cancer cells are mucus-secreting cells when fully differentiated. Samples from the mushroom were extracted using both water and ethanol. Ku shen root was extracted using ethyl acetate. All extracts were tested at 1.5, 3, and 6 mg equivalents per mL media (mg eq.) for effects on their ability to reduce cancer cell growth. Results of the study showed that the water extract of the unknown mushroom inhibited the HT-29 cell growth by 96.8% after 4 days of treatment at 6 mg eq., and the response was dose-dependent over the 4 time periods ($P < 0.001$). The ethanol extracts of the mushroom showed a dose-dependent reduction in the growth of HT-29 cells but it was not significant. After 96 h the response was 86.3% compared to the control. The Ku shen was effective at reducing the HT-29 population by 94.4% at 6 mg eq. after 4 days,

and the results were dose-dependent. These results suggest that the active constituents are soluble in water and they may be glycosides or other sugar type compounds. This finding opens many possible opportunities to expand our understanding of how certain saccharides may play a role in cancer prevention. This may be due to their glycosidic compounds, but they may also have other compounds that contribute to the anti-proliferation of cancer cell growth *in vivo*.

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Prevalence of Obesity Among Pre-School Children in Head Start Programs. M. Gidi*, Department of Advanced Technologies; M. D. Ravola, and O. Pittman, Department of Human Sciences; and V. Njiti, Department of Biotechnology, Alcorn State University, Alcorn State, MS 39096; and J. Escorcía, Thompson Head Start Center, Natchez, MS 39096.

Childhood obesity has health, economic and psychosocial ramifications. Prevalence of obesity in early childhood predisposes children to obesity even as adults. Interventions provided early in the formative years of life are likely to reap long-term benefits. The current study was an initiative to estimate the prevalence of obesity in pre-school children in the head start program. The objectives were to: 1) determine the prevalence of obesity; 2) measure the severity of the obesity problem; and 3) compare the extent of overweight and obesity problem in each county using select socio-economic indices. The study involved 200 parents of children attending Head Start Programs in Adams and Jefferson counties. Data were collected through face-to-face interviews using the Childhood Obesity Awareness interview schedule. The data obtained were analyzed using descriptive statistical methods to determine the proportion of children in the overweight and obese categories. A stratified random sampling study design was employed to draw a representative sample from each of the head start programs. Data obtained will be compared with the state and national averages. The results of the study will serve as a guide to direct surveillance strategies to curb childhood obesity epidemic at micro (family) and macro (community) levels. Findings will, also, reveal existing disparities in weight and socioeconomic variables within the counties under study. The outcomes of the study will, also, yield cross county comparison data. The data generated from the study will serve as a basis to formulate effective interventions and policies in tackling childhood obesity.

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Utilizing Myplate as an Effective Means of Providing Visual Regulations of Portion Sizes for Elementary Students in Grades 3-5. B. Gordon*, and M. Scott, Department of Health Sciences and Physical Education, and K. McClain, Department of Family and Consumer Sciences, South Carolina State University, Orangeburg, SC 29117.

In the nutrition lab, students take a pre-test on the information that will be taught during that session on MyPlate. After the information is reviewed by way of lecture, game, or interactive activities, students encounter hands-on experiences by preparing a healthy lunch for that day. While preparing lunch, students are verbally quizzed on portion sizes and the MyPlate guidelines. After preparing lunch, a post-test is given to determine how well students have retained the information. Each student will also be given a MyPlate portion plate to take home. The plates will be used at mealtime to ensure students are eating the correct portion sizes not only at camp but also at home. The utilization of MyPlate as an effective means of providing visual aids of portion sizes has shown an increase in retention level of knowledge gained by students who have been taught portion control by utilizing the MyPlate icon and plate. Research shows that younger children retain information more if they have a visual aid that is eye-catching and vibrant with colors. The MyPlate portion plate is the current food guide tool approved by the USDA, which accommodates the need for a colorful visual aid that youth need in order to understand and to retain knowledge about the importance of portion control.

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Spin-Coated Agar Microfluidic Device for Enhanced Imaging of Bacterial Cell Dynamics. I. Henry*, and M. S. Thomas, College of Agriculture and Food Sciences, Florida A&M University, Tallahassee, FL 32317.

The ability to image bacterial cell dynamics such as cell growth, cell division, cell response to stimuli and cell motility, can be critical to gaining understanding of bacterial cell function. One method of performing single bacterial cell analysis is to use a microfluidic device. In this method, media and/or stimuli can be introduced to maintain the cells on a thin layer of agar. In this study, we present our method of overcoming some of the challenges of creating a microfluidic device that can allow long-term imaging of

bacterial cells and allow cell perfusion. We will describe the creation of a bench top fabricated microfluidic device having a 200 μm thick agar surface coated onto a 1000 μm thick number one glass cover slide. The top of the device is covered with a 100 μm thick quartz glass cover slide. The agar layer was created by spin-coating a glass slide with Luria Bertani (LB) agar while the channel walls were created using an 80 μm thick double-sided tape. The channels of the device served as the culture chamber for *Streptomyces griseus* and *Serratia marcescens* cells for 48 hr cultures. Brightfield and fluorescent images were recorded of *Streptomyces griseus* and *Serratia marcescens* cells in the microfluidic device.

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Regulation of Allergenic Protein by Nadplus Dehydrogenase. D. Johnson*, S. South, S. Hylam, T. Brown, and G. Osuji, Cooperative Agricultural Research Center, Prairie View A&M University, Prairie View, TX 77446.

Peanut (*Arachis hypogaea* L.) seeds are extremely rich in protein. However peanut allergy is one of the most frequent causes of death resulting from food allergy. The allergenic protein found in peanut seeds, arachin 1, (68KDa) can cause fatal hypersensitive reaction such as anaphylaxis. NAD⁺ dehydrogenase is an enzyme that reduces NAD⁺ to NADH. This enzyme regulates the amount of NADH the cell produces. NADH is an electron carrier, which transfers electron to oxygen that allows the cell to generate ATP and respire aerobically. *Arachis hypogaea* (Virginia peanut) were cultivated and treated with mineral ions (N, PK, NPKS, S, P, PN, K, NS, and PS) in ten experimental plots at Prairie View A&M University field plots in Waller County. NAD⁺ dehydrogenase and arachin encoding mRNA for each peanut sample were analyzed by Northern blot analysis using GDH-synthesized RNA peanut probes. Mineral nutrients induce glutamate dehydrogenase (GDH) found within the peanuts to isomerize and to synthesize siRNAs. These are homologous to the arachin and NAD⁺ dehydrogenase encoding mRNAs. The relationship between the down regulation of allergenic protein and NAD⁺ dehydrogenase is directly proportional. Peanuts treated with PK and NPKS had a down regulation of NAD⁺ dehydrogenase and allergenic protein.

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Antibacterial Effects of Lactic Acid on a Foodborne Pathogen, *E. coli*. J. Johnson*, H. Black, N. Mohammed, and J. Stukes, Department of Biological and Physical Sciences, South Carolina State University, Orangeburg, SC 29117.

In the United States, food-borne agents cause an estimated 48 million illnesses annually, including 9.4 million illnesses from known pathogens. In 2008, the Center for Disease Control and Prevention reported that from 1,034 food-borne disease outbreaks, 23,152 cases resulted in illness, 1,276 in hospitalizations, and 22 in deaths. The annual cost of food-borne illness in the U.S. is about \$5-\$6 billion for loss of productivity and medical expenses. Probiotics are known as some beneficial yeasts and bacteria, especially *Lactobacillus*, which produces lactic acid. The objective of this research is to develop a cost effective approach to control bacterial contamination in beef by using a different percentage of lactic. A pure colony of *E. coli* was grown in 20 ml Tryptone Soy Broth (TSB) and incubated at 37°C for 24 hours. The OD_{600nm} of the culture was adjusted to 0.116, and 0.5 ml of the culture was transferred in TSB medium containing 0%, 2%, 4%, 8%, and 16% of lactic acid; the volume was adjusted to 10 ml into a snap cap tube. Triplicate incubations were carried out for each concentration and incubated at 37°C for 24 hours; the OD was measured at 600 nm. No growth of *E. coli* was found by using 2%, 4%, 8%, and 16% of lactic acid after being examined by the plate count method. The results are promising, and we will apply these antibacterial acids to control pathogens in beef in the future.

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The Effects of the Pedometer in the Battle Against Childhood Obesity. R. Johnson*, and M. Scott, Department of Health Sciences and Physical Education, and K. McClain, Department of Family and Consumer Sciences, South Carolina State University, Orangeburg, SC 29117.

This obesity project serves students in grades 3-5 in a tri-county area of South Carolina. PAAN (Physical Activity and Nutrition) Camp is a two-component research project that involves participants in varying physical activities and nutrition education. PAAN Camp was created to educate elementary students on the risks of being overweight or obese and to help set goals towards weight loss. The pedometer is a technological device that gives participants an opportunity to monitor personal workout goals. Pedometers give immediate results of the workout by allowing participants to read the number of steps

accumulated during the workout. At PAAN Camp, students are weighed and issued a pedometer as a visual to record the number of steps accumulated during the workout and the length of involvement time. The workout consists of riding a self-propelled trikke, exercising with the Wii gaming fitness videos, and some other form of recreational fun activities. Students take pedometers home to monitor the number of steps accumulated daily. Steps are recorded in the data collection, Mytracker. As a result, scores from the pedometers are used to help set goals for a personal physical activity plan for each participant. Based on the level of participation, the students get a visual of how much is necessary for a personal weight reduction plan. Participants understand that it is a personal challenge to reach their goal of 10,000 steps to lose weight.

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Inclusion of Dietary Fiber in Imitation Cheese. J. Ladmirault*, J. M. Kirven, and A. Mora-Gutierrez, Cooperative Agricultural Research Center, Prairie View A&M University, Prairie View, TX 77446.

Obesity continues to increase in the developed and developing world. There are a number of mechanisms known to affect food intake that may be manipulated by food factors. A food factor of potential importance for fat distribution in humans is the inclusion of dietary fiber with effects on particle size and viscosity. It is highly desirable from a health perspective to partially replace the fat in imitation cheese with a resistant starch that acts as a dietary fiber. Such a replacement can lead to hardening effects in the imitation cheese. It may be possible to overcome the hardening effects by increasing the moisture content. The objective was to determine the effect of starch as dietary fiber on the textural and sensory properties of imitation cheese. A series of imitation cheeses were manufactured to give a final moisture content of 60% with 10, 7, 4, 2 and 0% fat by replacement of fat with 10.7, 14.3, 17.3, 19.3 and 21.3% starch, respectively. Textural properties were determined using an Instron Universal testing machine. Imitation cheese manufactured with high levels of starch (21.3%) and 0% fat exhibits good melt properties and acceptable textural attributes. The results of this study suggest that starch can be used as a fat substitute that will satisfy the organoleptic interest in food.

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Effective Weight-Loss Through the Use of a Body-Propelled Trikke. J. Lawrence*, and M. Scott, Department of Health Sciences and Physical Education, and K. McClain, Department of Family and Consumer Sciences, South Carolina State University, Orangeburg, SC 29117.

This obesity project serves students in grades 3-5 in a tri-county area of South Carolina. PAAN (Physical Activity and Nutrition) Camp is a two-component research project that involves participants in varying their physical activities and nutrition education. PAAN Camp was created to educate elementary students on the risks of being overweight or obese and to help set goals towards weight loss. Riding the body-propelled Trikke is one of the activities in which PAAN campers participate. The Trikke is a three-wheeled cambered, human-powered machine that allows a rider to travel. Participants are issued a Trikke upon arrival to the camp. The Trikke allows participants with a fun way to burn more calories per hour. The entire body moves from head to toe, resulting in a whole body workout. Data regarding distance and time spent riding was collected from a computer chip that is installed onto the front wheel of the Trikke. Students ride Trikes for a maximum of 40 minutes. Once students become acclimated to riding the Trikke and learned the adjustments that were best for the individual, data indicated that the distance traveled and time spent on the Trikke improved tremendously. Participants incorporated a form of exercise that is viewed as not only beneficial to the body but fun and enjoyable as well. Students reviewed their scores to get a visual to help them set goals for a personal weight reduction plan. Participants understood the personal challenge in reaching personal goals.

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Portable Optical Sensor for Food Safety and Clinical Diagnostics. B. Lewis*, Y. Jones, S. Barnes, and A. Singh, Department of Chemistry and Physics, Alcorn State University, Alcorn State, MS 39096.

Chemical sensors and biosensors show great promise for detecting compounds for food safety, homeland security, clinical diagnostics, and environmental monitoring applications. There is a critical need for sensors that are smaller, easier to use, and less expensive. This project investigates the development of portable, inexpensive, and easy to use optical based electronic sensor. The sensor utilizes LED based excitation and a photocell detector. The fabrication and optimization of the sensor and its application for detecting biological pathogens, proteins, and pesticides will be discussed.

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A Reusable Microfluidic Impedimetric Biosensor for the Specific Detection of Low Concentrations of *Salmonella typhimurium* in Food Samples. S. Barizuddin, M. Dweik, and H. Loos*, Cooperative Research Programs, Lincoln University, Jefferson City, MO 65101.

A microfabricated microfluidic impedance biosensor was fabricated for the specific detection of viable *Salmonella typhimurium*. The surface of the interdigitated electrode array (IDEA) was immobilized with monoclonal antibodies to *Salmonella typhimurium*. The working range of the dose response for this device was found to be between 3.4×10^3 CFU mL⁻¹ and 3.4×10^6 CFU mL⁻¹. It was observed that the detection sensitivity of *Salmonella typhimurium* on this type of biosensor is better as compared with other bacteria like *E. coli* using impedance sensing. Both the qualitative and quantitative results can be obtained in 3 hours. Enrichment steps, which can involve single or multiple steps that take many hours or days to complete are not required for the impedimetric detection process. The biosensor is reusable since the surface is not compromised by adsorption that can occur during the enrichment process. Antibody immobilization and antibody-antigen times have been optimized to achieve the best response in the least amount of time. This sensor can be fabricated easily and cost effectively. Each of these sensors has been used at least five times by following a simple cleaning protocol after each use. The advantages of this sensor over other sensors are its simplicity, ease of use, cost effectiveness and reusability. The time for getting conclusive results has also decreased many folds.

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Interventions for the Obesity Epidemic in Mississippi. J. Marshall*, Y. Jones, and S. Barnes, Department of Chemistry and Physics, and M. Ravola, Department of Human Sciences, Alcorn State University, Alcorn State, MS 39096.

The obesity epidemic has affected every state in the nation and the worst affected state is Mississippi. The state of Mississippi has the distinction of being both the poorest and most obese state in the nation. Understanding how race and ethnicity, education, income, level of activity, general attitude, approach to overall health, and other risk factors affect is critical to develop an integrated approach to intervention in the state. This study discusses the impact of these convergent biological, behavioral, social, environmental and economic factors and their impact in the prevalence of obesity. The study was conducted on college students from a historically black university using a structured interview schedule. The study variables included personal factors, home influences, college influences, and community factors. Descriptive statistical analysis was used to examine the outcomes of the study. The results have demonstrated distinct trends especially in disparities within the subgroups of the population and obesogenic environments. The recommendations of the study would be useful to implement education, research, and extension-based approaches to raise awareness, improve education, and increase access to resources needed to reduce the obesity epidemic in the state.

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Processing Methods on Flavonoid and Phenolic Content of Peanuts and Walnuts. B. McArthur*, K. Busambwa, S. Ogutu, L. Shackelford, L. T. Walker, and M. Verghese, Department of Food and Animal Sciences, Alabama A&M University, Normal, AL 35762.

Peanuts and walnuts are a good source of phytochemicals, which have been shown to have health protective properties. These phytochemicals act as strong antioxidants, which help in the prevention of certain diseases such as cancer and cardiovascular diseases. It has also been reported that processing methods may have a positive and negative effect on the bioavailability of phytochemicals. The objective of this study was to determine the effects of various processing methods such as steam roasting, drying, microwaving, and open pan roasting on flavonoids and phenolics of peanuts and walnuts. Total phenolics (GAE mg/L) ranged from 39.9, 28.9, 22.4, 39.6, 30.4 in raw, oven dried, steam roasted, open pan roasted, and microwave roasted walnuts, respectively, while the phenolic content in peanuts ranged from 13.7 to 30.4. Steam roasted walnuts and peanuts had the lowest phenolic content compared to the other treatment groups; however, microwave roasted peanuts and walnuts had the highest phenolic content. The flavonoid content (CAE mg/100g) ranged from 36.7 to 56.35 in raw, oven dried, steam roasted, open pan roasted, and microwave roasted walnuts. The flavonoid content in peanuts ranged from 14.06 to 27.95. Open pan roasted peanuts had the lowest flavonoids compared to other treatments while steam roasted walnuts had the highest total flavonoid content. The result indicates processing of walnuts and peanuts may impact the

total phenolics and flavonoids. Because these foods contain important compounds that can protect against chronic diseases, the selection of processing method becomes critical.

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Dietary Fiber and Polyphenol Composition of Grape Pomaces from Four Grape Cultivars Grown in North Carolina. A. McMillan*, I. Smith, D. Lucas, and J. Yu, Department of Family and Consumer Sciences, North Carolina Agricultural and Technical State University, Greensboro, NC 27411.

Grape Pomace (GP) is a renewable by-product from wine making and is rich in dietary fiber (DF) and polyphenols that were reported to be inversely associated with weight gain and many chronic diseases. However, soluble and insoluble fibers have different physiological functions. The objectives of this study were 1) to characterize dietary fiber (DF) profiles of GPs from four grape varieties, namely, Muscadine Noble, Muscadine Scuppernong Cabernet Franc and Cabernet Sauvignon, for better understanding the health benefit of GP fibers, and 2) to evaluate the total polyphenol contents and *in vitro* antioxidant activities of the pomace. Results show that the DF and polyphenol compositions of GP varied significantly with grape variety/cultivar. GP contained up to 64% of DF, mainly insoluble. Among GPs from four cultivars of wine grapes grown in North Carolina, Cabernet Sauvignon and Muscadine Scuppernong Pomace had highest and lowest amount of neutral detergent fiber (NDF) and acid detergent fiber (ADF), respectively. Muscadine Nobel Pomace exhibited highest total polyphenol and anthocyanin while Cabernet Sauvignon showed highest flavonoids. The antioxidant activities of the pomace were proportional to the polyphenol contents, particularly, flavonoid content. The high insoluble dietary fiber and high flavonoid contents make GP a good source of DF and antioxidant in functional food development for weight control and disease prevention.

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Using Modern Technology to Track Eating and Exercise Habits in Overweight and Obese Elementary Students in Grades 3-5. R. Morgan*, and M. Scott, Department of Health Sciences and Physical Education, and K. McClain, Department of Family and Consumer Sciences, South Carolina State University, Orangeburg, SC 29117.

This 3-year obesity project serves students in grades 3-5 in a tri-county area of South Carolina. Physical Activity and Nutrition (PAAN) camp is a two-component research project that involves participants in various physical activities and nutritional education settings. PAAN camp was created to educate elementary students on the risks of being overweight or obese and to help them set goals towards weight loss. In the previous year of the project, utilization of paper food and exercise journals did not provide consistent data because campers did not complete forms or failed to return the journals to camp. Thus, modern technology became the alternative route to collect this detrimental data for the project. The purpose is to utilize modern technology to track eating and exercise habits in overweight and obese elementary students in grades 3-5. Campers were issued Apple iPods with a link to the PAAN camp website so that daily meal intake and exercise regimens could be recorded. This allowed campers to perform the same task by way of the Internet. Though this investigation is ongoing, current data shows a favorable change. Using modern technology to track information on a regular basis is easier than trying to manage the same task on paper especially for young people. Using modern technology to track eating and exercise habits in overweight and obese elementary students, grades 3-5 have proven to be essential in collecting the appropriate data to develop personalized meal plans for this population.

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Investigating the Effects of Isokinetic Resistance Training on Elderly Type 2 Diabetics. D. Murphy*, and B. A. Frishberg, Department of Health Sciences and Physical Education, South Carolina State University, Orangeburg, SC 29117.

Recent studies have suggested that the greater an individual's muscle mass, their risk to developing insulin resistance is lowered causing their blood glucose levels to rise, the major originator of Type 2 Diabetes. The purpose of our study was to evaluate the effects of isokinetic resistance training, assessed by an increase in muscle mass and hemoglobin A1C levels, with Type 2 diabetics over 60 years of age. The investigation was a randomized control trial on 30 men and women distributed into 3 groups: the HUMAC NORM resistance chair group, the resistance-band group, and the control group. This study lasted 9 months with 6 months of training and 3 months of follow-up, along with 3 testing sessions (before, during, and after). The testing sessions on all 3 groups consisted of isokinetic and isometric testing: testing

of the isometric knee flexors and extensors at angles of 20, 60, and 90 degrees; isokinetic testing of the knee flexors and extensors at controls of 60 d/s and 180 d/s; and isokinetic testing of the elbow at 60 d/s and 180 d/s. We expect to see the following: the increase of the muscle mass of the patients in the HUMAC NORM training group, as well as the patients in the band-resistance training, and the reducing of their hemoglobin at A1C levels. This information will be valuable to health professionals preventing and treating Type 2 Diabetes.

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The Accountability and Transparency Across the Supply Chain of Any Food Product Using Radio Frequency Identification (RFID) Technology. J. Murray*, J. Smith, and S. Littlejohn, Department of Industrial and Electrical Engineering Technology, South Carolina State University, Orangeburg, SC 29117.

An important aspect of food security is accountability and transparency across the supply chain of any food product. In order to create this accountability and transparency, traceability technology needs to be utilized within these food supply chains. Companies and farmers who have traceability technology implemented into their systems have a distinct advantage over their competitors in terms of public perception as well as the ability to sell their food (and food-related products) in additional markets. Many public and private sector organizations are either using or planning to use RFID technology; because the technology basically turns an inert object into one capable of communicating, the potential for use is enormous and limited only by our imagination and the capabilities of the technology involved. In fact, some organizations, notably Wal-Mart and the U.S. Department of Defense, have mandated the use of RFID by their business partners. Therefore, South Carolina farmers and producers who are at a disadvantage span across economic and racial boundaries. The primary source of their problem is the inability of these farmers and value-added producers to trace their food products as they move throughout their food supply chains. Hence, using RFID technology will greatly assist the limited resource farmers in the following ways: (a) supply chain management; (b) product integrity; (c) warranty services; (d) ID, travel, and ticketing; and (e) baggage tracking. This information can then be fed into other databases and applications (e.g., inventory management) for further processing.

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Antimicrobial Effect of *Allium sativum* (Garlic) and *Allium ampeloprasum* (Elephant Garlic) on *Salmonella typhimurium* Stored at Room and Refrigeration Temperature. R. Nicholson*, S. Anderson, and S. Woldeesenbet, Cooperative Agricultural Research Center, Prairie View A&M University, Prairie View, TX 77446.

The objective of this study was to examine the effect of garlic and elephant garlic on *S. typhimurium* growth at different storage temperatures. Garlic was purchased from the local store, while elephant garlic was obtained from PVAMU farm. Each garlic type was blended individually in food processor and were inoculated with *S. typhimurium* $2.8 - 3.5 \times 10^5$ log cfu/g garlic blends and incubated at 7 and 22°C for 2, 4, 7, 24 and 48 hours; and elephant garlic was stored at 24, 48, 72, 96 and 168 hours. The sample's pH was measured in all tested hours. The effects of garlic and elephant garlic on *S. typhimurium* growth was then assessed by recovering the bacteria from serially diluted samples with 0.1% peptone water, followed by inoculation and incubation onto Brilliant Green Agar containing novobiocin and nalidixic acid at 37°C for 24 h. Results showed that the numbers of viable population of *S. typhimurium* on garlic stored at 22°C completely inhibited by 7 hours storage period, while it takes 48 hours to eliminate at 7°C. Elephant garlic stored at 22°C showed complete inhibition on *S. typhimurium* growth at 48 hours storage period. Elephant garlic stored at 7°C showed minimal inhibitory effect on growth of *S. typhimurium* throughout the tested dates. The pH values of both garlic and elephant garlic were not changed significantly throughout tested storage periods. These results showed the effect of garlic and elephant garlic as antimicrobial agent is not pH but temperature dependent.

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Differential Display of Mirna Genes in Various Fruit Development Stages among Pepper Species Using RT-PCR. Z. Perry*, V. L. Abburi, A. Almeida, R. Cantrell, U. K. Reddy, and P. Nimmakayala, Gus R. Douglass Institute & Department of Biology, West Virginia State University, Institute, WV 25112.

Several non-miRNA and sRNAs are identified to be differentially expressed during tomato fruit development and ripening. These findings raise the possibility of similar regulative role of these sRNAs during fruit onset of various pepper species. Present research is to investigate the dynamic regulation of

various miRNAs using qRT-PCR in various tissues of diverse species of pepper (*Capsicum* spp.): *C. pubescens*, *C. chacoense*, *C. baccatum*, *C. chinense*, *C. frutescens*, *C. annuum* and *C. galapagoense*. Total RNA was isolated from the fruit tissues of various species with TRIzol reagent. Expression profiles of six miRNAs that are known to differentially regulate in tomato were used in *Capsicum* spp. using stem loop RT-PCR. 100 ng of total RNA was used to perform RT reaction with microRNA specific RT primers. Real-Time PCR was carried out using ABI SYBR Green qPCR Master mix in an ABI-Step One Plus Real-Time PCR System. The relative expression was obtained using delta-Ct method and 18S rRNA as reference gene. Heatmaps were made separately for the conserved, novel and uncharacterized small RNAs using log2 values of relative expression utilizing the Gitoools software. Here we show distinctive patterns of sRNA expression that often coincide with stages of the developmental process such as flowering, early and late fruit maturation. Expression pattern and putative function of these targets indicate a possible role in glutamate accumulation, which contributes to establishing the taste of the fruit.

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Nanomaterial Sensor for Rapid Detection of Cancer Markers. C. Raven-Pilate*, Y. Jones, S. Barnes, and A. Singh, Department of Chemistry and Physics, Alcorn State University, Alcorn State, MS 39096.

Kappa and Lambda light chain immunoglobulins are found in the plasma and urine of patients with multiple myeloma, the second most deadly cancer. The monoclonal proliferation of cancerous plasma cells causes the production of these proteins, which infiltrate the bloodstream and tissues. The concentration of these proteins is monitored in order to diagnose the disease, monitor efficacy of treatment, and enable prognosis. Conventional methods for detecting these proteins in plasma and urine are expensive, time-consuming, and some are invasive. Inorganic nanomaterials were synthesized and coupled with antibodies to the proteins. The resulting probes were investigated in optical and electronic sensors for their ability to rapidly detect and accurately quantify the proteins. A faster, more efficient detection method could improve diagnosis and monitoring of this disease.

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Inhibition Effect of Tea Extract by Infusion Time and Degree of Fermentation Against Bacterial Growth. T. Rhodes*, and B. Min, Department of Food and Nutritional Sciences, and K. Stewart, Department of Veterinary Medicine, Tuskegee University, Tuskegee, AL 36088.

Drinking tea has recently emerged as the new trend in many countries. Recent reports demonstrate the various health benefits of tea from polyphenolic compounds. Research also has shown that green tea contains the most beneficial antioxidant activity compared to oolong and black tea based on catechin amount. Catechin, a water-soluble polyphenol, is an active ingredient of antioxidants. In addition to antioxidant activity of tea extract, the type of tea and the preparation of the infusion might have significant influence on the polyphenolic compounds exhibits antioxidant or antibacterial activity as well. The objectives of this research are to investigate antimicrobial activity of tea extract and to compare any differences on infusion time and fermentation level. The stock tea infusion with green tea and black tea were prepared from 2 g of dry leaves with 100 ml of boiled distilled water. Each tea sample is placed in the water for 1, 3, and 5 minutes intervals to determine if the preparation of the infusion has significant influence on antimicrobial activity against gram-negative bacteria. From our preliminary test, there was no significant effect of tea extract using different infusion times against bacterial growth. Further study is needed to compare the effect of antimicrobial activity by fermentation level.

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Exploring Computer Applications in the Field of Computational Epidemiology. J. Richardson*, and J. Lim, Department of Business Administration, and Y. Kim, Department of Mathematics and Computer Science, South Carolina State University, Orangeburg SC 29117.

Epidemic diseases may strike people and livestock rapidly and without any warning. While we observe recent outbreaks of Severe Acute Respiratory Syndrome (SARS) or West Nile Virus around the globe, it is imperative that states respond to these emergency outbreaks at the very beginning of the planning process. Consequently, there has been an increasing need for disease-control strategies to be established based on the proper estimation of the grade and the range of diseases. Addressing the sheer complexity arising from these concerns and needs in the field, computer-based simulations have offered powerful tools. Computational epidemiology is one of the developing interdisciplinary domains where researchers can integrate and accumulate knowledge in epidemiology, computer science, and information

systems. Especially, computer-based simulations have been a well-touted technology for managing the risk of disease outbreak and spreading. However, researchers in the field find difficulty in accumulating knowledge because so many different software technologies have been used in research, and there is little research about the status of these applications in the field. This study provides an insight into the technologies used in the computational epidemiology field and explores the relevance of these technologies to various simulations.

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The Correlation Between Muscle Mass and Strength of the Knee/Hip in Female College Soccer Players. S. Searle*, R. Dale, D. Murphy, and B. A. Frishberg, Department of Health Sciences and Physical Education, South Carolina State University, Orangeburg, SC 29117.

It is widely believed that human muscle mass is proportional to muscle strength through the initiation and exertion of force. Although other factors are known to contribute to this relationship, the percent of a tissue composed of muscle, along with its water components, may provide insight into its relative strength. The intense training regime followed by soccer players during pre-season generally increases endurance and muscle mass while decreasing total body fat. This study investigated the association between the muscle mass and the leg strength of a collegiate women's soccer team before and after its intense two-week pre-season training. Our 20 subjects were all female athletes ranging from 17-22 years of age and of mixed ethnicity. Using the HUMAC NORM, we studied isokinetic contractions with the axis of rotation at both the knee and hip joints for 15 repetitions at a speed of 60/180 deg/sec. We expanded our range of data by also studying isometric contractions at the knee with desired angles of 20°, 60°, and 90° for 5 seconds. Tests were conducted on both the dominant and non-dominant legs. The results may show that strength is proportional to muscle mass. The correlation is not direct, however, the change in strength (measured in torque) and the change in muscle mass (measured in pounds) are not identical but definitely share a positive correlation.

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Consumers' Perceptions of Non-Traditional Vegetable Products in the Southern United States. K. Tarleton*, and A. Funtkova-White, Department of Agriculture, Alcorn State University, Alcorn State, MS 39096.

The overall objective of the study was to generate new knowledge about consumer attitudes towards new vegetable products and non-traditional crops, such as Japanese eggplants, Indian cucumbers, Chinese okra, asparagus beans, Chinese peas, Malabar spinach, guar, tindora, ginger, coriander, and organic vegetables. Data was collected on the basis of a telephone survey of residents and grocers in the Southeast United States. The questionnaire was designed so that the critical issues were addressed in more than one way in order to ascertain subtle consumer perceptions, attitudes, and behaviors associated with the purchase and/or use of a product. The survey consisted of 800 residents of Alabama, Arkansas, Georgia, Louisiana, Mississippi, Tennessee and Texas. Results of the analysis helped us to draw several conclusions about Consumer Perceptions of Non-Traditional Vegetable Products in the Southern United States, and to determine the most effective ways to promote and market exotic vegetables.

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Macro and Micro Mineral Concentrations of Retail Domestic Grain-Finished, Missouri-Produced Grass-Finished, and Imported New Zealand Grass-Finished Lamb Chops. C. L. Thomas*, A. Ikem, B. C. Shanks, J. D. Caldwell, J. Garth, and S. Ahuja, Cooperative Research, Lincoln University, Jefferson City, MO, 65101.

The objective of this study was to compare macro (Ca, K, S, Mg, Na, and P) and micro (Ag, Al, As, Ba, Cd, Co, Cr, Cu, Fe, Mo, Hg, Mn, Ni, Pb, Sb, Se, Sn, Sr, Ti, Tl, V, and Zn) mineral concentrations of retail domestic grain-finished (D), Missouri-produced grass-finished (M), and imported New Zealand grass-finished (N) lamb chops. Lamb racks (n = 58) were purchased from three different retailers in Missouri. After purchase, racks were stored frozen at -20°C for three weeks and were then thawed at room temperature and fabricated into 2.54-cm thick chops. Chops were further trimmed to include only the *longissimus dorsi* muscle (LM). Two LM chops from each rack were stored at -40°C until mineral analysis. Mercury concentrations were determined in both muscle and fat samples by thermal decomposition, amalgamation, and atomic absorption spectrophotometric measurement at 254 nm with a direct mercury analyzer. Other minerals analyzed followed microwave digestion of muscle samples and simultaneous

analysis of digests using ICP. Concentrations of P, As, and Sn were greater ($P < 0.05$) from D vs. M and N, but Mn, Cd, Co, Cu, and Tl concentrations were greater ($P < 0.05$) from M and N vs. D. Phosphorus, S, Mg, Al, As, Cd, Co, Cr, Ni, and Ti concentrations were greater ($P < 0.05$) from M vs. N. Concentrations of Na, Sn, Tl, and muscle Hg were greater ($P < 0.05$) from N vs. M. Therefore, lamb diet and origin may affect mineral concentrations of lamb chops.

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A Descriptive Study of Kaolin Geophagia in Macon County, Alabama. D. Thomas*, and K. Cromwell, Department of Allied Health, College of Veterinary Medicine, Nursing and Allied Health; T. Purdie, Department of Chemical Engineering; P. Curtis, D. Grant, and M. Myers, Department of Biology; K. Pickett, and L. Odom, Department of Agricultural and Environmental Sciences, College of Agriculture, Environment, and Nutrition Sciences; and A. D. Alexander, Department of Pathobiology, College of Veterinary Medicine, Nursing and Allied Health, Tuskegee University, Tuskegee, AL 36088.

Kaolin, also known colloquially as “White Dirt,” is a fine, soft, white, clay, that has many applications including use in making porcelain and china, as a filler in paper and textiles, and in medicinal absorbents. Kaolin is also a popular food supplement for women in the southeastern US and in South America and Sub-Saharan Africa. The purpose of this study was to determine the prevalence of Kaolin geophagia in Macon County, AL, a rural area in the south central part of the state. This area was chosen because of the prevalence of small grocery stores, which commonly displayed kaolin for sale. 300 people, who either self-reported kaolin geophagia or denied ever consuming kaolin, were selected for the study. These participants were identified using recruitment flier placed in each store that sold kaolin in Macon County, AL. Food frequency questionnaires and 24-hour recall surveys were used to evaluate the nutritional states of the participants in the study. Blood, urine and feces were collected and subjected to Complete Blood Counts, and differential blood analyses. Samples of kaolin soil were also subjected to elemental analysis to determine the compositions. We report here the frequent consumption of kaolin in Macon County, AL and the potential use of kaolin as a complementary and alternative medicine.

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Development of an On-the-Go Breakfast Waffle. J. Thomas, Jr.*, J. Allen, J. Thomas, J. Herring, L. Shackelford, S. Ogutu, L. T. Walker, and M. Verghese, Functional Food product Development Program, Department of Food and Animal Sciences, Alabama A&M University, Normal, AL 35762.

Breakfast is known as the most important meal of the day; however, it is also the meal most often missed. Consumers today lead busy lives and need meals that fit their lifestyle. The objective was to develop a portable, on-the-go breakfast waffle consisting of bacon, scrambled eggs, and cheese. This on-the-go meal offers convenience and provides a good source of protein, vitamins, and minerals needed for a balance meal. Analysis of protein was conducted using the Kjeldahl method, whereas the Soxtech method was used to determine total lipids in the waffle. Consumer preference testing showed that 76% of the respondents preferred the savory flavor of the bacon, egg, and cheese to the sweet Kiwi and Dried Mango, and Strawberry Kiwi flavors. The appearance, flavor, and texture, respectively, were “liked moderately” (80%), “liked much” (72%) or “liked very much” (80%). Physiochemical analysis, including texture (Newtons/force), Color (L, a and b values using a Hunter Colorflex) and water activity (Rotronix meter), were measured over the shelf life period. Water activity of the product remained stable over the shelf life period tested (0.854-0.859). There were small changes in L (lightness), a (redness), and b (yellowness) values. A nutrition facts panel was developed based on the proximate analysis with determination of protein, fat, carbohydrates, selected vitamins and minerals. For future research, the idea of a whole grain vegan waffle would be conducted to ensure low fat content, but also ensure that it is a good source of fiber, protein, vitamins, and minerals.

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The Knowledge of and Attitude Towards Hand Sanitizers Among Young Adults. S. Thomas*, N. A. James, and C. Newman, Food Science Program, College of Agriculture and Food Sciences, Florida A&M University, Tallahassee, FL 32307.

The sale of hand sanitizer products in the United States is expected to exceed 400 million dollars by 2015. The growth in this market has been aided by an increased awareness of consumers about the various threats to their personal health caused by microorganisms as well as concerns about food safety. The availability of hand sanitizers in public places has increased especially since the global threats of

SARS, H1N1, avian flu and the swine flu. Young adults are one of the groups making wide use of hand sanitizers and this exercise evaluated their knowledge of and attitudes toward these products using a survey instrument. The survey instrument was administered to young adults in the Tallahassee area of Florida. The survey evaluated their knowledge about the contents present in the hand sanitizers, their preferred choice of hand sanitizers, their knowledge of the proper use of hand sanitizers and the limitations of using hand sanitizers. It also evaluated their attitude towards the use of hand sanitizers and their expectations of its presence in various public places. The results from the survey participants were evaluated using several factors including the gender, race, income, location, education, science knowledge, and personal experience with health incidences caused by microorganisms.

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Evaluation of Lipolytic Characteristics of Caprine Milk Ice Creams Formulated with Three Different Levels of Milk Fat During Eight Weeks Frozen-Storage. K. Walker*, C. McGhee, J. Oglesby-Jones, and Y. W. Park, Agricultural Research Station, Fort Valley State University, Fort Valley, GA 31030.

Lipolysis is attributable to rancid or off-flavors in dairy products. Scientific studies on goat milk ice cream are almost non-existent, especially on storage effects on lipolytic characteristics of the goat ice cream products. A study was conducted to evaluate lipolysis of caprine ice creams formulated with different levels of milk fat during 8 weeks frozen-storage. Three batches of 3 types of goat ice creams were manufactured using 3 levels of milk fat including skim (0.46%), 2.0% and whole (3.65%) goat milk formulated with a commercial ice cream mix (0.25% fat). The fresh soft-serve ice creams were stored for 0, 2, 4, 6 and 8 weeks in a freezer at -18°C, and acid degree values (ADV) of all the experimental ice creams were determined as the primary indicator of lipolysis. The results showed that ADVs of skim, 2% and whole milk ice cream for 0, 2, 4, 6 and 8 weeks storage were: 0.469, 0.259, 0.393; 0.499, 0.379, 0.423; 0.574, 0.370, 0.466; 0.235, 0.292, 0.298; 0.230, 0.327, 0.401, respectively, indicating that skim milk ice cream showed slightly higher but statistically not significant ($P>0.05$) ADV values among the three products up to the 4 weeks period. The 2% fat ice cream had lower lipolysis compared to its whole milk counterpart. The respective pooled overall mean ADVs across batches and across storage periods for skim, 2% and whole milk ice creams were 0.381, 0.337 and 0.500, implying that the whole milk fat ice cream had slightly higher lipolysis than the two lower fat counterparts.

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The Effects of the Wii Gaming System on Increasing Physical Activity in Grades 3-5.

D. Washington*, and M. Scott, Department of Health Sciences and Physical Education, and K. McClain, Department of Family and Consumer Sciences, South Carolina State University, Orangeburg, SC 29117.

This obesity project serves students in grades 3-5 in a tri-county area of South Carolina. PAAN (Physical Activity and Nutrition) Camp is a two-component research project that involves participants in varying physical activities and nutrition education. PAAN Camp was created to educate elementary students on the risks of being overweight or obese and to help set goals towards weight loss. The purpose of using the Nintendo Wii fitness videos in this research project is to determine the impact this technology has on elementary school-aged children and to diminish some of the negative views about playing video games. The participants go through a series of warm-up exercises in the morning to get their blood circulating before participating with the Wii Fit videos. After the exercises, participants go to designated areas in preparation for participating with the Wii Fit videos. The campers are instructed to emulate the dances and exercises that are projected from the Wii Fit videos. Data is collected from the pedometers at camp. At home, participants input into the MyTracker using personal iPods each time they use the Wii Fit videos. Using the Wii Fit videos increases self-esteem and helps contribute to the 3% weight-loss, quarterly goals required of participants. Participants have shown an increased involvement in physical activities through the use of the Wii Fit videos. The more time the students continue to play the Nintendo Wii, the better chance they have to increasing physical activity.

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Metabolite Biodiversity in Pepper Fruits and Prospects of Pharmaceuticals. V. L. Abburi*, M. Nadimi, L. Abburi, Z. Perry, L. Dingess, V. Vajja, and P. Nimmakayala, Gus R. Douglass Institute & Department of Biology, West Virginia State University, Institute, WV 25112.

Ninety-six pepper (*Capsicum annuum* L.) accessions were tested for metabolome diversity of compounds using LC-MS Q-TOF (High performance Liquid Chromatography couples with Quadruple

Time of Flight mass spectrometer with MS/MS capability). The Q-TOF is a high resolution electrospray ionization system (HR ESI) with high sensitivity, resolution, and mass accuracy. The high mass accuracy allows exact mass measurements of small molecules such as phenolic acids, and of larger molecules such as polymeric proanthocyanidins. This system accurately identifies compounds based on retention time, absorbance values, and molecular weight. Many of these compounds can be identified by comparing results with existing metabolomic databases such as MetAlign®. We have generated a metabolite profile using LC-MS Q-TOF that identified several hundred novel compounds that comprise a quite diverse metabolome profile. A set of 11,400 SNPs was generated using the technique “Genotyping by Sequencing” to resolve population structure using STRUCTURE program. The results indicated presence of subpopulation structure with seven clusters. The clustering results (seven subgroups) were used as covariates in the association test (MLM procedure with GAPIT software and SVS software of Golden helix). Detailed results, including co-location of markers significant for various metabolites, will be presented.

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Usage and Beliefs About Dietary Supplements Among Professional Athletes in Saudi Arabia.

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Supplements provide nutritional levels for daily competitive performance. It is important that sports professionals have knowledge of these supplements. Athletes also need to be informed about the use and risks associated with dietary supplements consumption. The objective of this work was to understand the usage and beliefs about dietary supplements among professional athletes in Saudi Arabia. The survey consisted of sixteen questions divided into the following four categories: use of supplements, reason for consumption, personal beliefs, and behavior. The questionnaires were given to the three teams residing in Riyadh: Al Hilal, Al Nasr, and Al-Shabab. Out of the 105 athletes surveyed, we found that only 98 are currently taking dietary supplements. Survey results showed a high percentage of athletes (93.3%) using different dietary supplements throughout the season; 43 (43.88%) reported using supplements for performance, and 32 (32.65%) believed in improvement of health as a reason of using dietary supplements. Our results showed that a total of 87 (88.77%), 81 (82.65%), and 51 (52.04%) athletes are taking sports drink, vitamin C and multivitamins, respectively. Meanwhile, those ranking among the least used included omega 6 (18.64%), creatine (16.32%), and Ginkgo biloba (10.20%). The percentage of using supplements differs in each questionnaire among four categories. The majority of the athletes indicated the use of supplements to improve health and performance. However, there is a need to educate and provide scientific information on the usage of these supplements.

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Toward Development of Capsaicin Patch Using Functional Genomics in Peppers. A. Almeida^{*1}, V. L. Abburi¹, A. Alvarado¹, G. Kaushal², and U. K. Reddy¹, ¹Gus R. Douglass Institute & Department of Biology, West Virginia State University, Institute, WV 25112; and ²Department of Pharmaceutical and Administrative Sciences, University of Charleston School of Pharmacy, Charleston, WV 25301.

There is enough evidence to support the use of capsaicin topically for pain relief, but the development of capsaicin with better therapeutic profile still needs to be explored. Capsaicin patch formulation will allow the delivery of efficacious amount of capsaicin with no potential side effects for the desired duration of action. Forty different varieties of Capsicum were grown in three replications in greenhouse conditions. Fruit samples for each variety were taken at two developmental stages one at two weeks and the other at maturity. Capsaicin content has been estimated only for the first developmental stage. Transdermal delivery of capsaicin can potentially improve patient compliance compared with oral delivery. Basic components of transdermal delivery are polymer matrix/drug reservoir, permeation enhancers, pressure sensitive adhesive (PSA), backing laminates, and release liner. For the development of a transdermal patch it is critical to know the solvent system that can give optimum flux of the drug through the skin. Based on this solvent system the drug has to be dispersed in a suitable polymer with the optimum solvent mixtures to form a gel that can be further used as a transdermal patch. The flux of capsaicin in the presence of different solvent systems was calculated and compared with each other. The solvent system to be used for further studies of formulation of gels will be selected based on this study.

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Fifty Percent Acetone Extracts from Several Fruits and Spices Were Tested for Anti-Proliferation Effects on HT-29 Human Colon Cancer Cells. P. Awhaity*, H. Li, and J. Parry, Virginia State University, Petersburg, VA 23806.

The effect of 50% acetone extracts from selected fruit seeds and spices was tested for possible anti-proliferation effects on the human HT-29 colon cancer cells *in vitro*. The fruit and spice samples were obtained from their extracts and re-suspended in DMSO. The original samples were seeds from black peppercorn, pinot noir grape, chardonnay grape, black raspberry, cranberry, wheat, rose hip, and the spices were nutmeg, and cinnamon. Results were obtained following 24, 48, 72, and 96 h. The results showed that there was a dose-dependent reduction in proliferation from most of the extracts except the wheat and the cranberry. The wheat extract increased the proliferation of the HT-29. The cranberry seed extract at 1.5 mg equivalents per mL had no effect on cell proliferation throughout the study. The most effective cancer cell growth inhibitors, after 4 days of treatment, were black raspberry, chardonnay grape, pinot noir grape, and cinnamon, and were 3.5, 4.0, 26.5, and 29.9% reduction in cancer cell proliferation, respectively. These results show a possible link between healthy eating – including fruits and vegetables that can have a positive impact on cell physiological not only for humans but also for all animals. Essentially, these results show that these extracts have a possible positive effect on the reduction of colon cancer initiation, promotion, and propagation. Future *in vivo* animal tests are scheduled for anti-proliferation of cancer effects in the colon, small intestine and kidney.

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Food Safety Technology: Integration of Teaching, Research and Technology Transfer. R. Boateng*, A. Joseph, W. Whittaker, Y. Jones, and B. Owens, Department of Agriculture, Alcorn State University, Alcorn State, MS 39096.

Food is essential and safety should be a top priority. Safe food is important for public health, socio-economic stability and global commerce. Despite the attention to the subject of food safety and the rising concern for quality issues, research developing a deep understanding of the safety of food in Southwest Mississippi is limited. Understanding consumer responses to various food safety issues is of crucial importance, if effective policy and risk of contamination are to be developed and implemented. This means that the behavior of consumers in relation to food safety issues can only be properly predicted, if there is systematic understanding of the way in which consumers perceive risks, and benefits, associated with different food safety and quality issues. Therefore, the objectives of this study are to enhance the awareness of students and other consumers in Southwest Mississippi of various aspects of food safety practices, and to further develop a curriculum to promote food safety practices among students, other consumers and businesses. The study involves 500 participants from Southwest Mississippi. The results of data gathered from this study over several months will be compiled and disseminated to consumers to ensure that they keep abreast with the most common food safety practices. Also, general food safety awareness training to improve consumer understanding of the risk of foodborne illness will be included. This project has the potential to impact not only southwest Mississippi consumers, but a much broader audience.

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Chemopreventive Potential of Lentils, Green and Yellow Split-Peas (Sprouted and Non-Sprouted) on Azoxymethane-Induced Aberrant Crypt Foci in Fisher 344 Male Rats. K. Busambwa*, R. L. Miller-Cebert, L. Aboagye, L. Dalrymple, J. Boateng, L. Shackelford, L. T. Walker, and M. Verghese, Nutrition Biochemistry and Carcinogenesis Laboratory, Department of Food and Animal Sciences, Alabama A&M University, Normal, AL 35762.

Peas (yellow and green) (*Pisum sativum*) and lentils (*Lens culinaris*) contain bioactive compounds that have been linked to the prevention of diseases such as diabetes and cancer. Sprouting has shown to improve nutritional value due to activation of hydrolytic enzymes. The purpose of this study was to determine the anticarcinogenic potential of sprouted and non-sprouted green and yellow split-peas and lentils at 5% and 10% on Azoxymethane (AOM)-induced aberrant crypt foci (ACF) in Fisher 344 male rats. Seventy-eight rats were randomly assigned to 13 groups: Control (C) received AIN-93G diet; treatment diets included Lentils sprouted & non-sprouted (LS, LNS), Green peas sprouted & non-sprouted (GS, GNS), Yellow peas sprouted & non-sprouted (YS, YNS) at 5 and 10% levels in an AIN 93 based diet.

At 7 and 8 wk, rats received two subcutaneous injections of AOM at 16 mg/kg body weight. Rats were euthanized at 17 wk by CO₂ Asphyxiation. Selected legumes were able to reduce the incidence of ACF formation. ACF reductions (%) compared to C were 68.56; 63.25 and 51.46 in rats fed LS at 10%, LNS at 10 % and YNS at 10%, respectively. Detoxification and antioxidant enzymes were significantly (P<0.05) induced in treatment groups compared to the control. Our findings indicate that sprouted and non-sprouted green split and yellow peas, and lentils reduced AOM-induced aberrant crypt foci in F344 male rats with the greatest reduction in rats fed Lentil sprouted (10%). Selected legumes appear to have beneficial potential in reducing chronic diseases such as cancer.

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Dietary Patterns and Their Impact on Colon Cancer Risk in African Americans and Caucasians in North Alabama. K. M. Campbell*, J. Thomas, J. Hull, S. Ogutu, L. T. Walker, and M. Verghese. Department of Food and Animal Sciences, Alabama A&M University, Normal, AL 35762.

Western diets contain various combinations and concentrations of different sources of macro- and micronutrients. The typical western diet is high in added sugar and low in essential fatty acids, dairy products, and vegetables and fruits. Added sugar intake from soft drinks, fruit drinks, pastries and other sweetened foods are increasing, leading to a reduced overall diet quality. High intake of saturated fat has placed many Americans at risk of heart disease, cancer and increased risk of osteoporosis. Epidemiological and cancer research studies over the past decades strongly suggest a link between certain dietary factors and cancer risk. The objective of this study was to determine the dietary patterns associated with colon cancer risk in selected, race, ages and gender groups in North Alabama through using the NIH Food Frequency Questionnaire (FFQ) and a Food Collection and chemical/proximate analysis (analysis of proteins, carbohydrates, fats, dietary fiber and minerals). The diets of African Americans (AFAM) and Caucasians (CAUC) in North Alabama were assessed for exposure to dietary constituents associated with colon cancer. The results of the human study showed that the AFAM groups had higher calorie intake compared to the CAUC groups. The factors associated with a higher calorie intake include high intakes of carbohydrates, protein, and fat and lower intakes of dietary fiber. The information from this study will be used for dietary intervention education for colon cancer prevention in North Alabama.

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Chemopreventive Effects of Cocoa and Coffee on Selected Hepatic Detoxification Enzymes in Fisher 344 Male Rats. L. Dalrymple*, J. Boateng, K. Busambwa, J. L. Allen, L. T. Walker, L. Shackelford, and M. Verghese, Department of Food and Animal Sciences, Alabama A&M University, Normal, AL 35762.

Cocoa, *Theobroma cacao*, (CC) and coffee, *Coffea arabica*, (CF), are two widely consumed beverages. The aim of this study was to investigate chemopreventive effects of feeding cocoa and coffee to Fisher 344 rats. After an acclimatization period of 1 week, 17 groups of rats (6 rats per group) were assigned to an AIN 93 G diet incorporating CC and CF, at 2.5%, 5%, 7.5%, and 10%. CC and CF were also given in drinking water at the same concentrations. Rats received Azoxymethane (AOM) injections (16 mg/kg BW) subcutaneously at 7 and 8 weeks of age to induce Aberrant Crypt Foci (ACF). Rats were killed at 17 weeks of age by CO₂ euthanasia. The activity of hepatic enzymes (superoxide dismutase (SOD), Glutathione Peroxidase (GPx), and Glutathione-S-Transferase (GST) were also determined. Total ACF in rats fed CC and CF were lower than rats fed control (C) (185). Among treatment groups, total ACF ranged from 64 (5% CCD) to 128 (5% CCM) and 63 (7.5% CFD) to 99 (5% CFM). SOD, GPx, and GST were seen to be dose dependent and higher in treatment groups compared to the control. SOD activity (U/ml) ranged from 6.29 in 7.5% CF meal to 7.05 in 10% CC meal, compared to the control 0.09. GST activity (nmol/min/ml) ranged from 4.48 in 2.5% CC meal to 17.84 in 10% CF meal as compared to the control 0.07. These findings suggest that cocoa and coffee potentiated selected enzymatic activities, and reduced ACF. CC and CF showed radical scavenging and ferric reducing antioxidant abilities. Therefore, CC and CF may have potential as a chemopreventive agent.

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Evaluation of Practical Post-Harvest Mitigation Strategies to Reduce the Abundance of *Vibrio vulnificus* and *Vibrio parahaemolyticus* in Chesapeake Bay Oysters (*Crassostrea virginica*).

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Vibrio vulnificus and *V. parahaemolyticus* are two naturally occurring estuarine bacteria that can accumulate in oysters and cause illnesses in consumers. The objective of this study was to develop low-cost methods to reduce the abundance of *Vibrio* spp. in oysters. Studies were conducted to determine the effect of high salinity relaying in on-shore closed recirculating tanks and in the Chesapeake Bay to reduce *V. vulnificus* and *V. parahaemolyticus* numbers in oysters. We have also conducted studies on post-harvest cooling rates of oysters to limit *V. vulnificus* and *V. parahaemolyticus* growth after harvest. Oysters were collected from approved harvest water, temperature abused for 4 hours and then transferred to high salinity (28-34 ppt.). After 7, 14, and 21 days of relaying in high salinity, oysters were analyzed for *V. vulnificus* and *V. parahaemolyticus* using Multiplex qPCR and for the total coliforms and *Escherichia coli* using the petrifilm. The water samples were analyzed for total coliforms, *E. coli*, and total *Vibrio* spp. using the membrane filtration procedure. Our results show that the count of *V. vulnificus* and *V. parahaemolyticus* in oysters ranged from 24- 27, 124 MPN/g with 2-5 log₁₀ reductions, and the total mortalities of oysters were not higher than 4%. We were also able to chill oysters from 35°C to less than 10°C within 10 hours of harvest. We did not observe association between the reduction of total coliforms, *E. coli*, and *Vibrio* spp. in oysters and water samples. We suggest that these methods could be effective post-harvest mitigation strategies.

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The Impact of Wild Birds and Farm Management on the Prevalence of *Campylobacter* and *Salmonella* in Small Ruminants. B. Hagens*, and J. G. Schwarz, Department of Agriculture, Food and Resource Sciences, University of Maryland Eastern Shore, Princess Anne, MD 21853; and S. Pao, S. Wildeus, and C. Kim, Agricultural Research Station, Virginia State University, Petersburg, VA 23806.

Wild birds are potential sources of enteric disease infections in farm animals. This study was designed to evaluate the potential pathways and control of foodborne pathogen transmission between wild birds and farm animals. The study was conducted at UMES and VSU for a period of 2 years in the spring and fall. At two farms, a total of 14 one-acre pastures were each fenced to host 12 sheep and goats. For the control group, pastures were set up with open water tubs and grain pans to feed animals and attract wild birds. In contrast, the treatment group used nipple waterers and custom feed pans. Fecal and water samples were taken every 2 weeks May-June and October-November for 2 years. The samples were analyzed for the presence of *Campylobacter* spp. and *Salmonella* spp. using selective plating, immunoassays, and/or biochemical confirmation techniques. Analysis of *Campylobacter* and *Salmonella* with respect to species difference found sheep to have significantly higher counts than goats. Comparing seasons, higher prevalence occurred in spring. Although wild birds were more attracted to the feeding areas in some pastures with open water tubs and grain pans in spring, there was no significant difference in pathogen prevalence between the control and treatment animal groups when analyzed by season or location. The pathogens were not found in any water samples. In this study, season and species had an effect on the prevalence of *Campylobacter* and *Salmonella* in ruminants but the management practice did not.

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Use of Sweet Potato (*Ipomoea batatas*) to Develop a Medium for Cultivation of Lactic Acid Bacteria. S. A. Hayek*, A. Shahbazi, and S. A. Ibrahim, North Carolina Agricultural and Technical State University, Greensboro, NC 27411.

Sweet potatoes (*Ipomoea batatas*) are rich in many nutrients that could support the growth of lactic acid bacteria (LAB). The objective of this study was to develop a medium for LAB using sweet potato as a basic component. Fresh sweet potatoes were baked at 400°C for 1 h, cooled, peeled, cut, and blended with 50% (w/v) distilled water, and centrifuged. The supernatant was collected to form a sweet potato medium (SPM). Several components including sodium acetate (5 g), potassium monophosphate (2 g), ammonium citrate (2 g), Tween 80 (1 ml), magnesium sulfate (0.2 g), and manganese sulfate (0.05 g) were added to 1 L of SPM, then divided into two portions of 500 ml presenting SPM1 and SPM2. SPM2 was enhanced with beef extract 1%, yeast extract 0.5%, and peptone 1%. LAB growth in SPM was compared to that in lactobacilli MRS. Nine strains of LAB were individually inoculated at approximately 2-3 log CFU/ml into batches of MRS, SPM1, and SPM2. Samples were incubated for 48 h at 37°C and bacterial growth was monitored using turbidity reading, pH, and bacterial population CFU/ml. Our results showed no significant ($P > 0.05$) differences between LAB growth rates in MRS and SPM2, whereas SPM1 showed slightly slower growth rate. After 48 h of incubation, LAB populations reached 11.34±0.45 log CFU/ml in MRS, 11.74±0.36 log CFU/ml in SPM2, and 10.88±0.31 log CFU/ml in SPM1. These

finding indicated that sweet potatoes can support the growth of LAB and could be used as a low cost medium for laboratorial and industrial applications.

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Impact of Cholesterol Removal on Physicochemical Properties of Queso Fresco Cheese. P. Jackson*, P. Tomasula, S. Besong, and S. E. Lumor, Department of Human Ecology, Delaware State University, Dover, DE 19901.

This study was carried out to investigate the impact of the removal of cholesterol using beta-cyclodextrin (BCD), on the physicochemical properties of queso fresco cheese. Pasteurized cream (44%, v/v) was treated with 10% BCD, warmed to 25°C and mixed for 30 min. The treated cream was then added to the skim and queso fresco cheese was made. Fatty acid and cholesterol contents were determined by gas chromatography. Preliminary results indicated that cheese treated with BCD had lower cholesterol content compared to untreated cheese. Also, there were no significant differences between fatty acids in the treated cheese versus the untreated. The next step is the investigation of the effects of cholesterol removal on rheological and textural properties, which will be assessed by the use of a rheometer and texture analyzer, respectively, to see if there will be significant differences between treated and untreated cheese samples with respect to the said properties. This will be followed by sensory evaluation of treated and un-treated samples with respect to the attributes, flavor, texture, bitterness and appearance.

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Persistence and Survival of Generic *E. coli* and Total Coliforms on Field-Grown Tomatoes Irrigated with Contaminated Water. T. Khairi*, C. P. Cotton, and F. M. Hashem, Department of Agriculture, Food, and Resource Sciences, University of Maryland Eastern Shore, Princess Anne, MD 21853; and K. Shenge, Food Animal Health Research Program/Department of Plant Pathology, The Ohio State University, Wooster, OH 44691.

Surface water used to irrigate fresh produce may contain pathogenic microorganisms that can cause foodborne illnesses due to the human consumption of contaminated fresh produce. A study was conducted at the University of Maryland Eastern Shore Agricultural Experiment Station to investigate the survival and persistence of non-pathogenic generic *E. coli* and total coliforms inoculated onto field grown tomatoes. The experiment's design was a randomized complete block with four treatments and three replications. Bacterial inoculum was prepared with bovine manure at four concentrations: 0, 100, 1,000, and 10,000 cfu/ml. The inoculum was applied to tomato plants using watering cans 10 days before harvest. Fruits were harvested at mid-maturity stage. Fruit samples were collected pre- and post-inoculation at 0, 1, 3, 5, 7, and 10 days. IDEXX Quanti-Tray™/2000 and direct plating methods were used to detect the presence of generic *E. coli* and total coliforms on tomato fruits. Total coliforms and generic *E. coli* populations fluctuated in response to weather events within the sampling period. However, generic *E. coli* population on tomatoes receiving 1,000 and 10,000 cfu/ml, decreased by 74 and 99%, respectively, while populations of total coliforms increased by 35 and 114%, respectively, by day 10. More studies are needed to further investigate the survival and persistence of pathogenic microorganisms in surface water used to irrigate fresh produce.

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Monitoring Physicochemical Properties of Restructured Chevron Jerky Processed under Non-Commercial Condition. B. B. Lemma*, C. Felton, J. H. Lee, G. Kannan, and B. Kouakou, Agricultural Research Station, Fort Valley State University, Fort Valley, GA 31030.

Production of chevon (goat meat) jerky is less common than beef jerky and limited information is available about its quality. The aim of this study was to monitor the physicochemical properties of restructured chevon jerky, processed under non-commercial processing conditions. Four batches of restructured chevon jerky were prepared using ground chevon from Spanish goats in the meat processing plant at Fort Valley State University. Ground chevon was mixed with jerky seasonings and cure mixes, and then extruded through a stuffing horn. Restructured jerky strips were prepared in a convection oven at 93.3°C for 120 min according to the recommended processing of home-style jerky. During the processing, jerky strips were removed at 30, 60, 90, and 120 min from the oven for evaluating physicochemical properties. The CIE L*, a*, and b* color values of jerky strips were significantly affected by oven heating time. Hardness and toughness of jerky increased ($P < 0.05$) with processing time. The moisture content of jerky strips progressively decreased ($P < 0.05$) with time. Total fat and protein contents of the jerky also

increased ($P < 0.05$). Water activity of the jerky gradually decreased ($P < 0.05$) from 1.00 to 0.93 with heating time. However, chevon jerky, prepared with the recommended heating time/temperature for home-style jerky, could not satisfy USDA/FSIS standards. These results indicated that either a longer heating time or a higher heating temperature or both may be required to produce restructured chevon jerky to meet USDA/FSIS standards.

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The Investigation of Negative Eating Habits in Regards to Economically Challenged Families and How They Prevent Children from Eating Healthy. S. F. Neal*, T. Nelson, K. Coley, and D. J. Morgan-Bloom, Cooperative Agricultural Research Center, Prairie View A&M University, Prairie View, TX 77446.

Healthy eating promotes proper growth and development in school aged children. There are various factors that influence the eating habits of children during the developmental stages. Socioeconomic status, race and ethnicity are related to the prevalence of childhood obesity and unhealthy eating. The purpose of this study is to examine the negative eating habits acquired among elementary children in the Hempstead community between first grade through fifth grade, caused by their families' economic status. Revenue plays a major role on the parental perception of eating healthy among many Americans. Greater study is necessary to gain information on not only the eating habits of the child but also why that eating habit is the way it is. Data was collected from 100 parents of elementary school aged children from Hempstead Independent School District in Hempstead, Texas. Surveys were created and issued to the target population. A descriptive research methodology was used to collect and analyze the data. The findings of this research investigation will be used to create awareness among low-income families about the effects of unhealthy eating habits and provide information on intervention programs. Children from households with economically challenged parents are more likely to suffer from unhealthy eating habits.

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Chemopreventive Potential of Fresh and Processed Ginger on Mammalian Cells- HEG2 and Caco2. R. Offei-Okyne*, J. Patterson, J. Boateng, L. Shackelford, L.T. Walker, and M. Verghese, Nutrition Biochemistry and Carcinogenesis Laboratory, Department of Food and Animal Sciences, Alabama A&M University, Normal, AL 35762.

Ginger (*Zingiber officinale*) is endowed with antioxidants, phenols and polyphenols such as gingerol, shagaol, paradol and many other compounds, which have anti-inflammatory, antimicrobial and anticancer properties. Processed ginger has shown to exhibit more compounds as heating and other physical processing activity affects the chemical profile, leading to changes in bioactivity. The purpose of this study was to determine the chemopreventive potential of sun dried, oven dried, fresh and freeze dried ginger on cell lines HepG2 and Caco2. Chemical analysis; DPPH (diphenylpicrylhydrazyl), FRAP (Ferric Reducing Antioxidant Power), total Phenolics and Flavonoids, were determined on fresh and processed ginger. The DPPH results showed 70.51, 81.77, 45.78 and 79.30 inhibition for oven dried, sun dried, fresh and freeze dried ginger, respectively. Total phenolics were 7.60, 9.25, 3.21 and 10.35 mg gallic acid/g dry weight (except fresh ginger) for oven dried, sun dried, fresh and freeze dried ginger, respectively. Flavonoids were 3.419, 5.506, 1.512, and 6.223 mg catechin/g dry weight for oven dried, sun dried, fresh and freeze dried ginger, respectively. The FRAP values for oven dried, sun dried, fresh and freeze dried ginger were 50.23, 62.30, 28.79 and 52.72 mmol Fe(II)/g dry weight, respectively. Chemopreventive potential of ginger extracts in mammalian cell lines (Caco2 and HepG2) will be determined by production of selected detoxification and antioxidative enzymes such as Glutathione-S-transferase (GST), Glutathione Peroxidase (GPx), Superoxide Dismutase (SOD), Catalase Activity (CAT), Glutathione and Lactate Dehydrogenase (LDH) in human liver cells. The results show that consumption of ginger may have implications in prevention of colon cancer.

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Efficacy of Selected Solvents on the Extraction of Phenolic Yield and Antioxidant Activities of Culinary Herbs and Spices in an *in vitro* System. V. L. Shoots*, J. Boateng, S. Ogotu, L. T. Walker, and M. Verghese, Department of Food Science, Alabama A&M University, Normal AL 35762.

The use of culinary herbs and spices as a remedy for healing dates back many years. Today, herbs have been found to possess high levels of polyphenols and antioxidants, which can directly prevent DNA damage. The objective of this study was to determine the effectiveness of Methanol (80:20 v/v; MeOH: H₂O), Ethanol (70:30 v/v; EtOH: H₂O) and Acetone (70:30 v/v; ActOH: H₂O) for the extraction of

phenolics from basil, clove buds and oregano. This will provide information for the maximum yield of phenolics, antioxidant potential of the extracts as well as their bioactivity. Extracts were analyzed for the total flavonoid content (TFC) and total phenol content (TPC). Also, the reduction of 1,1-diphenyl-2-picrylhydrazyl (DPPH), ferric reducing antioxidant power (FRAP) and the Trolox equivalent antioxidant capacity (TEAC) were measured. Cellular antioxidant activity (CAA) was also determined. Results indicated TFC of all samples and solvent extracts ranged from 1.35-2.53 mg CE/g herbal extract, while the TPC ranged from 2.68-9.91 mg GAE/g herbal extract. The radical scavenging activity was highest in basil, oregano and clove extracted with ActOH, EtOH and MeOH, respectively. FRAP was highest in herbs extracted with ActOH. Overall, the polarity of the organic solvent determines the amount of polyphenol and antioxidant activity extracted. The activities of TPC, TFC, FRAP DPPH and TEAC indicated the herbs extracted with ActOH yielded the highest activity.

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Assessing Honey Bee (*Apis mellifera* L.) Health in Conventional and Organically-Kept Apiaries for the Development of Sustainable Beekeeping Practices. S. Siebert*, and L. H. B. Kanga, College of Agriculture and Food Sciences, Florida A&M University, Tallahassee, FL 32307.

Reports of dramatic declines in honey bee and native bee populations have spread across the United States. Most researchers agree that there is no single causal agent of the newest phenomenon termed "Colony Collapse Disorder." Several new findings indicated that exposure to pesticides were important contributing factors to the decline in honey bee colonies. Thus, there is an urgent need for sustainable crop management systems, specifically organically kept crops and the use of organic beekeeping methods for the conservation of honey bee populations and biodiversity. Organic beekeeping is a sustainable practice that is environmentally friendly and provides a substantial source of income to the community. Currently very limited information is available on organic beekeeping. Data indicated significant differences in total proteins between honey bees from conventional beekeeping compared to those from organic beekeeping. Further, the prevalence of pesticide residues found in adult bees, wax and honey was the highest in conventional beekeeping settings. This study provided useful insights into the reduction of pesticide use in beekeeping and safety for honey consumption.

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Fortification of White Bread with Grape Pomace from North Carolina Wineries. I. N. Smith*, A. McMillan, and J. Yu, Department of Family and Consumer Sciences, North Carolina Agricultural and Technical State University, Greensboro, NC 27411.

Fortification of food products with micronutrients is a common practice to enhance the nutritional value and functional properties of foods. Grape pomace (GP) is rich in polyphenols and dietary fiber that possess many proven health benefits. The application of GP in bread could add nutritional value to a largely consumed product. In this study GP from Muscadine Noble, Muscadine Scuppernong, Cabernet Franc and Cabernet Sauvignon were used to fortify white bread. A white bread formula was modified by replacing 5 and 10% of flour with GP. The bread with 0% GP was used as a control. Reformulated dough was baked following a standard bread making procedure. The loaf volumes, inside color, dietary fiber, total polyphenol contents and antioxidant activities of the products were evaluated. Sensory qualities of products were evaluated using a panel of 15 untrained subjects. Results show that bread with 5% GP had similar loaf volume and texture as the control, but bread with 10% GP became denser and harder. The color of bread containing GP changed significantly compared to white bread, but was more comparable to whole wheat bread and rye bread. The total dietary fiber, polyphenol content and antioxidant activity of the bread increased with increasing GP content in the formula. This study indicates that GP has great potential to serve as a functional food ingredient in bread making to deliver health promoting polyphenols and dietary fiber to the product.

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Hydrolyzed Organic Fish Fertilizer and Poultry Litter Influence Total Phenolic and Antioxidants Content but Not Yield of Amaranth, Celosia, Gboma and Long Bean. L. Staley*, D. G. Mortley, C. K. Bonsi, A. Bovell-Benjamin, and P. Gichuhi, George Washington Carver Agricultural Experiment Station, and Department of Food and Nutritional Sciences, Tuskegee University, Tuskegee AL36088.

Dietary intake of a variety of vegetables is very important for disease prevention and may help in the treatment of certain maladies. A study was conducted to evaluate the antioxidant and phenolic content

of four Asian and African vegetables, Amaranth (*Amaranthus hybridus*), Celosia (*Celosia argentea*), Gboma (*Solanum macrocarpon*) and Long Bean (*Vigna unguiculata*), when treated with two organic amendments, poultry litter and fish proteins with conventional NPK as a check. The plants were grown in greenhouse and field experiments conducted in a randomized complete block design with a 6 x 3 factorial treatment arrangement and four replications. The organic amendments were applied based on soil test recommendations, in single bands 15-20 cm away from the plants one week after transplanting. Plants were harvested sequentially during the season as foliage and fruits became physiologically mature and once at the end of the season. Species were analyzed for vitamin C, total phenolics and β -carotene content as well as their antioxidant capacity. The results showed that all fertilizer amendments significantly impacted beta-carotene content and antioxidant capacity. Among species the use of organic amendments enhanced beta-carotene content of Gboma and antioxidant capacity in Longbean. These results suggest that the use of organic amendments in vegetable production did not enhance phenolic and antioxidant capacity since they were only marginally greater than those of plants receiving NPK.

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Reported Food Safety Practices of Older Adults Place Them at Risk for Foodborne Illness. R.

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Over the course of their lives, older adults have experienced and adapted to many different changes, but the safe handling, storage and cooking of foods is one practice many are reluctant to adopt. This change is extremely important, especially to older adults, because they have a higher risk of becoming sick from a foodborne illness. The purpose of this study is to determine what food handling, storage, and cooking practices of older adults place them at risk for foodborne illness. Two hundred eight older adults, in middle Tennessee and southeastern Virginia, completed in person surveys pertaining to their kitchen habits. The results showed that a majority of the participants were putting themselves at risk for a foodborne illness. Some of these actions were eating cold deli meats without reheating, absence of an appliance thermometer in refrigerator, improper storage of leftovers, lack of use of a food thermometer, and not cooking fried eggs to a proper end point temperature. Most of the participants were following hand washing and the thawing of raw meat, chicken and seafood recommendations. When comparing these results to the participants' age, education, race, and agreement or disagreement of being at an increased risk for foodborne illness, there was very little impact on the reported food safety practices. This study demonstrates that older adults lack of knowledge of or are unwilling to implement some proper food handling, storage, and cooking practices, thus placing them at risk for foodborne illness. Food safety educational programs targeting older adults are essential and need to be disseminated throughout the entire community.

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Chlorine Inactivation of Non-Resistant and Antibiotic Resistant Strains of *Salmonella typhimurium* Isolated from Pre-Chill and Post-Chill Poultry Carcasses. R. Tasmin^{*}, and S. Parveen, Department of

Agriculture, Food and Resource Sciences, University of Maryland, Eastern Shore, Princess Anne, MD 21853; and T. P. Oscar, USDA/ARS Residue Chemistry and Predictive Microbiology Research Unit, Princess Anne, MD 21853.

Salmonella infection or salmonellosis is one of the major causes of bacterial food-borne illness worldwide. Food animals, especially poultry and poultry products, are the major sources of *Salmonella* outbreaks. *Salmonella typhimurium* is the leading cause of gastroenteritis in the USA. This study was conducted to test the hypothesis that antibiotic resistant *Salmonella typhimurium* strains are more resistant to chlorine than *S. typhimurium* strains that are non-resistant or sensitive to antibiotics. A total of 16 *S. typhimurium* strains were selected based on their resistance pattern to antibiotics, chilling step, and pulsed-field gel electrophoresis profiles. The four antibiotic resistance profiles were: 1) none, 2) tetracycline-sulfisoxazole (T-Su), 3) tetracycline-ampicillin-amoxicillin-cefoxitin-ceftiofur-sulfisoxazole (T-A-Am-C-Ce-Su), and 4) tetracycline-ampicillin-amoxicillin-cefoxitin-ceftiofur-sulfisoxazole-kanamycin (T-A-Am-C-Ce-Su-K). Two strains from each antibiotic resistance group were pre-chill and two were post-chill isolates and the pulse-field gel electrophoresis profile was also different for each strain. *S. Typhimurium* strains were tested for their inactivation kinetics in chlorinated (30 ppm, pH 6) water at 4°C. Inactivation of *S. typhimurium* in chlorinated water displayed non-linear inactivation kinetics with a concave downward curve. The time for a single log reduction (*d*-value) of *S. typhimurium* from initial concentration did not

differ among the four antibiotic resistance groups. The chilling step or pulse-field gel electrophoresis profiles had no effect in conferring resistance to chlorine. Thus, the hypothesis was rejected, and it was concluded that expression of an antibiotic resistance phenotype does not confer cross-protection in *Salmonella typhimurium* to chlorine inactivation.

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An Assessment of the Relationship between Nutrition Education and Food Consumption in a Nashville, TN Youth Summer Program. D. Towns^{*1}, J. C. Ricketts², and R. X³, ¹Agricultural and Environmental Sciences, and ²Agricultural and Extension Education, Tennessee State University, Nashville, TN 37209; and ³The Village Community Development Corporation, Nashville, TN 37206.

Portion control is one of the main problems when combating childhood obesity. Food consumption in excess of the necessary body requirements and misunderstanding the food groups represented on the food pyramid can cause additional body fat. The eating behaviors of a child can continue into adulthood. The aim of the study was to examine the relationship between nutrition education and food consumption among children in Nashville, Tennessee. In this study, the daily activities of the participants included studying the nutritional facts about food consumed during breakfast and lunch. Hands-on daily instruction of United States Department of Agriculture's MyPlate concept led to the following results. The participants' knowledge of the MyPlate increased from an initial mean score of 28 to a final mean score of 96 on a 100-point scale. However, the participants' reported consumption of high fat food showed no significant change. This research will present how a youth summer program can make a difference in the struggle to combat childhood obesity.

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Survival and Persistence of Non-Pathogenic *Escherichia coli* and *Escherichia coli* O157:H7 in Soils Amended with Animal Manure in a Greenhouse Environment. C. Whyte*, C. Cotton, and F. Hashem, Department of Agriculture, Food, and Resource Sciences, University of Maryland Eastern Shore, Princess Anne, MD 21853; and M. Sharma, and P. Millner, USDA-ARS, Beltsville, MD 20705.

Land application of raw animal manure to enhance soil productivity may pose a food safety risk from pathogenic microorganisms that survive and contact fresh produce. This study, conducted at the University of Maryland Eastern Shore (UMES) Agricultural Experiment Station, evaluated the survival and persistence of non-pathogenic *E. coli* (Ec) and attenuated *E. coli* O157:H7 (attO157) in two soil types, sandy loam (SL) and clay loam (CL), amended with poultry litter (PL) and dairy manure liquids (DML) in a greenhouse environment. Pots (8.89 cm) were filled with 350 lbs of SL or CL soil and amended with or without PL or DML. Each pot received either low, 1.15×10^4 CFU/m², or high, 2.07×10^5 CFU/m² dose of a multi-strain inoculum. Soil samples were collected periodically over 56 days post-inoculation and analyzed for viable *E. coli* by direct plating and/or mini-MPN. By day 28 at high inoculum densities, Ec counts on DML in SL and CL soil declined to 2.94 and 3.01 log₁₀ CFU/g, respectively, and attO157 counts declined to 2.88 and 3.01 log₁₀ CFU/g, respectively. By day 56 at high inoculum densities, Ec and attO157 counts on PL in both soils declined to 3.32 and 2.62 log₁₀ CFU/g, respectively. Survival of Ec and attO157 populations declined more rapidly in soil amended with DML compared to soil amended with PL. These findings are comparable with a previous field study, conducted at UMES, and should be taken into consideration when setting guidelines for fresh produce safety relative to PL and DML application to soil.

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Synergistic Effects on Nuclear Factor Kappa B Expression in an Ovarian Cancer Cell Line, SKOV-3, in the Presence of Chitosan and Docosahexanoic Acid. E. L. Williams*, C. Woodard, P. Otenyo, D. Macaulay, D. Peterson, J. M. Stone, L. Carson, and G. Regisford, Department of Biology, Cooperative Agricultural Research Center, Prairie View A&M University, Prairie View, TX 77446.

Current treatments for ovarian cancer have a significantly high level of reoccurrence. Hence, it is imperative that alternative treatments be adopted. Studies have shown that natural products, such as chitosan and docosahexanoic acid (DHA), inhibit the proliferation of cancer cells. Nuclear factor kappa B (NF-κB) is a latent gene regulatory protein transcription factor that lies at the heart of most inflammatory responses. It has been shown to be upregulated in ovarian cancer patients. The objective of this study was to determine the effect of chitosan and DHA on NF-κB expression levels in an ovarian cancer cell line, SKOV-3. We hypothesized that chitosan and DHA will decrease NF-κB expression in a dose-dependent manner. To test our hypothesis, SKOV-3 cells were treated with (a) 0 ng/mL, (b) 1% Acetic acid, (c) 250

ng/mL of chitosan, (d) 100 μ M of DHA, and (e) 250 ng/mL of chitosan + 100 μ M of DHA for 48 hours. Western Blot analysis and immunocytochemistry were performed to observe the expression and localization of NF- κ B, while an ELISA was used to determine NF- κ B DNA binding activity. Quantitative RT-PCR determined NF- κ B mRNA expression. Nuclear factor kappa B protein was localized within the nucleus of SKOV-3 cells and its DNA binding activity decreased when treated with chitosan and DHA individually. Cells treated with both chitosan and DHA had an even greater decrease in NF- κ B expression. The synergistic effects of chitosan and DHA suggest that these natural products may serve as potential natural treatment for ovarian cancer.

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Subacute Toxicity Study of Herbal Tea Supplementation and Effects on Toxicological Biomarkers: Oxidative Stress and Drug Metabolizing Enzymes. S. Willis*, J. Boateng, L. Shackelford, K. Busamwa, L. T. Walker, and M. Verghese, Department of Food Science, Alabama A&M University, Normal, AL 35762.

The demand for herbal preparations is on the rise and as such there's an urgent need to investigate their potential toxicity especially when consumed in high doses. The aim of this study was to evaluate the effect of high dose consumption of green tea (GT), bitter melon leaf (BMT) and blueberry leaf (BBT) teas using a 28 days repeated oral dose toxicity design in rats. Several toxicokinetics parameters and biomarkers, including changes to body and organ weight, urinalysis and hematology and serum biochemistry, were measured. Effects on redox and drug metabolizing enzymes were also determined. Ten groups of rats were administered once daily by gavage 0, 4, 8, and 12 g/kg body weight/day of GT, BMT and BBT, respectively. At the end of the dosing period (28 days) rats were killed by asphyxiation and samples were collected for analysis. Results indicated rats administered herbal teas at higher doses exhibited increase antioxidant activities (Glutathione-S-transferase (GST), Catalase (CAT) Superoxide dismutase (SOD) at μ mol/mg protein) (8.11-18.92; 0.36-0.55 for GST and SOD, respectively) compared to the control (5.2; 0.31 for GST and SOD, respectively). Urine (127-189) creatinine levels in rats administered herbal teas were different from the control (125), while serum creatinine levels were higher in the control (1.21) compared to the treated groups (0.56-0.81). Body weight gains and relative organ weights did not significantly differ among the experimental groups. In conclusion, administration of herbal teas significantly affected redox and drug metabolizing enzymes. The NOAEL for gunpowder green, bitter melon, and blueberry leaf teas was 12g/kg body weight.

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Expression of Kallikrein 6 in a Chitosan-Treated Ovarian Cancer Cell Line, SKOV-3. C. Woodard*, E. Williams, P. Otenyo, D. Peterson, L. Carson, and E. G. C. Regisford, Department of Biology and Cooperative Agricultural Research Center, Prairie View A&M University, Prairie View, TX 77446.

The reoccurrence of the most deadly gynecological malignancy, ovarian cancer, has a high mortality rate due to the delay in diagnosis of this disease. Not only is it important to detect this disease early, it is also important to develop novel therapies with fewer adverse effects than current treatments. Biomarkers, such as Kallikreins (KLK), which are serine proteases, have been associated with playing a role in ovarian carcinogenesis. The expression of one member of this family, KLK 6, has been reported to be involved with cancer progression. Chitosan, a natural polysaccharide that is biodegradable and biocompatible, may serve as a potential alternative treatment for ovarian cancer, and may function by regulating the expression of KLK 6. Therefore, the objective of this study was to determine the effects of chitosan on the expression and localization of KLK 6 in SKOV-3 cells. It was hypothesized that the expression of KLK 6 protein will be down-regulated in a dose-dependent manner. To test this hypothesis, SKOV-3 cells were treated with 0, 1% acetic acid, 50, 100, 250, 500, and 1000 ng/mL of chitosan for 48 hours. The treated cells were harvested and monitored for further analysis of KLK 6 activity. The expression of KLK 6 was determined by Western blot analysis. Protein localization and expression of KLK 6 were also determined by immunocytochemistry. Western blotting and immunochemical studies revealed that chitosan treatment resulted in a decreased expression of KLK 6 protein in the cytoplasm of SKOV-3 cells, in a dose-dependent manner. These data indicate that chitosan may regulate KLK 6 expression.

Quality Changes on Fresh Southern Peas in Vented and Closed Clamshells during Refrigeration Storage. K. Wright*, S. Jongrattananon, and J. Koo, Department of Agriculture, University of Arkansas at Pine Bluff, Pine Bluff, AR 71601.

Vented and closed clamshells were filled with fresh shelled southern peas (1 lb peas/clamshell) and stored at 4°C. Each of vented and closed clamshell containers was randomly taken out from a low temperature incubator on days of 0, 4, 7, 12, and 14 to determine quality changes on fresh southern peas in vented and closed clamshell during refrigeration storage. Microbiological analysis, color measurement, and visual observation were performed on southern pea samples. On day 0 when southern peas were shelled and delivered to the laboratory, samples were analyzed upon receipt. In general, no quality differences on peas were detected between vented and closed clamshell. Surface color was measured from peas taken from middle layers in clamshells. Little changes were observed on surface color (L^* , a^* , and b^* values) of individual peas during storage, regardless of vented or closed clamshell. On day 0, fresh peas showed initial aerobic plate counts (APC) and yeast and mold counts (YMC) of about 6.5 and log 3.6 CFU/g, respectively. APC reached 8.0 log CFU/g on day 4, whereas YMC reached 7.0 CFU/g. Slight decrease in APCs was noticed on day 8. On day 7, samples started being slippery and slimy with strong beany odor. No sprouting from peas was detected in both closed and vented clamshells during storage. Additional study using new batch of fresh peas will be performed to determine shelf life of fresh southern peas since APCs of days 4 and 7 in the current data were similar.

Divergence in Non-Farm Labor Force Participation of Men and Women. S. Allen*, W. Whittaker, T. Hargrave, and V. Igboke, Agricultural Economics Program, Alcorn State University, Alcorn State, MS 39096.

The United States economy has undergone and continues to undergo economic and structural changes. The evolution of economies is an important phenomenon that represents economic progress. In the United States, the characteristics of farms, non-farm businesses, and farm households have undergone many changes in the last several decades, culminating in rapid changes in the allocation of time spent in the household and the labor market for both men and women. The labor force participation rate (LFPR) is the "share of the population 16 years and older working or seeking work". This paper studies, longitudinally, the apparent differences between nonfarm labor force participation of women and men; it further provides explanations for the divergences. As preliminary results indicate, there has been a tendency in the last four decades toward greater involvement in the nonfarm labor force for both men and women, but the tendency is much stronger for women. The LFPR of men has been decreasing since the 1950s, having registered 86.4% in 1950, and 70% in 2012. Women's LFP, which was at a rate of 33.9% in 1950, increased significantly during the 1970s and 1980s, climbing to 57.5% in 2012. While these are the rates for women and men in general, they vary considerably for different racial groups. This study underlies the transformation of gender roles in society. Indeed, the economic well-being of households will likely be influenced by the changes in labor force participation and earnings levels.

Sustainable Vegetable Gardening Using IPM Practices. K. Barr*, D. Walker, M. Haseeb, Center for Biological Control; G. Umar, and B. Phills, Center for Viticulture and Small Fruit Research, College of Agriculture and Food Sciences, Florida A&M University, Tallahassee, FL 32317.

Community and small scale gardening have been very popular in rural and urban communities. In summer 2012, several small training and demonstration plots of vegetables were cultivated in North Florida. The major objective of these demonstration plots was to offer small scale farmers the necessary skills and knowledge to produce fresh vegetables. These plots were developed using integrated pest management practices. Several vegetables were grown including: okra, tomato, squash, eggplant, bean, turnip, collard, and mustard. From sowing to harvesting insect pest monitoring and scouting were carried out. Several traps were arranged to measure population density of mature and immature stages of pest and beneficial species. Each crop was fertilized using synthetic and compost according to recommended doses. Irrigation was done using a drip system. Wood chips and weed blocker fabric were used to control weeds. In certain cases weeds were mechanically removed. A major emphasis was to use a very limited amount of pesticide only when needed. Two field days for small-scale farmers were organized which drew the participation of several farmers and their knowledge and skills were enhanced. In addition, a summer youth

training program on sustainable vegetable production was organized. Numerous high school students participated and achieved knowledge on diverse vegetable production techniques using IPM practices. The model developed for sustainable backyard gardening using IPM practices provides the necessary capacity to our cooperative extension program to attract new students. This program has demonstrated its effectiveness as a tool for information exchange between the community and small scale growers.

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Survey Results of North Central Missouri 4-H Sheep and Goat Camp Participants. K. A. Cash*, J. D. Caldwell, B. C. Shanks, and C. A. Clifford-Rathert, Cooperative Research Programs, Lincoln University, Jefferson City, MO, 65101; E. L. Walker, Missouri State University, Springfield, MO, 65897; and R. A. Fay, University of Missouri Extension, Dade County, Greenfield, MO 65661.

This study surveyed participants ($n = 62$) of various ages that attended the North Central Missouri 4-H Goat and Sheep Camp at Lincoln University Carver Farm on April 21, 2012. The objective of our survey was to determine if this camp was beneficial to individuals who produce and exhibit goats and sheep. A six-question descriptive survey was hand-given to all participants in attendance at the conclusion of the camp. A greater ($P < 0.01$) percentage of participants indicated that this was the first camp of this kind that they had attended, and thus, had not made any changes in their operation based on previously learned information. Also, post-camp results revealed a 45% increase ($P < 0.01$) in the number of participants rating their knowledge of the topics presented at this camp from 6-10 on a 10 point scale (with one = low rating and 10 = high rating). The majority ($P < 0.01$) of participants indicated that they learned something they could use in their own farming operations and would adopt new management practices, or alter existing practices, as a result of learned strategies. Therefore, the use of 4-H sheep and goat camps may be a beneficial tool for increasing knowledge of relevant topics and may result in a possible increase in utilization of applicable management strategies.

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Understanding the Marketing Strategies of Georgia Goat Producers. R. Clark*, B. Perry, M. Nelson, X. Liu, and E. Styles, Agricultural Research Station, Fort Valley State University, Fort Valley, GA 31030.

The U.S. meat goat sector has experienced substantial growth during recent decades. The increase in meat goat production is related to the growing U.S. population components that show a preference for goat meat. Hispanics are one of the fastest growing and one of the important consumer groups of goat meat and prefer animals yielding a carcass of about 25 pounds. It was observed that the goat meat market demonstrated some obvious volatility in both supply and transaction prices. Therefore, the objective of this study is to assess the price and price variability of animals by slaughter classification. The data on sales by classification and weight category and price came from seven goat markets with sales twice a month over four years. There were nine classifications of animals with several weight categories per classification. The data were secured from the USDA – Georgia Department of Agriculture Market News. We observed that prices in Georgia goat markets were generally high and variable, but less volatile in larger volume markets. Kids and yearlings were two of the most frequently marketed goats and their price variability index were the lowest of all classifications. The price variability measure for kids is most stable and it was about one-half that of yearlings. The results suggest that producers are generally more concerned with stable rather than higher and more volatile prices and are supplying animals that meet the demand of the Hispanic market.

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Mayoral Leadership and the Delivery of Municipal Services in Small Towns in South Carolina. A. Grant*, C. Peyton, and W. M. Legette, Department of Social Sciences, South Carolina State University, Orangeburg, SC 29117.

Scholars have long recognized the contributions of municipal leadership to solving problems in local communities. The mayor is the central figure in this process. Small town mayors are responsible for engaging citizens in local public policy decisions and for the quantity and quality of service delivery. When council members occasionally receive complaints about service, they refer these grievances to the mayor's office or to a municipal department where the mayor serves as the top administrator. Studies found that when mayors offer effective leadership the performance of government officials improves. When mayors provide strong leadership, council members are more likely to work together. When mayors are ineffective, the performance of government suffers. Thus, mayors make a difference in the performance of government

and the delivery of municipal services. Mayors often develop influence through both formal structures as well as informal mechanisms. How well the mayor uses his or her political skills defines the core of political power. This presentation reports on mayoral leadership in small towns in South Carolina; it discerns the role and performance of mayoral leadership in the distribution of services delivery. The presentation explores the relationship between social, political, ideological, and institutional forces and the ability of the mayor to provide an equitable distribution of municipal services in small towns in South Carolina. The data are derived from surveys of and interviews with municipal officials, and a review of city council meeting minutes.

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Research and Outreach Approaches at the Kentucky State University Environmental Education and Research Center. R. Graves*, W. Stilwell, M. Silitonga, and K. W. Pomper, College of Agriculture, Food Science, and Sustainable Systems, Environmental Education and Research Center, Kentucky State University, Frankfort, KY 40601.

In April of 2005, Kentucky State University (KSU) obtained 307 acres located 15 miles north of Frankfort, in Henry County, which is now known as the KSU Environmental Education and Research Center (KSU EERC). The EERC includes hilly terrain, a stream that is part of the Kentucky River watershed, extensive walking trails and sites for anthropology, aquatic sciences, forestry, biology, and science education. The goals of the Center are to assess, protect and enhance these wild lands and create a collaborative learning facility, which connects students, faculty, and staff to the environment through meaningful learning activities. The objectives of the EERC are to 1) educate the public in environmental issues and conservation approaches, and 2) evaluate and manage the native plant inventory, invasive plant incidence, stream ecosystems, and water quality. The EERC provides opportunities for all persons to interact in a safe and educational manner with the natural world. This program has educated and reached over 7,000 visitors on-site and over 40,000 off-site participants with the Mobile EERC across the Commonwealth. The EERC web site, which has received over 30,000 hits from over 90 countries, provides a virtual tour of the EERC. Several KSU graduate and undergraduate classes utilize the facility. Forest inventories have included important native plants, including pawpaw, spicebush, and a range of nut tree species which are important to wildlife. The EERC was recently awarded the prestigious Stewardship Award from the Kentucky Heritage Land Conservation Fund Board.

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Panama Canal Expansion, Toll Increase and Impact on U.S. Corn Exports in the Southeast Region of the United States. A. James*, and G. Ma, Department of Business Administration, South Carolina State University, Orangeburg, SC 29117.

U.S. corn and corn products move through the canal to destinations throughout the world. Panama Canal Expansion, a project scheduled to be complete by 2014, will greatly impact the U.S. corn exports. The scale of the impact depends on the management and operation decisions of the Panama Canal Authority (PCA). If the PCA raises more revenue through increased tolls, U.S. agricultural shipments will be most affected. In this study, we will research the Panama Canal expansion and its effects on the corn industry in the southeastern region of the U.S. We will provide analysis from other researchers who have used different equations to showcase the effect the expansion has on the industry.

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Nutrition Education and Fitness Camp: Can it Prevent Obesity? T. Kelley*, R. Ouazaz, J. Ruffin, and N. Sistani, Family and Consumer Science/ Nutrition and Hospitality Management, and L. Edmondson, Department of Health and Human Performance, Alabama A&M University, Normal, AL 35762

The top three causes of death in the United States are lifestyle diseases, i.e., heart disease, diabetes, and stroke. We need to train youth to take responsibility for their personal health. Youth will benefit by participating in a Nutrition Education and Fitness Camp. The objectives of this preventive obesity camp were: 1) to teach an evaluated Center for Disease Control Curriculum over the course of a 14-day camp; and 2) to measure participants' knowledge, attitude, beliefs, skills and body composition related to their chosen sports, physical activities, and food choices. Nutrition education was taught through interactive lectures and hands-on learning activities including hunger awareness, eating triggers, low energy dense food choices, portion control, menus and meal preparation, and dining out. Twenty-five students, 11-21 years old with readiness to change, were recruited to participate in the 14-day camp.

Students were recruited from the email pool (<All Users>) at Alabama A&M University and from businesses, churches, and agencies in surrounding communities. Program outcome data on age, gender, pre- and post-nutrition knowledge, and pre- and post- BMI are presented.

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Obesity Intervention in Low-Income Children from High Risk Families. S. Long-Lambi*, L. Weatherford, and N. Sistani, Family and Consumer Science/Nutrition and Hospitality Management, Alabama A&M University, Normal, AL 35762.

Obesity has become the most prevalent nutritional disease of children and adolescents. Being overweight during childhood is a predictor of significant risks to physical and emotional health. It is well known that chronic disease risk increase with increasing body weight. Approximately 177,000 of 512,000 Alabama children ages 10-17 years (34.6%) are considered overweight or obese according to BMI for age standards, the sixth highest state rate in the country. Therefore, there is crucial need to improve overall health through safe eating practices, daily physical activity, and modifying behavior that might lead to overweight, obesity and poor health. The overall goal of this cooperative, multi-state, multidisciplinary, research and outreach project is to prevent obesity and to promote weight loss/weight control. The specific objectives of this proposal were to 1) Conduct an expert field review of key behavioral measures purported to contribute to excessive weight gain in children aged 4-10 years old; and 2) Identify anthropometric and physiological measures that could be used to differentiate families within the target population in the community setting. The survey pointed out what changes individuals and families are willing and able to make, and which methods and tools will be needed for successful interventions. Interviews with low-income parents have demonstrated how obesity prevention programs can be more successful in limited-resource communities.

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Factors Influencing Graduation Rates in two Mississippi School Districts. C. Mawusi*, W. L. Whittaker, T. Hargrave, and V. Igbokwe, Agricultural Economics Program, Alcorn State University, Alcorn State, MS 39096.

Education is a critically important ingredient in economic development. It seems even more important with the rapid structural changes taking place in countries around the globe. Education is both a consumer and a capital good because it offers utility to the consumer, and is an important input in the production of other goods and services. High school dropout rates in the United States have become a major point of discussion, because in some parts of the country and among certain ethnic groups it is disproportionately high. In certain areas of Mississippi, the rate has declined, but is still unacceptably high. This paper assesses selected factors that influence the high school graduation rate in two Mississippi counties. To accomplish the objectives, secondary data were collected and analyzed using various multivariate techniques. Overall, the results indicate that since 1990, high school graduation rates have trended upward in the two school districts. The variables that had the highest level of significance in Jefferson County were unemployment and per capita income, respectively. Unemployment was significant and the hypothesized relationship turned out according to expectation. For Warren County, unemployment was also statistically significant, but the resultant sign did not correspond to the a-priori relationship, and is the opposite of the results for Jefferson County. Other variables also show interesting correlation. The results of this study help to shed light on a serious issue that plague many counties in Mississippi.

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Financial Challenges of the NC Elderly Population: Supplemental Nutrition Assistance Program (SNAP) and Housing Expenditures. J. Wade*, S. Lee, and V. Giddings, Department of Family and Consumer Sciences, North Carolina Agricultural and Technical State University, Greensboro, NC 27411.

The SNAP (Supplemental Nutrition Assistance Program, previously called Food Stamp Program) helps the U.S. low-income population, particularly an elderly group who lives with limited incomes and resources. In this study, the authors explored NC elderly households to obtain representative information regarding SNAP and housing expenditures before and after the recent U.S. 2007-2009 recession. For this, the American Community Survey data from 2008 to 2011 were employed. In North Carolina, the median household incomes had decreased from \$46,549 in 2008 to \$43,916 in 2011, which was lower than the U.S. median household incomes during the same period. Housing expenditures increased from \$811 to \$840. Such findings, a decrease in median household income and an increase in monthly housing costs might lead

North Carolina residents to face housing cost burdens, particularly the low income elderly who were less likely to work and more likely to spend resources on health related costs compared to their younger counterparts. Therefore, government assistance such as SNAP/Food Stamps can be a tool to be used to reduce their financial burdens and also when pursuing a healthy and nutritious diet, which may aid in leading an independent living at home environment. However, the number of recipients did not increase. When considering a 6% decrease in median household incomes from 2008 to 2011, the food stamp recipients aged 60 and over only increased at a rate of 2%. Therefore, the U.S. government should provide elderly populations with more enhanced programs to improve their finances and health.

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The Effect of Nitrogen Treatment on the Anthocyanin and Polyphenols Content of *Aronia melanocarpa* Grown in Maryland. B. Aroh*, and B. Volkis, Department of Natural Sciences, University of Maryland Eastern Shore, Princess Anne, MD 21853; A. G. Ristvey, and S. Mathew, University of Maryland Extension, Wye Research & Education Center, Queenstown, MD 21658; and V. V. Volkis, Department of Natural Sciences, University of Maryland Eastern Shore, Princess Anne, MD 21853.

Black chokeberry or *Aronia melanocarpa* is a small fruit-bearing shrub in the rose family. Although it is native to Maryland, its range is from Newfoundland, west to Ontario, south into Alabama, and east to Georgia, and it is hardy to Zone 3. *Aronia* is a landscape quality plant, susceptible to few pests and diseases, that persists in a variety of soils and temperate climatic conditions. It is, therefore, an ideal candidate for organic fruit production. The *Aronia* fruit has nutraceutical qualities, heightening its marketability and sales potential as a value-added product. There is currently great interest in fruits and vegetables that contain high concentrations of flavonoids, considered potent antioxidants. Some recent studies have implicated the relationship between in-field plant nutrient fertility and antioxidant production in *Aronia*. Here we present the data for the antioxidant content of *Aronia melanocarpa* as a function of the difference of age, amount of time spent in the sun or shade, and nitrogen treatment levels of crops. We have shown that the level of nitrogen treatment in the soil influences the antioxidant capacity significantly. Detailed measurements and an analysis of anthocyanin and polyphenols will be presented and discussed. The aim of the project is to determine the treatment that produces the highest capacity of antioxidants in *aronia*.

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Identification of Proteins Associated with Pierce's Disease Tolerance in Xylem Tissue of *Vitis* Species. K. Chibanguza*¹, D. M. Kambiranda¹, R. Katam¹², S. M. Basha¹, L. M. Latinwo², ¹Center for Viticulture and Small Fruit Research, College of Agriculture and Food Science; and ²Department of Biological Sciences, College of Science and Technology, Florida A&M University, Tallahassee FL 32307.

Pierce's disease (PD), caused by bacterium *Xylella fastidiosa*, seriously hampers the cultivation of bunch grapes in different parts of the world. *X. fastidiosa* clogs xylem vessels and causes the plant to wilt. The southeastern region of the U.S. cultivates Florida hybrid bunch grape and Muscadine varieties, which are known to be tolerant to PD. A detailed proteomic profile study of contrasting grape cultivars will assist in identifying key molecules associated with PD tolerance. Different *Vitis* species were analyzed using proteomic studies to obtain insight of molecular and cellular functions involved in the tolerance mechanisms. The overall goal is to determine signal sequences from xylem to deliver therapeutic proteins to control *Xylella fastidiosa*. The specific objectives are to: 1) Compare proteome profiles of xylem tissue from PD tolerant and susceptible grape cultivars; and 2) Determine the role of signal sequences in the tissue associated with PD tolerance mechanism. Differentially expressed proteins were identified using LCMS/MS spectrometer and their function was determined using computational methods such as gene ontology, Blast2Go, and *Vitis* database. Eight proteins were found uniquely expressed in PD-tolerant genotypes while they are absent in PD-susceptible genotypes. This data suggests that *V. rotundifolia* and Florida hybrid bunch grape genotypes express novel proteins in xylem to overcome pathogen infestation. These studies on the differentially expressed proteins revealed the possible role in PD tolerance of Florida hybrid bunch grapes and Muscadines.

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Effect of Fertilizers on Eggplant Resistance to Insects. J. Coleman, Jr.*, T. Rashid, and M. Ravola, Department of Agriculture, Alcorn State University, Alcorn State, MS 39096.

In a field study eggplant cv. Black Beauty (*Solanum melongena*) resistance to insect damage was compared after applying two different regimens of fertilizers. Eggplant seedlings were hand transplanted in the field plots with 2 ft plant to plant distance. Each test plot was 145 ft. long and consisted of three rows. Rows were spaced 3 ft. apart. The two fertilizer treatments were NPK (Nitrogen, Phosphorus, and Potassium – 8, 24, and 24, respectively) fertilizer compound only and NPK with added Biogreen A (Green Global Manufac. & Exp.). The test compounds were applied at 250 lb/acre and 10 lb/acre, respectively. Each treatment had 4 replications and was applied in randomized complete block design. Insects were monitored bi-weekly with sweep net samples. Randomly selected leaves and fruits were observed biweekly in each treatment for insect damage. Thirty eggplant fruits were harvested after 10 weeks from randomly selected plants in each test plot to determine insect damage and yield. Both foliar and fruit damage by insects occurred throughout the season. Major insect pests observed feeding on eggplants were Lepidoptera larvae, eggplant flea beetle, 12-spotted cucumber beetle and Colorado potato beetle. Percent insect damage and fruit yield significantly differed among treatments. Added fertilizer treatment had significantly less insect damage and higher yield.

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Germination and Growth of Fall Cover Crops Following Organic Tomatoes. K. D. Hudson, C. Cooper*, L. Marsh, and B. Smith, Department of Agriculture, Food and Resource Sciences, University of Maryland Eastern Shore, Princess Anne, MD 21853.

Cover crops are generally planted to manage soil fertility, soil quality, water, weeds, pests, diseases, biodiversity, and wildlife in agro-ecosystems. Their biomass is particularly beneficial in organic agriculture, where the vegetation produces both nutrients and mulch cover to suppress weeds. Over the last 3 years of establishing an organic site at the University of Maryland Eastern Shore, the fall planted hairy vetch (*Vicia villosa*) and rye (*Secale cereale*) cover crop consistently failed to produce sufficient vegetation for adequate mulch cover. Consequently, there was a need to determine how the planted seeds and resulting stands developed over the fall to spring period and whether any residual soil treatments may affect them. This study was therefore conducted to assess the cover crop germination of a hairy vetch rye mixture planted in a field that previously produced organic tomatoes (*Lycopersicon esculentum*). The plot's history includes eight treatment combinations of two tomato varieties and four soil additives: control, vesicular arbuscular mycorrhiza (VAM), and poultry compost (PC) replicated four times. Overall seed germination was low, less than 70%, and generally unaffected by prior plot treatments. Cover crop biomass as assessed by LAI readings was lower in the plots treated with only VAM or PC than in the VAM +PC plots. Based on the results, previously applied soil treatments may be a factor in affecting the biomass of the hairy vetch rye cover crop.

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Characterization, Molecular Cloning, and *in silico* Analysis of UDP-Glucose: Flavonoid-3-O-Glucosyltransferase (UFGT) Gene from *Muscadinia rotundifolia*. P. Corbiere*, A. Ananga, V. Georgiev, S. Leong, and V. M. Colova (Tsolova), CAFS, Center for Viticulture and Small Fruit Research, Florida A&M University, Tallahassee, FL 32317.

Muscadine grapes are known to have high antioxidant capacities, which are due to accumulation of flavonoids and anthocyanins that are processed during the ripening of the grape berries. The expression of the UDP-glucose:flavonoid 3-O-glucosyltransferase (UFGT) gene is critical for anthocyanin biosynthesis in the grape berry. UFGT catalyzes the formation of glucosides, which stabilizes the anthocyanidins by 3-O-glucosylation. UFGT enzyme has been previously purified from other model plants; however, no genes coding for UFGT have been cloned or characterized in *Muscadinia rotundifolia*. In this study, we report the cloning and *in silico* characterization of the UFGT gene from muscadine grapes for the first time. The muscadine UFGT sequence showed a significant similarity to characterized UFGT genes from *Vitis vinifera* and *Vitis amurensis*. The prediction of the three-dimensional structure of the protein showed the characteristic fold topology of UFGT enzymes. Furthermore, the phylogenetic analysis showed that the UFGT from muscadine share the same clade with characterized UFGT from *V. vinifera* suggesting a common evolutionary origin and a similar catalytic function. This study provides a foundation for further biochemical and genetic studies of the anthocyanin pathway in muscadine grapes, and also opportunities to

assess the potential of the UFGT in regards to enhancing the production of antioxidants through expression of red color for health benefits.

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Role of MicroRNA Regulation for Sex Expression of Melon. L. Dingess*, A. Almeida, Y. Tomason, and U. K. Reddy, Gus R. Douglass Institute & Department of Biology, West Virginia State University, Institute, WV 25112.

Sex determination in melons leads to the development of unisexual flowers from an originally bisexual floral meristem. This mechanism promotes cross pollination and is important to maintain genetic diversity. In melon, sexual forms are controlled by identity of the alleles at the andromonoecious (a) and gynoecious (g) loci. In our laboratory, we constructed several small RNA libraries from various cucurbit species and identified miRNAs that differentially express in flowers. Expression profiles of ten miRNAs that are known to regulate in melon flowers were used in various kinds of melon flowers using stem loop RT-PCR. 100ng of total RNA was used to perform RT reaction with microRNA specific RT primers. Real-Time PCR was carried out using ABI SYBR Green qPCR Master Mix in an ABI-Step One Plus Real-Time PCR System. The relative expression was obtained using delta-Ct method and 18S rRNA as reference gene. Heatmaps were made separately for the conserved, novel and uncharacterized small RNAs using log2 values of relative expression utilizing the Gitoools software. Here we show distinctive patterns of miRNA expression that often coincide with andromonoecious, gynoecious and hermaphrodite flowers. Validation of target genes and their potential role in sex expression is under evaluation.

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Emergence and Growth of Teff (*Eragrostis tef*) Varieties as Influenced by Seedbed Compaction and Row-spacing. C. Epps*, M. Kering, and V. Temu, Agricultural Research Station, Virginia State University, Petersburg, VA 23806.

Teff (*Eragrostis tef*) is becoming an alternative summer forage plant in the U.S., but its small seed size makes establishment difficult due to poor emergence when planted deep or to limited seed-soil contact when broadcasted. Effects of seed-bed compaction and row spacing (30 or 15 cm and broadcasting) on emergence and vegetative growth were assessed for Five Teff varieties; Virginia Tech Ivory and brown (VTI, VTB), Quality Grass White and brown (QGW, QGB) and Ethiopia Brown (ETB) were seeded in late July and half-plots compacted immediately. Two weeks after germination, plants were counted in row-segments. Plant heights and percent ground cover were recorded at boot stage. With broadcasting, plant densities on compacted seedbeds were greatest for VTB and ETB. Corresponding ground cover reached 95% in compacted areas but was very low in loose seedbeds. In the seed-drilled plots, emergence was lowest for QGW in non-compacted and highest for VTB in compacted plots. Corresponding ground cover was lower in loose seedbeds than in compacted seedbeds. Emergence was significantly greater for VTB and ETB in compacted seedbeds with broadcasted seed. In loose seedbeds, VTB and QGB had the greatest emergence. Before and after first harvest, plants at boot stage tended to be taller in broadcast and at 15 cm than the 30 cm row spacing. Based on these results, seed bed compaction appears to be critical in seedling emergence and successful establishment of Teff.

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Chromatin Immunoprecipitation (ChIP) Assay and Methylation Analysis Protocols in Common Bean (*Phaseolus vulgaris* L.). E. Fiedler*, Q. S. Owusu-Hassan, V. Ayyappan, and V. Kalavacharla, Department of Biological Sciences, Department of Ag & Natural Resources, and Center for Integrated Biological and Environmental Research (CIBER), Delaware State University, Dover, DE 19901.

Chromatin immunoprecipitation (ChIP) assay and methylation analysis are two important protocols that are used in epigenetic research. ChIP assay is currently being used for analyzing the interactions that occur between proteins and DNA in many different types of organisms. The Plant Molecular Genetics and Genomics Lab at Delaware State University is using ChIP assay, with some modifications to the basic protocol, to analyze and subsequently construct a map of the different protein interactions that occur along the common bean (*Phaseolus vulgaris* L.) genome. Cytosine methylation is another type of mapping tool currently being used by the PMGG lab for the common bean genome. It examines methylation of cytosine-rich locations along the genome and gives a distinct pattern for the genome being analyzed.

Plant Growth Inhibitor on Sweetpotato Growth and Yield: Application Timing and Frequency.

J. L. Freeman*, Q. Xia, L. Tyler, L. Stewart, A. Tenner, C. Zhang, D. Alipoe, F. Chukwuma, M. Gao, and V. N. Njiti, Department of Agriculture, Alcorn State University, Alcorn State, MS 39096.

The sweetpotato is among the top seven main crops in the world, with more than 130 million tons produced each year. It grows well in poor soils and harsh environments and depending on the cultivar and growth conditions will produce a huge amount of interlocking vines. Uncontrolled vegetative growth presents multiple problems of great economic importance, including increased harvest cost and increased photo assimilate sink capacity of the vines. Several plant growth inhibitors have been found to be effective in controlling vegetative growth but have environmental concerns. Pro-Ca belongs to a new class of plant growth inhibitors that is only taken up by the green tissues and safe for the environment. The influence of Pro-Ca on sweetpotato (*Ipomoea batatas* Lam.) vegetative growth and storage root yield was evaluated in 2012. One sweetpotato cultivar was sprayed with 0 and 810 mg a.i. per liter Pro-Ca at two and four weeks. Spray frequency varied from zero to three. Plants treated with Pro-Ca produced less vine biomass and more root biomass, relative to the control. This suggested that it may be possible to use Pro-Ca to manipulate source-sink relationship for higher storage root yielding sweetpotato.

Increasing Production Efficiencies through Better Germination in Food-Type Soybeans. C. Greene*, and B. Zhang, Agricultural Research Station, Virginia State University, Petersburg, VA 23806; and M. Rosso, Department of Crop, Soil and Environmental Sciences, Virginia Tech, Blacksburg, VA 24061.

Soybean (*Glycine max*) is one of the most important sources of protein and oil, and is also consumed worldwide for its nutraceutical and pharmaceutical benefits. Soyfood consumption in the U.S. has dramatically increased because more and more people become aware that soyfood contains highly digestible protein, all essential amino acids and a high concentration of isoflavones. The most popular soyfood, soymilk and tofu, and the miracle “super-food” edamame, are all produced from large-seeded soybeans. However, seedling vigor of large seeds is lower than medium and small seeds, so large-seeded soybeans tend to have a lower germination rate than commodity soybeans. The objectives of the proposal were to discover the germination difference between soybean seeds in various sizes, and to increase the germination rate and speed of food-type soybeans. Six soybean varieties varied in seed size (V08-4000 and V08-4426, <10 g/100 seeds; V03-4705 and Glenn, between 12 and 16 g/100 seeds; MFL-159, V06-1778, > 20 g/100 seeds) were harvested in Blacksburg, VA in 2011. The results showed that the large seeds have significantly lower germination rate ($P < 0.0001$) and lower germination speed ($P < 0.001$) than small and medium size soybeans in the lab and the field. Large seeds soaked for 5 hours had higher germination rate and speed than untreated medium (by 23% on rate and 23% on speed) and large seeds (by 29% on rate and 28% on speed) ($P < 0.001$). Ten-hour soaking and fertilizer treatment significantly delayed germination rate of large seeds by comparison with untreated large seeds.

Assessing Trends in Selected Agricultural Commodity Prices: a Correlation Analysis. M. Griffin*, W. L. Whittaker, T. Hargrave, and V. Igboke Agricultural Economics Program, Alcorn State University, MS 39096.

Agricultural commodity prices have been fluctuating in recent years. This is partly due to short-term supply-side factors. There are also mid to long-term trends that seem to be putting upward pressures on prices. Critically unpredictable weather conditions in places such as Canada, Australia and Central America, including rain and drought, have meant irregular harvests. Speculation may be another factor that will not contribute to sustained price stability. Structural factors which suggest that there is the underlying upward trend in prices include: population and economic growth in emerging economies which will increase the demand for food and oil; oil price increases will raise agricultural production costs as well as rising biofuel production. Although volatility has always been a feature of agricultural commodity markets, the evidence suggests that volatility has increased in certain commodity markets. A growing problem is that agricultural price shocks and volatility disrupt agricultural markets, economic incentives and incomes. Using longitudinal data, this study analyzes trends and seeks to better understand the unique price associations that exist among selected agricultural products. Commodities were selected on the basis of their relative importance to Mississippi agriculture. Descriptive statistics and correlation analyses were used to analyze the data. Outcomes of the study are important because, although the agricultural sector is a

declining component of the United States and other economies around the world, agricultural product prices remain important both economically and politically. They strongly influence the level of farm income and are important determinants of economic well-being.

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High Frequency Propagation Regeneration in *Valeriana officinalis*: a Rare Medicinal Plant.

C. Hicks*, A. L. Williams, and S. K. Dhir, Center for Biotechnology, Department of Plant Science, Fort Valley State University, Fort Valley, GA 31030.

Valeriana officinalis is a perennial, flowering herbal plant native to Europe and parts of Asia. It is a medicinal plant used as a muscle relaxer for anxiety relief, as well as a sleep aid. Due to its variations, poor seed production and germination, and traditional breeding cost and time, clonal propagation should be used in order to produce large scale homogeneous plants with high yields of Valerian. In propagating Valerian clonally, we have developed a simple one step method for the regeneration of plants/multiple shoots using nodes as explants. We supplemented the MS media with various concentrations of cytokinins-benzyl amino purine (BAP) and kinetin (KN), to study which concentration had the best effect on producing Valerian efficiently and effectively. The results from this protocol indicated that KN or BAP at 2.5 mg/l was the best concentration for shoot induction. Comparing KN 2.5 mg/l with IAA, IBA, or NAA, maximum number of shoots were observed with KN 2.5 mg/l + IAA 0.1 mg/l. Rooting was effectively achieved on MS supplemented with IAA at 1.0 mg/l. The subsequent hardening experiment showed that the commercial medium, containing a mixture of decomposed coir waste, perlite and organic compost in the ratio of 1:1:1 by volume was most effective, with 80% of plantlets surviving. Regenerated plants were morphologically uniform, having normal leaf shape and growth.

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Growth and Yield of Native Warm-Season Grasses as Affected by Root-Loss at Transplanting and Cutting Height. D. Johnson*, M. Kering, and V. W. Temu, Agricultural Research Station, Virginia State University, Petersburg, VA 23806.

Native warm-season grasses (NWSGs) are slow to establish from seeds due to weed competition. Transplanting seedlings may give seedlings advantage over weeds for faster establishment. Mowing during establishment may reduce weed competition, allowing some forage yield. However, root loss at transplanting may affect initial growth and establishment. Mowing for weed control may impact species differently during establishment. Effects of root trimming at transplanting and cutting heights on growth and forage yield of big bluestem (BB, *Andropogon gerardii*), gamagrass (GG, *Tripsacum dactyloides*), Indiangrass (IG, *Sorghastrum nutans*) and switchgrass (SG, *Panicum virgatum*) were assessed. Seedlings transplanted with or without root trimming into pots were clipped at 10, 15, or 18 cm height, watered and fertilized uniformly. Plant heights were measured two weeks after planting and on three subsequent harvest days. A month after planting, plants were clipped every two weeks and materials oven-dried to determine dry matter yield. Root trimming had no effect on plant height or yield. The first re-growth height for GG was greater for the 18 cm cut than alternative heights. For SG, 10 cm cut had the shortest plant height. For the second re-growth, height values of the 18 cm cut were greater for BB and SG. Cutting height had no effect on yield in all species except SG where 18 cm cut had greater yields than the 10 cm. Results show that with adequate soil moisture, root loss at transplanting and mowing above 10 cm to suppress weeds may not significantly impact establishment of the NWSGs.

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Effect of Biodegradable Polymer on the Growth and Development of Plants: Part II. S. Lewis*, F. O. Akindoju, M. Stewart, G. Beharie, K. Hibbert, T. Fisher, C. Johnson, J. M. Stone, P. Traisawatwong, R. Griffin, E. G. C. Regisford, and L. Carson, Department of Biology and Cooperative Agricultural Research Center, Prairie View A&M University, Prairie View, TX 77446.

Studies have shown that consumption of plant products have contributed to a reduction in the risk of many diseases, such as hypertension and cancer. Radishes (*Raphanus sativus*) contain a high amount of antioxidants, high Vitamin C content, and are very low in calories, fat and cholesterol. It is important to increase the growth and production of these plants for increased human consumption, using biodegradable molecules. Chitosan, a biodegradable polymer, has previously been reported to promote plant growth. The objective of this study was to determine if the growth and germination of radishes would be enhanced in the presence of chitosan and its degraded derivatives. It is hypothesized that the plants grown in the

presence of degraded and purified chitosan would have an enhanced germination rate, larger leaves, larger bulb size and greater root length. Seeds of each plant were subjected to various treatments. The seeds of radish were planted and were grown for sixty, twenty-five and sixty eight days, respectively. For all soaked experiments, seeds were first soaked for 18 hours before being planted. It was observed that the soaked radish seeds had larger leaves and grew bigger than plants in other treatment groups. Additionally, the plants in which seeds were soaked in acetic acid did not grow well and many of the leaves changed from green to yellow. Conclusively, our data indicate that chitosan may directly affect the growth and development of plants and this may be due to the increased availability of nutrients to the plants.

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The Effects of Fly Ash on Germination and Growth of Lettuce, Mustard and Tomato Seedlings. K. Martin*, A. E. Clardy, and E. K. Dzantor, College of Agriculture, Human and Natural Sciences, Tennessee State University, Nashville, TN 37209.

Fly ash (FA) is a major waste byproduct from burning coal to generate 42% the nation's electricity. Currently most of the FA produced by coal power generating facilities is stored in ash ponds or landfills where they usually pose serious threats to human and environmental health because they can contain toxic substances such as Al, As, Cu, Cr, Hg, and Pb. Fortunately, FA also contains several major- and micro- nutrients required for plant growth; therefore, there have been increasing calls to develop ways for beneficial uses of the material, including use in potting soil mixtures for crop production. Such use is expected to reduce significantly, amounts FA that must be stored in ash pond and landfills and thereby reduce human and environmental threats. The purpose of this project is to assess the effects of the fly ash on lettuce, mustard and tomato seed germination and seedling production. Thirty seeds of each variety were germinated in a RCBD with Treatment (1) control (all potting mixture), Treatment (2) 5% fly ash, and (3) 10% fly ash potting soil mixtures. Experiments will determine the effects of FA on rate and efficiency of seedling germination and plant development after 20 days incubation in the greenhouse. Plant biomass and composition of selected elements will be measured to determine uptake of and compared to fly ash and potting soil mixtures.

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Influence of Hydrolyzed Fish Fertilizer and Poultry Litter as Organic Amendments on Yield and Leaf Nitrogen Concentration of Four Sweetpotato Varieties. L. Parks*, D. G. Mortley, and C. K. Bonsi, Department of Agricultural and Environmental Sciences, Tuskegee University, Tuskegee, AL 36088.

Four sweetpotato [*Ipomoea batatas* (L.) Lam.] varieties, BH, Whatley Loretan, J6/66 and NCC-58 were grown in a randomized complete block experiment with a 4 x 4 factorial treatment arrangement and three replications, to determine the impact of hydrolyzed fish fertilizer and poultry litter on root yield and leaf nitrogen concentration. Fertilizer treatments were MegaBloom (MB) (a hydrolyzed fish protein-based fertilizer), broiler litter (BL), NPK and an untreated check. Storage root yield for BH was highest with BL and similar among the other treatments. For J6/66 and Whatley Loretan yields were best with BL followed by MB, while NCC-58 responded best to MB followed by NPK. Dry matter was similar for BH regardless of treatment followed by J6/66, NCC-58 and Whatley Loretan. Whatley Loretan was the highest with NPK. Leaf nitrogen concentration was highest with NPK followed by BL, MB, and Control. These results suggest that the four varieties showed positive yield.

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A Comparative Evaluation of EM on Soil Quality and Fresh Yield of *Brassica oleracea* var. *acephala* Grown on Orangeburg Loamy Sand Soil. H. Reed*, C. Gardner, and A. B. Lorenzo, Agronomy Program, College of Agriculture and Food Sciences, Florida A&M University, Tallahassee, FL 32307.

Effective Microorganisms (EM) is a microbial inoculant designed to improve soil condition and to increase production while reducing the use of chemicals and other synthetic compounds. A field study was conducted to comparatively examine the effects of EM and traditional nutrient sources on fresh leaf yield of collard greens (*Brassica oleracea* var. *acephala*) and post harvest soil chemistry. The study, a 4 x 4 RCBD, was conducted on the Research and Extension Center Farm of Florida A&M University, Quincy, Florida, during Fall 2011. The treatments were 202 kg/ha of N as ammonium-nitrate fertilizer, mushroom compost, EM at 0.1 percent per hectare, and control. Seedlings were planted on raised beds covered with

black plastic, and drip irrigated. The crops were harvested approximately 12 weeks after planting. Data collected includes plant height, plant weight, leaf length, leaf width, root length, and root weight. The fresh yield in kilograms per hectare was derived using aboveground plant weight. Approximately 2 weeks after harvesting, soil cores were removed at 0–15.24 cm and 15.24–30.5 cm and were processed and subjected to physical and chemical analyses. All data were statistically analyzed using SAS 9.3. Results showed fresh leaf yield was significantly higher in plots treated with ammonium-nitrate fertilizer and mushroom compost than those treated with EM and control. Preliminary analysis of soil chemistry showed no significant differences among the treatments in concentrations of P, NO₃, TKN; pH, OM, and CEC. This study will be continued to establish more accurate information.

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Forage Yield and Flowering of Teff (*Eragrostis tef*) Varieties as Influenced by Seedbed Compaction and Row-spacing. L. Robinson*, M. Kering, and V. W. Temu, Agricultural Research Station, Virginia State University, Petersburg, VA 23806.

Teff (*Eragrostis tef*), a warm-season grain from Ethiopia, is becoming an alternative summer forage plant in the U.S., but its small seed size makes establishment difficult due to poor seed-soil contact and emergence. Effects of seed-bed compaction and row spacing (30 or 15 cm and broadcasting) on forage yield and flowering were assessed for Five Teff varieties; Virginia Tech Ivory and brown (VTI, VTB), Quality Grass White and brown (QGW, QGB) and Ethiopia Brown (ETB) were seeded in late July and half-plots compacted immediately. At boot stage, forage was clipped at 10 cm, within a 0.25 m² quadrant and half of each plot mowed at the same height. Compaction did not affect flowering for all varieties, which was over 90% for first crop and averaged 50% for re-growth. Except for the ETB and QGB varieties, forage yields at boot stage were greater in the broadcast than the 30 cm rows. For the ETB and QGB varieties, yields were greater in the broadcast than both 15 and 30 cm row spacing. The best yielding variety was VTB in broadcast and 15 cm rows followed by QGB broadcasted and at 15 cm rows, and VTI broadcasted. The lowest yields were for QGW and ETB at 30 cm row spacing. Except for VTI and QGB, yields were also greater in compacted than in loose seedbeds. Results indicate that closer row spacing (<15 cm) and seedbed compaction may achieve greater Teff yields. More studies are needed on forage quality and potential seed yield.

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Effects of Larval Density of Cabbage Looper, *Trichoplusia ni*, on Defoliation and Performance of the Predator Spined Soldier Bug, *Podisus maculiventris*. J. Rowell*, and J. C. Piñero, Department of Agriculture and Environmental Sciences, Lincoln University of Missouri, Jefferson City, MO, 65101; and T. Coudron, USDA/ARS Biological Control of Insects Research Lab, Columbia, MO, 65203.

The objectives of this study were (1) to quantify the level of defoliation caused by varying densities of the cabbage looper, *Trichoplusia ni* as a function of time and cabbage cultivar; and (2) to assess the effectiveness of the predator, *Podisus maculiventris*, as a function of the predator's stage of development (nymph versus adult) and prey density. Findings indicate that groups of 10 *T. ni* larvae can achieve 100% defoliation of cabbage plants (8-leaf stage) within a 96-hour period. The performance of *P. maculiventris* varied and was influenced by the density and instar of the host larvae as well as by the stage of development of the predator. Results have applications for more effective biological control of cabbage loopers in small vegetable farms.

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Evaluation of Tasks Necessary for Maintaining an Organic Blueberry Orchard through One Growing Season. B. F. Schmitz*, J. D. Caldwell, B. C. Shanks, C. L. Boeckmann, and C. A. DeOrnellis, Cooperative Research Programs, Lincoln University, Jefferson City, MO 65101.

The market for organic fruit, including blueberries, continues to grow at a rapid rate. However, weed and pest control, pruning, irrigation, and related tasks are all significant barriers in the early establishment and subsequent maintenance of an organic blueberry orchard. These tasks must be performed throughout the entire year, although certain months require more hours than others. Therefore, the objective of this evaluation was to compare the amount of hours spent on tasks related to maintaining a newly established organic blueberry orchard from January through September, 2012. In 2011, 3,000 individual blueberry plants from a variety of different cultivars were planted at the Lincoln University Busby Research Farm. Beginning in January 2012, data were recorded on the hours worked for each month and

task. Hours spent “weed eating”/pruning were greater ($P < 0.02$) compared with other tasks (40 vs. 15 hours average, respectively). A month effect ($P < 0.03$) was observed, with July involving more hours worked ($P < 0.05$) than January, February, March, April, and September. Therefore, based on these data, “weed eating”/pruning may be the most time consuming task associated with maintaining an organic blueberry orchard. However, hours spent doing any particular task may vary by month.

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Yield Trials for Hot and Specialty Peppers for Small Farm Production. J. A. Thaxton*, B. J. Wooten, and B. E. Liedl, Gus R. Douglass Institute, Agricultural and Environmental Research Station, West Virginia State University, Institute, WV 25112.

Small farm growers look for new or better varieties to grow and interest in hot/specialty peppers is on the rise. WVSU ran yield trials on hot and specialty pepper varieties in 2011 and 2012. Varieties were chosen for three types: Cayenne, Jalapeno and Specialty. Two blocks of six plants per variety were grown on irrigated raised beds covered in plastic mulch following standard production practices. Plants were grown from seed and hand transplanted into the field. Fruit were harvested by plant into marketable and cull classes following USDA standards. The growing environment in the two years differed dramatically and affected the yield as well as weeks to first harvest. In 2012 only 77% of the peppers transplanted produced peppers unlike 99% in 2011. This is likely due to the high temperatures experienced in 2012 as well as the change to dark green mulch. Concho was an early jalapeno variety with the highest average fruit weight reliably over both years, but did not meet the high production per plant in number and weight that El Jefe exhibited. Recommendations would be to plant both varieties to get both early and high production. Joe’s Long Cayenne produced the heaviest fruit both years, but the highest production varied between varieties in both years for both number and weight. Variation in weeks to first harvest occurred only in 2011 and with the lines producing the smaller average fruit weight. No clear recommendations can be made at this time.

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Increase Yield and Quality of Vegetable Soybean through Optimum Planting Practices.

I. Thompson*, and B. Zhang, Agricultural Research Station, Virginia State University, Petersburg, VA 23806.

Growing food-type soybean (*Glycine max*) is potentially more profitable than grain-type soybean because consumers are willing to pay a premium for food-grade soybean. Vegetable soybean (edamame) is rapidly being incorporated into American diets because of increasing ethnic populations and awareness of its nutritive properties within the general population. However, vegetable soybean planting practices in the U.S. still follow recommendations for commodity soybean. The objectives of this study were to determine favorable production practices for edamame, and study the correlation between yield and seed quality in edamame. Three soybean cultivars (Moon Cake and Owens, edamame cultivars; Osage, commodity cultivar) were planted in three row spacing (24”, 30” and 40”) and three seed spacing within rows (1.5”, 2” and 2.5”) using a strip-split-split plot design in three replications at Randolph Farm in 2012. Fresh pod yield and quality traits were measured for each cultivar. The results showed that fresh pod yield and bean size of all cultivars were not significantly different in various row and seed spacing, but variety affected fresh pod and yield greatly. Moon Cake had the heaviest pods and the biggest beans, and Osage had the highest fresh pod yield. Two-bean and three-bean pod weight were important to determine edamame yield because they were significantly, positively correlated to fresh pod yield. Three-bean pod weight also had significant, negative correlation with 10-pod weight and 25-bean weight. Increasing the number and weight of two-bean pod may be very efficient to improve pod yield and bean size.

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An Efficient Plant Regeneration Protocol from Hypocotyl and Leaf Explants of Alfalfa. S. Williams*, K. Rozier, and S. K. Dhir, Center for Biotechnology, Department of Plant Science, Fort Valley State University, Fort Valley, GA 31030.

Medicago sativa L. (alfalfa) is a flowering legume of the pea family Fabacea. For centuries, alfalfa has served as forage for cattle and as medicine to heal digestive tract disorders and arthritis in humans. The development of an efficient plant regeneration system for alfalfa is essential for the production of large scale planting material and is a precondition for genetic manipulation. We investigated direct and indirect formation of somatic embryos in alfalfa. Direct somatic embryogenesis, which is rather rare, was achieved

in culture of 2-week-old hypocotyl explants on MS medium supplemented with 1.0 mg/l 2, 4-dichlorophenoxyacetic acid (2, 4-D) and 0.5; 1.0; and 1.5 mg/l kinetin and/or thidiazuron (TDZ). Initial induction of embryogenic callus was achieved on MS supplemented with very low concentrations of 2, 4-D (0.05 mg/l and 0.1 mg/l). Indirect somatic embryogenesis from leaf sections was obtained on MS supplemented with 0.05 or 0.1 mg/l 2, 4-D. We examined various stages of somatic embryos (globular, heart, torpedo, cotyledonary). More embryos per explant were produced through the indirect pathway (23-25) than through the direct pathway (14-19). The number of embryos produced was high. There is potential for recurrent, repeated or secondary somatic embryogenesis, possibly an unlimited source for mass propagation and ideal for synthetic seed production in this species. Plant regeneration was achieved on half-strength MS medium without any hormones.

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Comparison of the Structural Changes in US and Mississippi Agricultural Production and Productivity. R. Yates*, W. L. Whittaker, T. Hargrave, and V. Igbokwe Agricultural Economics Program, Alcorn State University, Alcorn, MS 39096.

With increased economic interconnection and globalization we are often asked, how has United States agriculture changed over the years, how does the sector compare today with the 1950's and what factors account for the changes. The questions are even more intriguing because agriculture throughout the country varies from one state to another. An even more important question therefore is how agriculture has in various states throughout the US changed over the past 60 years. Indeed, major technological innovations have transformed the relationship between agricultural inputs and outputs, thereby contributing to changes in productivity. Because agriculture is not place specific, these changes are likely to vary from state to state. This paper compares the structural changes in US versus Mississippi agricultural production and productivity and explains some of the logical reasons for the divergences. Analyses are based on historical data collected from NASS databases. Main factors assessed are physical structure, in terms of number and size of farms; crop output, productivity and profitability. Preliminary results indicate that the number of farms in the US has declined dramatically from 6.8 million to about 2 million currently but the average farm size has increased. In Mississippi, there is a direct relationship between the number of farms and the average size of farms. The amount of land farmed in Mississippi has declined compared to that of the US, which has remained relatively stable. A large increase in the use of manufactured resources has also occurred, making farming more capital intensive than in the past.

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Association Mapping of Fruit Traits in Watermelon. L. Aburri^{*1}, V. G. Vajja¹, M. Nadimi¹, J. Poe¹, V. Abburi¹, Y. Tomason^{1,2}, P. Nimmakayala¹, and U. K. Reddy¹, ¹Gus R. Douglass Institute & Department of Biology, West Virginia State University, Institute, WV 25112; and ²Department of Plant Breeding, Dnepropetrovsk State Agrarian University, Voroshilov 25, Dnepropetrovsk 49600, Ukraine.

Two hundred fifty watermelon heirlooms from all over the world and an F₂ population from the cross PI-244018 (*Citrullus lanatus* var. *citroides*) X PI-270306 (*Citrullus lanatus* var. *lanatus*) were used for generating 11400 SNPs (Single nucleotide polymorphisms) using the technique "Genotyping by Sequencing," and a subset of 96 genotypes was used to evaluate their fruit traits. Data is recorded for fruit traits like fruit weight, color, length, width, rind pressure and total soluble solids. Large set of SNPs was utilized to resolve population structure using STRUCTURE program. This analysis was conducted assuming two subpopulations (K = 2) to ten subpopulations (K = 10). The results indicated presence of subpopulation structure with six clusters. The clustering results (six subgroups) were used as covariates in the association test (MLM procedure with GAPIT software). For the traits with high heritability values (P > 0.5), i.e. rind pressure and soluble solids 4 to 8 markers were identified showing significant associations, with R² values ranging from 5 to 10%. As to fruit yield and yield components, the majority of the markers could be identified with R² values lower than 5%. Detailed results, including co-location of markers significant for different traits will be presented.

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Dynamic Regulation of Novel and Conserved miRNAs Across Various Tissues of Diverse Cucurbit spp. A. Alvarado*, S. Manohar, P. Nimmakayala, Y. Tomason, A. Almeida, and U. K. Reddy, Gus R. Douglass Institute & Department of Biology, West Virginia State University, Institute, WV 25112.

MicroRNA genes (miRNAs) encoding small non-coding RNAs are abundant in plant genomes and play a key role in regulating several biological mechanisms. Five conserved miRNAs, miR156, miR168-1, miR168-2, miR164 and miR166 were selected for analysis from the 21 known plant miRNA families that were recovered from deep sequencing data of small RNA libraries of pumpkin and squash. A total of six novel miRNAs that were not reported before were found to have precursors with reliable fold-back structures and hence considered novel and were designated as cuc_nov_miRNAs. A set of five conserved, six novel miRNAs, and five uncharacterized small RNAs from the deep sequencing data were profiled for their dynamic regulation using qPCR. The miRNAs were evaluated for differential regulation across the tissues among four diverse cucurbit species, including pumpkin and squash (*Cucurbita moschata* Duch. Ex Poir. and *Cucurbita pepo* L.), bitter melon (*Momordica charantia* L.), and Luffa (Loofah) (*Luffa acutangula* Roxb.). Expression analysis revealed differential regulation of various miRNAs in leaf, stem and fruit tissues. Importantly, differences in the expression levels were also found in the leaves and fruits of closely related *C. moschata* and *C. pepo*. Comparative miRNA profiling and expression analysis in four cucurbits led to identification of conserved miRNAs in cucurbits. Predicted targets for two of the conserved miRNAs suggested miRNAs are involved in regulating similar biological mechanisms in various species of cucurbits.

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Differential Gene Expression in Developing Sweetpotato Storage Roots in Response to Infection by the Root-Knot Nematode *Meloidogyne* spp. G. C. Bernard*, M. Egnin, C. Bonsi, W. Witola, and V. Khan, George Washington Carver Experiment Station, Tuskegee University, Tuskegee, AL 36830; and K. Lawrence, Department of Nematology, Auburn University, Auburn, AL 36849.

Sweetpotato (*Ipomoea batatas* L.) production is devastated by a myriad of pathogens resulting in the development of deleterious symptoms, which reduce plant development, nutritional quality and attainable yields. Root knot nematode species *Meloidogyne incognita* and *Meloidogyne arenaria* are severe pests of sweetpotato storage roots causing significant crop losses and diminishing market values. Moderately resistant cultivars are commonly used to decrease disease incidence in commercial production however; the conserved use of these specific genotypes may contribute to increased pathogen aggressiveness resulting in epiphytotic conditions. The characterization and deployment of new highly resistant varieties is a key strategy in sustainable sweetpotato production. Phenotypic evaluation and genetic analyses of nematode resistance genes will contribute to the release of new highly resistant cultivars and increase our overall understanding of the inherent molecular pathways involved in nematode resistance. Several new cultivars of sweetpotato have been developed and are under current investigation for nematode resistance. Root-knot nematode resistance is conferred by several genes and preliminary molecular analyses have revealed differences in the expression of candidate defense markers between newly developed and known resistant and susceptible cultivars. Significant differences in genetic expression profiles due to transcriptional reprogramming and specific gene upregulation will be further elucidated during these analyses. Overall, this project may promote efficacy of successful breeding programs aimed at root-knot nematode resistance to sustain the production of an essential and nutritional food source.

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Effect of Organic and Inorganic Fertilizer on the Production, Elemental Composition and Quality of Roselle Hibiscus Calyces. M. Breithaupt*, and Y. Qi, Urban Forestry Program, Southern University and A&M College; Southern University Agricultural Research and Extension Center; and K. L. Chin, V. A. Ferchaud and R. Payne, Jr., Southern University Agricultural and Research Extension Center, Baton Rouge, LA 70813.

There are more than 300 species of hibiscus found around the world. Only Roselle hibiscus (*Hibiscus sabdariffa*) provides the swollen red calyces and is used as an herbal tea drink and other food products because of its antioxidant activities and medicinal properties. A field experiment was conducted to evaluate the effects of both organic and inorganic fertilizers on the elemental nutrient content of the calyces, their antioxidant activities and anthocyanin profiles. Preliminary data indicated that there were significant differences in elemental nutrient content among accessions of Jamaica, Nigeria and Senegal origins, and fertilizer treatments (6 levels of organic fertilizers, two inorganic fertilizers and the control). Significant differences in calyce Mg, Mn, N, P and Na were observed among the three Roselle hibiscus accessions and fertilizer treatments. No significant differences in C and Fe were observed among the

roselle hibiscus accessions. The application of fertilizers at planting time has no effect on Al, Bo, Cu, P, S and K content in the calyces samples. Ca content varied significantly among fertilizer treatments within roselle hibiscus accession. Mo was not detected among the three Roselle accessions as well as among fertilizer treatments. Elemental composition, antioxidant activities and anthocyanin contents of the calyces from plants treated with fertilizers will be presented and discussed.

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Detailed Outline of Plant Molecular Genetics and Genomics Research in Common Bean (*Phaseolus vulgaris* L.) at Delaware State University. A. Brown*, R. Kusi-Appiah, Y. Thurston, A. Todd, K. Cosden, E. Fiedler, Q. S. Owusu-Hassan, K. Melmaiee, V. Ayyappan, and V. Kalavacharla, Department of Biological Sciences, Department of Agriculture and Natural Resources; and Center for Integrated Biological and Environmental Research (CIBER), Delaware State University, Dover, DE 19901.

The Plant Genetics and Genomics Laboratory (PMGG) at DSU conducts research in epigenetics, molecular biology, bioinformatics and genomics. Our focus is on the interaction of common bean (*Phaseolus vulgaris* L.) plant host and fungal pathogen *Uromyces appendiculatus*. Over time common bean has been economically and nutritionally valuable worldwide. Previously, the PMGG lab used classical genetics to study mutant genotypes from Sierra (a rust resistant genotype); next molecular biology tools were used to identify markers (AFLPs and RGAs) for disease resistance genes, and a combination of molecular biology and bioinformatics was used to derive 454-sequencing derived transcriptome data. Currently we are working with epigenetic tools to observe DNA methylation, HDACs and small RNA activity under inoculated and uninoculated conditions. The PMGG lab leads the National Science Foundation funded undergraduate research program titled Research Experience for Undergraduates (REU) in molecular genetics and genomics, where integrating research through teaching techniques and skill for undergraduate students all over the country for the past six years was achieved.

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Investigating *Stevia* for High Yield and Biomass Production *in vitro*. P. Bumpus*, S. Konkayala, S. Johnson, B. Ojo, and B. K. Biswas, Agricultural Research Station, Fort Valley State University, Fort Valley, GA 31030.

Stevia (*Stevia rebaudiana* Bertoni) is a sweet perennial herb of the Asteraceae family native to Paraguay. There are over 100 species in the *Stevia* genus. The sweet compounds found in stevia leaves, stevioside and rebaudioside, are up to 400 times sweeter than sucrose. *Stevia* has no calcium cyclamate, no saccharin, no aspartame, and no calories, making it diabetic safe. It does not affect blood sugar levels and does not have the neurological or renal side effects associated with some artificial sweeteners. *Stevia* has been used in herbal medical practices for managing weight and blood pressure, for skin care, and in daily usage products. *Stevia* leaves are also used for their antifungal and antibacterial properties. There is a lack of information on high yielding *stevia* germplasm as well as *in vitro* production of biomass for active compounds using various media compositions. In this investigation, our goals were to select high yielding *stevia* genotypes using high performance liquid chromatography (HPLC) and to develop *stevia* cell lines through tissue culture to optimize an alternative corridor for year-round *in vitro* production of biomass and active compounds. Statistical analysis will be carried out to detect differences between HPLC values to select the highest yielding *stevia* line and *in vitro* production of biomass among different culture media.

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Symbiotic Performance of Genetically Diverse Cowpea Genotypes on the Delmarva Peninsula. N. M. Burton*, F. M. Hashem, R. B. Dadson, and C. P. Cotton, Department of Agriculture, Food and Resource Sciences, University of Maryland Eastern Shore, Princess Anne, MD 21853.

Cowpea (*Vigna unguiculata* (L.) Walp), a promiscuous legume crop, has the ability to fix atmospheric nitrogen by establishing an effective symbiotic nitrogen fixation association with *Bradyrhizobium* spp. present in soil. This symbiotic relationship maintains soil fertility; ensures food security and sustainability; improves the socio-economic well-being of the farmers; and reduces contamination of both ground and surface waters on the Peninsula. This study was conducted to identify high performance cowpea genotypes that can be grown and perform well, as an alternative crop, under the Delmarva environmental conditions. The study also evaluated the symbiotic performance of 27 diverse cowpea genotypes. The experiment, conducted at the University of Maryland Eastern Shore Agricultural Experiment Station, was a randomized complete block design with 27 treatments in four replications. The

cowpea genotypes were assessed using the following parameters: nodulation, plant growth, yield, and maturity. At flowering stage, genotypes 524B, IT85F-867-5, and cv. CB46 exhibited the highest number of nodules, producing 31, 25 and 24 nodule per plant, respectively. Dates to 50% flowering, podding, and maturity were also recorded. Results show clear variability among cowpea genotypes. Genotypes IT85F-867-5, TX128BE, and IFE Brown produced the highest biomass: 5.64, 4.35, and 4.14 Kg m⁻², respectively. Genotype 524B produced the highest seed yield and harvest index (0.72 Kg/m⁻² and 25.71%) compared to cv. CB46 (0.05 Kg/m⁻² and 1.56%). It is concluded that cowpea genotypes vary in nodulation, yield, and maturity and in their response to the environmental conditions of the Delmarva Peninsula.

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Effect of Fertilizer Application on Elemental Content of Roselle Hibiscus Leaves. S. Chin*, and Y. Qi, Urban Forestry Program; and K. L. Chin, V. A. Ferchaud, and R. Payne, Jr., Southern University Agricultural Research and Extension Center, Baton Rouge, LA 70813.

Roselle hibiscus (*Hibiscus sabdariffa*) leaves are widely consumed by a diverse population of ethnic groups as salads, cooked greens and as dietary supplements. From nutritional stand-point, it is important to have nutrient data of the leaves in addition to antioxidative phytochemicals. A field experiment was conducted to evaluate the effects of both organic and inorganic fertilizers on the mineral content of the leaves. A completely randomized design with three hibiscus accessions, nine fertilizer treatments and three observations were used for the study. There were significant differences in Al, B, C, Mg, Mn, N, P, Na, S and Zn content in the calyces were observed among hibiscus accessions from Jamaica, Nigeria and Senegal, respectively, and fertilizer applications at planting time. There were no differences in Ca, Fe, and K content in the calyces among roselle hibiscus accessions. Fertilizer treatments had no effect on Cu and Fe content. Mo was not detected among roselle hibiscus accessions and fertilizer treatments. There were no significant differences in the distribution of B, Ca, C, Cu, Fe, Mg, Mn, N, Na and S between the apical three-leaf samples and the immediate lower three-leaf samples of the 12-inch shoots. Apical leaves had significantly higher content of P, K, and Zn than leaves located at the lower part of the 12-inch shoots. Al content was higher in apical leaves. Data on elemental composition, phenolic acid content and antioxidant activities as influenced by the fertilizer treatments will be presented.

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Acoustical Detection of the Pametto Weevil, *Rhynchophorus cruentatus* (Fabricius) [Coleoptera: Dryophthoridae]. O. Dosunmu*, N. Herrick, and M. Haseeb, Center for Biological Control, College of Agriculture and Food Sciences, Florida A&M University, Tallahassee, FL 32307; and R. Mankin USDA, ARS, CMAVE, Gainesville, FL 32608.

The palmetto weevil, *Rhynchophorus cruentatus* (Fabricius), is native to Florida and it attacks mostly stressed palms like *Sabal palmetto* (Walt.) Lodd. ex J. A. & J. H. Schult and *Phoenix canariensis* hort. ex Chabaud, even though it is beginning to gain pest status by attacking healthy palms as well. This study was carried out to determine the feasibility of detecting early instars of *R. cruentatus* in palm fronds using acoustical recordings and to compare the sounds with that of *R. ferrugineus* (non-native species) to know if it is species specific. Three neonate larvae were introduced into separate holes drilled in base of healthy palm frond. Experiment was conducted with a total of ten replicates and insects were kept under ambient conditions. After 24 hours, recordings were made, and this continued at 7-day intervals until day 106 after infestation. Each replicate was recorded five times in laboratory and field conditions. The recordings were separated into possible component sounds such as bird sounds, car noises, early and late instar sounds, and analyzed using the Digitize Analyze and View Insect Sounds (DAVIS) software. Results showed that *R. cruentatus* produced enough audible sounds to be detected in both laboratory and field conditions.

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Monitoring for Susceptibility of the Asian Citrus Psyllid to Insecticides and Potential Microbial Control Agents. J. Eason*, and L. H. B. Kanga, College of Agriculture and Food Sciences, Florida A&M University, Tallahassee, FL 32307; and B. Rohde, University of Florida, Gainesville, FL 32308.

The Asian Citrus, Psyllid *Diaphorina citri* Kuwayama, is currently one of the most destructive pests to citrus crop in Florida following its introduction in 1988. It is a vector of a bacterial disease called "Haunlongbing," also known as "Greening disease". The bacterial disease was initially found in Florida by 2005 and presently more than 43% of Florida's citrus groves are infested with this disease. The deadly

combination, Asian citrus psyllid and Haunlongbing, is a critical threat to the United States citrus industry as it continues to spread nationwide. A modified rearing technique has been developed to provide immature and adult stages of the psyllid for laboratory bioassays. We have also developed an adult vial test for use to screen for potential resistant allele frequency in citrus psyllid populations. Potter tower bioassays indicated that the citrus psyllid was susceptible to fungal pathogens. Overall, our study provided promising new avenues for the management of the Asian citrus psyllid.

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A Faunistic Survey of Mealybugs (Hemiptera: Pseudococcidae) Occurring on Coffee (*Coffea arabica* L.) and Cacao (*Theobroma cacao* L.) Agroecosystems in the Dominican Republic. E. G. Ramirez*, M. T. K. Kairo, and M. Haseeb, Center for Biological Control, College of Agriculture and Food Sciences, Florida A&M University, Tallahassee, FL 32307; A. Roda, USDA, PPQ, CPHST, Miami, FL 33158; and I. Stocks, Division of Plant Industry, Florida Department of Agriculture and Consumer Services, Gainesville, FL 32614.

During the summer of 2010, a country-wide survey was conducted in the Dominican Republic to collect mealybugs (Hemiptera: Coccoidea: Pseudococcidae) occurring on coffee (*Coffea arabica* L.) and cacao (*Theobroma cacao* L.) agroecosystems; the goal was to collect and identify the mealybug fauna and assess their status as pest, as well as confirm the presence or absence of *Planococcus lilacinus* (Cockerell), an important invasive threat to the United States and other countries in the Western Hemisphere. A total of 131 locations in 19 of 31 provinces were surveyed, resulting in more than 1500 specimens of 10 species. At each province, five or more sites were examined, with the exception of La Altagracia and Santo Domingo, where only three and four locations were inspected in each case, and the province Sánchez Ramírez with only one site. One hundred eighty two possible host species in 58 plant families were examined, targeting plant aerial parts. The mealybugs collected were identified as *Dysmicoccus boninsis* (Kuwana), *D. brevipes* (Cockerell), *D. neobrevipes* Beardsley, *Ferrisia virgata* (Cockerell), *Hypogeococcus pungens* Granara de Willink, *Paracoccus marginatus* Williams & Granara de Willink, *Planococcus citri* (Risso), *Pseudococcus jackbeardsleyi* Gimpel & Miller, *Puto barberi* (Cockerell), and *Saccharicoccus sacchari* (Cockerell). There was no evidence of *Pl. lilacinus*; and the most prevalent and widely distributed were *Pl. citri* and *P. barberi*. All species found had previously been reported, except *H. pungens*, which is, reported a new country record by this study. Thirty plant species representing 22 plant families served as hosts, including coffee and cacao (cocoa).

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Performance of Genetically Developed *Gladiolus* Genotypes in Southeast Arkansas Conditions.

M. Hossain*, and S. Islam, Department of Agriculture, University of Arkansas at Pine Bluff, Pine Bluff, AR 71601.

‘Poma’ and Mopa’ were developed by the Department of Horticulture, University of Arkansas, Fayetteville through crosses between *Manfreda x Polianthes Gladiolus* varieties. The two genotypes were planted on March 3, in the greenhouse at the University of Arkansas at Pine Bluff (UAPB) and later transferred to the UAPB research field in late March 2008. Results indicate that flowers of the two genotypes are generally tubular on tall racemes or spikes, and there is no significant difference between height of plant, flower yields, biomass, and other agronomic measurements in the two genotypes. Nevertheless, field observations reveal that ‘Mopa’ produces flowers earlier than Poma. Mopa started flowering in June, while Poma started flowering in August. Growth and flowering in the two types continued until November 2008. They apparently resisted frost and cold temperatures. On survivability ratio, ‘Mopa’ has higher survival potential than ‘Poma’ in the Southeast Arkansas region. About 60% of ‘Poma’ plantings died mid-way in the experiment. Conversely, over 75% of Mopa survived and produced flowers. The result suggests that the Southeast Arkansas environment is very favorable or conducive for the growth of ‘Mopa’ genotype. However, there is need for more field trials in different agro-ecological locations to validate the results.

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Investigating Medicinally Important Phytochemicals of Peach While Employing *in vitro* Studies for PTSL Evaluation. S. Johnson*, P. Bumpus, S. Konkoayala, B. Ojo, and B. K. Biswas, Agricultural Research Station, Fort Valley State University, Fort Valley, GA 31030.

Peach (*Prunus persica* (L.) Batsch), a native to South Asia, has numerous health promoting bioactive compounds, vitamins, and minerals. Peach fruit is high in phytochemicals and antioxidants. Peach phytochemicals are also used in breast cancer treatment research. Peach tree parts used for medicinal and nutritional purposes include flowers, leaves, fruit, seeds, and bark. Besides its medicinal value, peach is an important fruit crop for Georgia farmers. Tree survival and orchard longevity are a major problem for peach production in Georgia. Tree longevity, along with consistent cropping and high quality fruit, are the major predictors of overall profitability from orchards. *Armillaria* root rot, peach tree short life (PTSL) syndrome, soil nematodes, peach tree borer, and cold stress reduce orchard longevity. A combination of factors, including cold damage, bacterial canker, and ring nematode, exacerbated by various management practices such as early pruning and insufficient liming of acid soils, are the primary causal factors of PTSL. It typically causes the sudden collapse of peach trees in late spring. In recent years, this has been a major problem in the southeastern peach growing areas, more specifically in Georgia. This investigation was taken up to screen locally grown peach trees for high content of active phytochemicals for medicinal uses and to continue research to develop *in vitro* protocols to evaluate onset of PTSL using biotechnology. Noteworthy findings will be highlighted, and significant research outcomes will be advanced toward thesis research for Master's Degree in Biotechnology.

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Controlling Cherry Leaf Spot Disease in Flowering Cherry. J. Joshua*, and M. T. Mmbaga. Tennessee State University, Nashville, TN 37209.

Cherry Leaf spot (CLS) caused by *Blumeriella jaapii* affects flowering cherry and most *Prunus* species. It has increasingly become a significant constraint in nursery production of flowering cherries; growers' efforts to control this disease with fungicides have been limited by poor timing of spray programs. Efficacy of fungicide applications depends on correct timing of spray program. A study was conducted to evaluate winter survival of the pathogen and determine the timing of infection establishment in relation to mid-Tennessee weather. Sticky slides placed in a field of cherry trees trapped ascospores that were morphologically similar to those of *B. jaapii* starting March through June with a peak in May coinciding with frequent rain showers. Representative spores were cultured on potato dextrose agar (PDA) and identified by morphological features. Previously infected dormant trees of six flowering cherry cultivars were evaluated for cherry leaf spot pathogen in a controlled environment protected from airborne spores; all plants developed brown spots, shot holes and leaf yellowing symptoms typical of CLS disease. These results indicated that leaf debris and dormant buds from previous infection constituted the main sources of initial infection in mid-Tennessee. Both ascospores and conidiospores were trapped before infection was observed in the field suggesting that initial infection started earlier than disease symptoms were observed. Results also showed that primary inoculum was available when first leaves emerged. Thus, early fungicide applications during petal drop are recommended to protect the first leaves.

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***in vitro* Investigation of Neem for Higher Yield of Azadirachtin and its Biopesticidal Applications.** S. Konkayala*, P. Bumpus, S. Johnson, B. Ojo, and B. K. Biswas, Agricultural Research Station, Fort Valley State University, Fort Valley, GA 31030.

Neem (*Azadirachta Indica* A. Juss.) tree, a member of the family Meliaceae, is native to the Indian subcontinent and grows in tropical and semi-tropical regions. Azadirachtin found in neem tree leaves, seeds and bark has many properties needed for a natural insecticide. It does not directly kill insects, but acts as an inhibitor for feeding and growth of several insect species. However, it is less toxic to mammals, making it safe for humans. Azadirachtin is a highly oxidized tetranortriterphenoid, containing a plethora of oxygen functionality, and hence may be useful for treating Peach Tree Short Life (PTSL) syndrome. The PTSL relates to sudden death of peach trees during late spring due to cold injury and/or bacterial canker (*Pseudomonas syringae*) of trees already weakened by infestation with nematode species. Compared to synthetic insecticides, azadirachtin is highly biodegradable and causes minimal side effects to the crop or the environment. The molecular structure of azadirachtin is highly complex, making its production using a synthetic approach challenging and time-consuming. Hence the need to investigate the yield of azadirachtin *in vitro* using various media compositions is well justified. We used different compositions of *in vitro* culture media to increase biomass content and determine azadirachtin content using high performance liquid chromatography (HPLC). This research also investigated the effect of neem powder rich in azadirachtin on treating ring nematodes on peach trees to consequently mitigate PTSL.

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Increasing Fresh Virginia-Grown Edamame Supply Through Season Extension Techniques.

S. Nolen*, and B. Zhang, Agricultural Research Station, Virginia State University, Petersburg, VA 23806.

Domestic demand of vegetable soybean or edamame (*Glycine max*) has increased due to its health benefits like reducing cancer risks and lowering total and bad cholesterol. Most edamame in the U.S. market relies on frozen product imported from China and Taiwan. However, the quality of edamame quickly drops in frozen storage. Fresh edamame is preferred by consumers, but local fresh edamame supply lasts only a few days every year as a result of a short harvest window. The objectives of this project were to increase fresh Virginia-grown edamame supply up to half-a-year by building up an off-season edamame production system; and to identify optimum edamame varieties in multiple growing seasons. Four released edamame cultivars (Gardensoy 31, Gardensoy 41, Moon Cake and Randolph) with different maturity groups were sowed in greenhouses and transplanted into high tunnels and the field for spring and early summer harvest, and were successively, directly planted in the field and high tunnels for summer and fall production. Total marketable yield and seed quality traits including protein, oil and sucrose content of each cultivar were measured after each harvest. Fresh edamame harvest started from as early as June with higher yields for early maturing cultivars and ended as late as December with higher yields for late maturing cultivars with continuous supply for half-a-year. Yield and quality of fresh edamame from each harvest are under analysis, and will be reported at the conference.

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Molecular Characterization and *in silico* Expression Analysis of a MYB Gene Family in *Muscadinia Grapes* (*Muscadinia rotundifolia*). L. Oglesby*, A. Ananga, V. Georgiev, and V. M. Tsoolova, CAFS, Center for Viticulture and Small Fruit Research, Florida A&M University, Tallahassee, FL 32317.

Anthocyanins are the major color pigments in plants. The color of red grapes is fundamentally triggered by the release of anthocyanins from the skin of grape berries. Elucidating transcriptional regulatory networks in muscadine grapes is vital to understanding the molecular and biochemical processes in the flavonoid biosynthesis. To understand anthocyanin biosynthesis mechanism in muscadine grapes, the cDNAs encoding MybA1, MybA2, and MybA3 was isolated from cDNA libraries prepared from skin tissues of muscadine (*Muscadinia rotundifolia*). Research has determined their structures, functions, and evolution in *Arabidopsis*, and rice. However, these transcription factors have not been studied in muscadine grapes, and no genome sequence is yet available. In this study, we have identified *MybA1*, *MybA2*, and *MybA3* gene sequences from muscadine grapes and confirmed their putative MYB proteins. The putative homologues will also be assigned in *V. vinifera*, and *V. amurensis* based on the phylogenetic tree. Tissue-specific expression pattern analyses have also been used to confirm the predicted homologues. Amino acid sequences encoded by *MybA1*, *MybA2*, and *MybA3* cDNAs indicate that there is high sequence homology with the MYB gene family from related plants. Transcript expressions of *MybA1*, *MybA2*, and *MybA3* genes are abundant in the red skins cultivars, confirming that these genes have major roles in determination of muscadine skin color. The outcome of this research will not only contribute to understanding of the color variation in muscadine grape berries, which is correlated with the evolutionary events occurring in the MYB gene family of grapes, but it will also strengthen functional genomic studies in North American native grapes.

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Arkansas Grand Grassland Prairie Switchgrass, *Panicum virgatum*, Adaptability for Production in Southwest Mississippi. K. Olowola*, L. Anderson, B. Knox, K. Pittman, L. Wilson, and L. Peavie, Department of Agriculture, Alcorn State University, Alcorn State, MS 39096.

Arkansas Grand Grassland Prairie switchgrass was evaluated for its potential adaptability for production in Southwest Mississippi. Switchgrass seeds collected from the Arkansas Grand Prairie were used to establish a demonstration research plot at the Alcorn State University Experiment Station. Seeds soaked in liquid fertilizer to increase seed germination had a lower production factor than non-soaked seeds. Non-soaked seed plants were more susceptible to rust rot than soaked seeds. Also, non-soaked seed plants produced seedheads faster than soaked seeds. Therefore, non-soaked seed plants have displayed a greater adaptability for production in Southwest Mississippi.

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Effect of Muscadine Grape Extracts on Proteome Profiles of Cancer Cell Lines and Identification of Associated Anticancer Compounds. V. Sridhar^{*1}, R. Katam¹, M. Musa², L. Badisa¹, D. M. Kambiranda³, L. M. Latinwo¹, and ³S. M. Basha³, ¹Department of Biological Sciences, College of Science and Technology; ²Department of Chemistry, College of Science and Technology; ³Center for Viticulture and Small Fruit Research, College of Agriculture and Food Science, Florida A&M University, Tallahassee, FL 32307.

Muscadine grapes (*Vitis rotundifolia*) contain a variety of phenolic compounds that have been related to many health benefits, including positive effects towards cardiovascular diseases and cancer. These grapes are commonly found in southeastern United States, and research shows it to be a potential source of antioxidants, which is capable of inhibiting cancer cell growth. The focus of this study is: 1) to identify the differentially expressed proteins in human cancer cell lines in response to various muscadine grape berry extracts; and 2) to identify anticancer compounds in muscadine grape berry extracts. Aqueous and methanol extracts of the grape skin and seed were tested on breast, prostate, and lung human cancer cell lines. The gradient concentrations of crude extracts were used for the cell viability test. The effectiveness of the cytotoxicity capabilities of these extracts was found to be positive against all the three cancer cell lines. Breast cancer cell lines treated with solvent extract of skin and seed; lung cancer cell lines treated with aqueous extract of skin and solvent extract of seed; prostate cancer cell lines treated with both aqueous and solvent extracts of seed all showed significant amount of cell death. Active compounds of the extracts were identified by IR, MS, and NMR analysis. Differentially expressed proteins in cancer cell lines were identified using 2-dimensional electrophoresis and mass spectrometry analysis. Findings suggest biosynthesis involved in cell signaling and biogenesis were affected in the cells treated with active compounds from grape extracts.

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Greenhouse Noni (*Morinda citrifolia*) Production and Utilization in Southwest Mississippi.

Q. Thomas*, A. Burks, C. Campbell, J. Jackson, Z. Cuadra, and P. Igbokwe, Department of Agriculture, Alcorn State University, Alcorn State, MS 39096.

Greenhouse studies were used to determine the effect of planting dates on the survival, growth, yield and chemical compositions of Noni (*Morinda citrifolia*) plants grown on greenhouse ground rows. Seedlings obtained by seeding in “Pro Mix” commercial growing medium were transplanted into greenhouse ground rows two years later. The seedlings transplanted into ground rows at a weekly interval were spaced 1.2 meters apart within each of the 4 rows used for this study. Each plant represented an experimental unit. Row preparations, planting, management practices, data collections and analysis were as for vegetable crops grown on ground beds within greenhouses. Harvested fruits were either eaten raw or processed. Planting sequence or dates did not influence plant survival, growth, yield potential, and processed fruits. Edible fruits were produced one year from planting date.

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Chromatin Structure and Genome Response in Maize. Z. Wiggins*, and O. U. Onokpise, College of Agriculture and Food Sciences, Florida A&M University, Tallahassee, FL 32307.

The urgency of finding a solution for drought tolerant crops is increasing rapidly. With low rainfall occurring more frequently it is pertinent that there is an understanding of how maize and other important crops respond to these situations. The overall goal of the project is to characterize the chromatin landscape of the maize genome in response to biological and environmental inputs using integrated assays to measure chromatin structure and nuclear architecture. Nucleosome position and nuclease sensitivity assays were carried out using new high density microarrays spanning several levels of coverage. These approaches establish and test novel methodologies for mapping chromatin template responses in maize, a large, complex model plant genome. This study provides a good contribution to functional analysis of the maize genome by generating public datasets for design, execution, or interpretation of genomic information. The microarray based nucleosome mapping assays to be developed are considered robust and cost efficient, easily applied to other biological questions in any plant species with sequenced genomes, such as rice, sorghum or among others.

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Greetings from Viruses: the Development and Applications of Plant Virus-Based Functional Genomics Technology. S. Williams*, Y. Meng, L. Tyler, V. Njiti, and C. Zhang, Department of Agriculture, Alcorn State University, Alcorn State, MS 39096.

Plant viral vectors are valuable tools for heterologous gene expression, and because of virus-induced gene silencing (VIGS), they can also be used as reverse genetics tools for gene function studies. Recent advancement of plant virology has allowed for significant improvements and fine-tuning of plant viral vectors. These breakthroughs enable novel designs for plant virus-based expression and VIGS and, hence, the development of many plant viral gene expression and silencing systems. There are two major viruses infecting sweetpotato worldwide, *Sweetpotato leaf curl virus* (SPLCV) and *Sweetpotato feathery mottle virus* (SPFMV) that limit sweetpotato production. SPLCV (genus *Begomovirus*, Geminiviridae) has a single stranded circular DNA genome and is transmitted by whitefly (*Bemisia tabaci*). SPFMV (genus *Potyvirus*, Potyviridae) has a single stranded positive sense RNA genome and is transmitted by aphids. SPLCV and SPFMV field isolates were collected from Alcorn State University, MS and full length genomic DNA and cDNA clones were constructed and molecularly characterized. Further, multiple designs for foreign gene expression and silencing were evaluated for both viruses. The successful development of sweetpotato viral gene expression and silencing technology enables wide range of functional genomics applications for sweetpotato. The results demonstrate the potential of novel designs for virus-based gene expression, silencing technology to major crops, and implications for further improvement of important plant virus-based functional genomics systems.

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Protein-Protein Interactions among Water Stress Responsive Proteins in Peanut Leaf. C. Williams^{*1}, R. Katam¹, P. Suravajhala², C. Lee³, and L. M. Latinwo¹, ¹Department of Biological Sciences, Florida A&M University, Tallahassee, FL 32308; ²Bioclues.org; and ³University of Wisconsin, Madison.

Expression profiling at the protein level represent the core of current proteomic approaches. Protein-protein interactions play an important role in deciphering the function of the proteins discovered through molecular maps. The goal of this research was to determine differentially expressed proteins in peanut to water stress and study interactions of these proteins among themselves and with other leaf proteins. Drought tolerant and susceptible peanut cultivars were subjected to water stress and leaf tissue was analyzed for proteins using two-dimensional electrophoresis and MALDI/TOF mass spectrometer. Eighty-seven differentially expressed proteins to water stress were resolved in both genotypes. Four new proteins were induced in drought tolerant peanut. Plant protein interactions studies were carried out using Arabidopsis thaliana Plant Interaction Database (AtPID). The results indicated that, three protein orthologues AT1G11840, AT5G56500 and AT5G17710 mapped to Arabidopsis genome. Phylogenetic profiling revealed that AT5G56500 known to have eleven predicted functional interactors. So, we contemplate that the said protein in peanut would also have these functional partners since there might be interactions prevailing in orthologues of peanut genomes. Furthermore, various methods including orthology mapping, phylogenetic profiling, gene fusion, text mining etc. were used to decipher putative protein interaction networks based on the above features and resulted in novel candidates among them to have potential functional linkages.

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Factors Influencing Electroporation-Mediated Gene Transfer to *Stevia rebaudiana* Protoplast.

A. L. Williams*, and S. K. Dhir, Center for Biotechnology, Department of Plant Sciences, Fort Valley State University, Fort Valley, GA 31030.

Stevia (Stevia rebaudiana) has been used as a sweetener, as its leaves are almost 300 times sweeter than sugar without any negative health effects. In order to develop a high-efficiency transformation protocol, various factors, such as type and concentration of enzymes, concentration of mannitol in digestion solution, incubation time, and plant material type and age, were studied to obtain a high yield of viable protoplasts. The highest yield of viable protoplasts, about 9×10^5 protoplasts g^{-1} fresh weight and viability 95%, was obtained when protoplasts were digested from three week-old leaves *in vitro* with 2% Cellulase Onozuka RS, 1.0% Macerozyme and 0.7% Pectolyase Y-23, 0.5 M mannitol, 2.5 mM $CaCl_2 \cdot 2H_2O$ and 5 mM MES for 4 h in the dark. For regeneration of protoplasts, viable protoplasts were cultured on KM8P

medium supplemented with 1.0 mg L⁻¹ 2,4-dichlorophenoxyacetic acid (2,4-D), and 0.5 mg L⁻¹ α -naphthalene acetic acid (NAA), by agarose-bead with thin layer liquid culture. The protoplasts regenerated cell walls within 48-72 h. First cell division was observed after culturing for 3-4 days, and micro-colonies were formed within 30 days. The plating ratio of cell cluster regenerated from protoplasts was up to 45%. Transient expression experiments indicate the electroporation uptake of DNA is possible. Electroporation of cells at an electric field of 200 Vcm⁻¹, with the use of EPR buffer (pH 7.2) and at least 20 μ g ml⁻¹ of plasmid DNA, has shown the maximum number of GFP expressing protoplasts cells in comparison to rest of the treatments.

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Hot Pepper (*Capsicum frutescens*) Processing in Southwest Mississippi. R. Williams, Jr.*, A. Burks, J. Jackson, P. Igbokwe, C. Campbell, and Z. Cuadra, Department of Agriculture, Alcorn State University, Alcorn State, MS 39096.

Hot peppers (*Capsicum frutescens*) are among the vegetable crops being evaluated for adaptation, growth and yield potential, pest resistance and product development at the Alcorn State Experiment Station. The hot pepper processing at the station involves the use of "Alcorn Long Pod" Cayenne peppers to formulate hot pepper sauce, now called "Alcorn Natural Hot Sauce". Organoleptic evaluations were used to determine the effect of storage containers, storage environment and length of storage on the quality (appearance, flavor, texture, and pungency) of two Alcorn Natural Hot Sauce and two other commercially available products. Mean sensory scores revealed that Alcorn products are superior to the commercial products in appearance, flavor, and texture. Glass containers enhanced quality retention for all products. Although the length of product storage at a room temperature did influence the color for products in plastic containers, their flavor and pungency were not affected. Nutrient compositions for Alcorn Natural Hot Sauce are comparable to some commercially available products.

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Survey of *Liriomyza trifolii* (Diptera: Agromyzidae) and *Liriomyza sativae* (Diptera: Agromyzidae) Parasitoids from Vegetables in Leon County, Florida. J. Williamson*, and R. L. Hix, Florida A&M University, Tallahassee, FL 32307; and S. Reitz, Oregon State University.

Liriomyza trifolii, the American Serpentine Leafminer, and *Liriomyza sativae*, the Vegetable Leafminer, occur primarily in Florida and California, and are found rarely in greenhouses along the eastern United States. They are considered to be the most important agromyzid pests in North America. They are truly highly polyphagous insects having a host affinity for vegetables, ornamentals and weeds with the potential to become a serious pest if introduced to new areas. Additional pest species of *Liriomyza* are invasive threats to the U.S. *Liriomyza huidobrensis*, the pea leafminer is considered by APHIS to be a pest of quarantine significance posing a high risk for introduction into the U.S. Florida is concerned by the threats posed from invasive species, since the states economy is heavily based on agriculture. The value of Florida's crops in 2011 exceeded \$7 billion. Given this likelihood of introduction, it is critical to proactively develop management tactics for the pea leafminer should it become established in the US. It is well established that in many cases hymenopteran parasitoids of leafminers can provide acceptable control in the absence of pesticide spraying. Most of these parasitoid species that attack *L. sativae* and *L. trifolii* are also able to attack the pea leafminer. Improved biological control has the potential to reduce the use of agrochemicals in vegetable fields and mitigate pest pressure from invasive species. The goal in this project is to provide information on plant-leafminer-parasitoid associations in leafminers established in Florida, and to relate these to potential hosts of the pea leafminer.

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Water Dispersible Carbon Nanotubes Silica Hybrids. G. Beharie*, C. Johnson, M. Stewart, C. Kelly-Brown, P. Traisawatwong, J. M. Stone, E. G. C. Regisford, A. Oki, and L. Carson, Department of Biology, Cooperative Agricultural Research Center, and Department of Chemistry, Prairie View A&M University, Prairie View, TX 77446.

Hybrid materials composed of carbon nanotubes (CNTs) and silica nanoparticles are a class of synthetic materials in which properties of CNTs are combined with properties of silica constituents and lead to materials with interesting functionalities that do not exist in the individual components. Colloidal CNTs are a type of hybrid material that has drawn interest due to their importance in material science. Many synthetic routes are aimed at the synthesis of dispersible CNT derivatives especially water-based

CNT sols for biomedical applications. In this case, the sidewalls of CNTs were decorated to afford a hydrophilic surface that confers dispersibility in water. However, silica functionalized CNTs lack water dispersibility and thus leading to limited manipulation in other processes. Thus, it is hypothesized that the fabrication of water dispersible CNT-silica hybrid can be produced through the surface engineering of the silica moiety and thus can introduce a new class of hydrophilic CNTs based on nanoparticles modifiers. In this study, acylated CNTs are reacted with diethylamine then triethoxyvinylsilane (TEVS) to afford dendritic type CNTs. These were further reacted with tetraethoxysilane (TEOS) to afford a sol-gel network system, which could be used in a polymeric bone scaffolding system. While Fourier Transform Infrared Spectroscopy did not show a significant difference in peak assignments, thermogravimetric analyses (TGA) showed a vast decrease in the 20% weight loss temperature as the reaction proceeded toward final product. Because the amount of CNTs grafts were small when TEOS was added to produce the sol gel network, Scanning Electron Microscopy (SEM) and Transmission Electron Microscopy (TEM) at the time of abstract submission reveal no results.

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Urban Forests and Climate Change - A Comparative Study in Beijing and Shenyang, China.

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As the world's largest developing country with enormous environmental problems, China is a "living textbook" for the study of ecosystem management. To enhance our understanding of the urban ecosystems and climate change, we conducted a comparative study of the urban forests in two major cities in China, Beijing and Shenyang. Results showed that the urban forests in the two cities contribute to air pollution removal, storm water runoff prevention, carbon storage, and climate change mitigation. Results indicated that the two cities' urban forests share some common problems such as lack of species diversity, high planting density, and low canopy coverage.

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Determining Urea Persistence in a Coastal Plain Soil: An Incubation Study. I. Bottone*, L. C. Kibet, A. L. Allen, F. M. Hashem, and L. E. Marsh, Department of Agriculture, Food and Resource Sciences, University of Maryland Eastern Shore, Princess Anne, MD 21853; R. B. Bryant, USDA-ARS, Pasture Systems and Watershed Management Research Unit, University Park, PA 16802; and E. B. May, Department of Natural Sciences, University of Maryland Eastern Shore Princess Anne, MD 21853.

Urea-based fertilizer use has increased in recent years because ammonium nitrate was banned after the Oklahoma bombing incident. Thus, farmers switched to commercial urea-based fertilizers as an economical alternative. When manures are used as a nitrogen source, studies have shown urea to exist in runoff several days after application. Over or improper application of urea-based nitrogen sources can possibly lead to nutrient pollution of various water bodies due to leaching and runoff, and also trigger the diatom *Pseudo-nitzschia* spp. to produce shellfish poisoning. This causes economic and human health concerns in the Chesapeake Bay region. To prevent these occurrences, researchers need to learn more about how urea behaves and moves through soils to water bodies. The objective of this study was to determine how urea in urea-based fertilizers and manures persists in soil after application. Four treatments were used: poultry litter, broiler manure, urea prill, and a control. Our hypothesis is that soils amended with poultry litter and broiler manure will have slower mineralization (hydrolysis) rates of urea, and a longer release of inorganic nitrogen than soils amended with commercial urea fertilizers. The latter is thought to have a more rapid mineralization rate of urea, but shorter release of inorganic nitrogen over time. This study is expected to help inform those concerned about the health of the Bay as to what agricultural practices may harm the Bay. It will also aid farmers in choosing which urea-based fertilizers pose the least risk of polluting the environment through runoff and leaching.

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Plant Decomposition and Production of Byproducts that Potentially Serve as Biofuel Feedstocks.

D. Clarke*, and R. W. Griffin, Cooperative Agricultural Research Center, Prairie View A&M University, Prairie View, TX 77446.

This research project focused on plant decomposition and production of byproducts that can potentially serve as biofuel feedstocks. Five non-native, invader plant species were collected from the field to serve as the initial feedstock for the production of organic acids and natural plant oils which will be

examined for use in biofuel production. The plants included *Croton capitatus* (Wooly Croton), *Sesbania drumondii* (rattlesnake bush), *Sesbania alterniflora*, *Poncirus trifoliata* (Trifoliolate orange), and *Ambrosia trifida* (Giant Ragweed). The method used included collection, processing, preparation and testing of plant seeds and leaves in triplicates during a thirty-five day monitoring period. Measurements included pH, Eh, EC, color and smell of water extract. Preliminary results indicated that pH values ranged from 3.23 to 7.34 with the trifoliolate orange seed samples producing the lowest pH values and the wooly croton seed samples having the highest pH values. The low pH for the trifoliolate orange was produced as a result of the citric acid from the orange. Another observation was that the Eh values ranged from -119 to 307 mV and that on the respective days of measurement the values ranged from anaerobic (without oxygen) to aerobic during production of organic acids. An interesting observation was the change in the smell and color of the various samples over time indicated that decomposition was occurring in the system and byproducts were being produced.

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Use of Fly ash and Poultry Litter Mixtures for Biomass Production by the Cellulosic Herbaceous Perennial, Eastern Gamagrass.

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Coal accounts for 42% of our nation's electricity generation. However, burning coal produces large amounts of wastes known as coal combustion wastes (CCW). One CCW is fly ash (FA), which is composed of fine residues collected by air purification systems while coal is burned. Disposal of FA poses serious environmental problems globally because it contains toxic elements required for plant growth; accordingly, there have been calls for beneficial use of fly ash in crop production. Instead of traditional crops, switchgrass (SG) and eastern gamagrass (GG) grown in a soil that was amended with 0%, 2.5% and 20% FA. SG is the model bioenergy feedstock and GG is complementary or alternative feedstock to SG. The preliminary tests were conducted under acidic conditions, typical of acid-degraded land. After three months, aboveground biomass production by SG was consistently higher than that by GG in unamended and FA-amended soils (5.8, 5.3, 4.7 grams dry biomass per pot versus 4.1, 4.7, 4.3 gram per pot, respectively). The trend of biomass decline between 2.5% and 20% FA amendment suggested that GG was more tolerant to FA-amendment than SG, even though under all treatments, biomass production by SG was higher than that by GG. Experiments are ongoing to further evaluate the effects of combinations of FA and organic amendment (poultry litter, 1-2%) on biomass production by GG.

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Molecular Genetic Variation in *Arundo donax* Populations in South Georgia. S. Harrison*, and S. K. Dhir, Center for Biotechnology, Department of Plant Science, Fort Valley State University, Fort Valley, GA 31030.

Arundo donax (giant reed) is a potential biofuel feedstock crop that is distributed throughout the southern half of the United States, from California to Maryland. *A. donax* is a native to Asia and was initially introduced into North America from the Mediterranean region, although subsequent introductions were from multiple regions. *A. donax* is hypothesized to displace native plants and associated wildlife species as a consequence of the massive stands it forms, and it subsequently becomes a dominant component of the flora of that region. Invasive species such as *A. donax* are interesting for geneticists because these species often evolve rapidly in response to novel abiotic and biotic conditions, and native species evolve in response to the invasion. In the current project, we are interested in understanding local genetic diversity of *A. donax* stands in Houston and Peach Counties in Georgia, with the goal of 1) identifying superior genotypes for biofuel production, and 2) understanding the potential for colonization and establishment, geographic patterns of invasion and range expansion, and the potential for evolutionary responses to novel environments. In the current study, we analyzed *A. donax* individuals from 12 distinct populations in and around Peach and Houston Counties. The poster describes details about DNA isolations from various populations, design of PCR primers to amplify candidate chloroplast and nuclear genes, Sanger sequencing and phylogenetic analysis of sequence data. Further analysis of *A. donax* genome is underway to understand the genetic basis of invasiveness and identification of superior genotypes to be promoted as superior biofuel feedstock.

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Public Awareness and Perceptions of Green Infrastructures for Mitigating Storm Water Runoff.

C. Hopkinson*, and A. B. Lorenzo, Landscape Design and Management Program, College of Agriculture and Food Sciences, Florida A&M University, Tallahassee, FL 32307.

The Environmental Protection Agency (EPA) has cited storm water runoff as the number one water quality issue in Florida, mainly as a result of increased impervious surfaces in urban areas. Due to the potential negative impacts of storm water runoff to the environment, and human health and well-being, studies are increasingly needed in determining the possibility for alternative mitigation systems. Several green infrastructures including rain gardens, rain barrels and green roofs are possible solutions to this problem. However, information on public awareness and perceptions regarding these tools are insufficient. A survey was conducted to gauge the awareness, knowledge, and beliefs about water quality among students, staff and faculty across the campus of Florida A&M University. The questionnaire consisted of questions designed to elicit responses to different green infrastructures that could potentially prevent decline in water quality. Analyses of the results indicate a large majority of survey respondents have heard of either rain gardens or rain barrels, or both. The common source that respondents have relied upon for information about these tools is the Internet. However, respondents are also likely to use sources such as printed materials, television, and formal classes. The causes respondents cited as most responsible for poor water quality are industrial discharges and runoff from farms. Many respondents also believe that these tools can control storm water runoff and prevent flooding.

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Assessing Correlations Between Soil Organic Carbon and Phosphatase Activity in Southeast US Soils Across Various Land Use Types. S. Jones*, R. Shange, R. O. Ankumah, and C. Fluker, Department of Agricultural and Environmental Sciences, Tuskegee University, Tuskegee, AL 36088.

With concerns of carbon tracking for purposes of cap and trade, global carbon accounting, new decision making tools, and model calibration, soil carbon has become the interest of many research groups throughout the world. In hopes of creating a national soil carbon inventory as well as a rapid soil carbon assessment technology, NRCS in conjunction with academic institutions implemented the Rapid Carbon Assessment project through the US. Tuskegee University served as a processing and data collection center for soils in the southeastern US. In a parallel study, the Environmental Quality Lab at Tuskegee University had the objective of assessing correlations between soil phosphatase enzyme activity and organic carbon content of the same soils across various land use and soil types. Soil samples were collected from the upper 15 cm and assessed for carbon content, pH, as well as phosphomonoesterase and phosphodiesterase activity. Correlations between the measures will be reported.

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Genetic Engineering *Cytophaga hutchinsonii* Toward High Efficient Bio-Ethanol Production: Gene Transformation and Reporter Gene Expression. K. Jones*, S. Weeda, G. Ndip, and S. Ren, Virginia State University, Petersburg, VA 23806.

Fossil fuel drives the global economy. However, at the current pace of use, the world's oil reserves will be depleted in about 40 years. The search for alternative fuels is an urgent priority, but crop-based bio-ethanol production will increase the cost of food commodities. Agricultural crop residues provide the largest biomass for cellulosic-based bio-ethanol production. However, current efficiency of converting cellulose and hemicellulose into glucose is low, and this becomes a bottleneck for the use of agricultural residues. Isolation of high efficient micro-strains or engineering high efficient enzymes that can sufficiently convert cellulose and hemicellulose into glucose will warrant self-dependent bio-fuel production in the USA. This study is the first step toward genetic engineering of *Cytophaga hutchinsonii* for high efficient bio-ethanol production. A putative ori from *C. hutchinsonii* was successfully amplified and cloned into pCR2.1 vector in replacing ampicillin gene, forming the plasmid pCR2.1_CHori. The pCR2.1_CHori was able to transform into *C. hutchinsonii* as indicated by the expression of b-galactosidase. A glucose inducible gene was identified from *C. hutchinsonii* and the promoter will be amplified and cloned into pCR2.1_CHori vector. Full length b-galactosidase gene will be cloned into pCR2.1_CHori at the MCS site behind the glucose inducible promoter. The engineered plasmid will be transformed into *C. hutchinsonii*. Mutagenesis will be conducted and mutants for high efficient cellulosic conversion will be screened.

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Comparison of Modified Chitosan Derivatives. O. Macaulay*, J. Onyenekwe III, U. Oviawe, J. M. Stone, and L. Carson, Cooperative Agricultural Research Center, Prairie View A&M University, Prairie View, TX 77446.

Plastics make up about 20-30% of the volume of municipal solid waste landfill sites. This creates a major problem as these polymers systems do not degrade rapidly. Therefore much attention has been focused on blending biodegradable and creating environmentally friendly biodegradable polymers. Chitosan, a biodegradable polymer, is derived from chitin, which is found in the shells of crustaceans. We believe that the degradative properties of chitosan could be improved by either physically blending it or chemically modifying it using other polymer systems. In this study, poly (ethylene glycol) (PEG) was blended with chitosan or polystyrene (PS) or poly(methyl methacrylate) (PMMA) was chemically reacted with chitosan to afford modified chitosan derivatives. Various composition of chitosan was blended with varied composition of PEG at elevated temperature and pressure to yield semi-pressed samples. These samples were continuously heated at 85°C for thirty days. Additionally, styrene and methyl methacrylate monomers were grafted onto chitosan using free radical reaction conditions in order to improve the thermo-degradative temperature to afford chitosan-g-polystyrene (PS) and chitosan-g-poly (methyl methacrylate) (PMMA). Results from TGA indicated that a 40%:60% chitosan: PEG system indicated that the presence of PEG had a slight increase in the 20% weight loss temperature while TGA studies of grafted chitosan derivatives had a decrease in the presence of PS or PMMA chains. Thus, the thermal properties of chitosan can be affected by blending or chemical modification.

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Native Plant Seed and Nursery Stock Production from the Mark Twain National Forest at Lincoln University. N. Navarrete-Tindall, E. Skornia*, A. Wells, and A. Hempen, Native Plants Program, Lincoln University of Missouri, Jefferson City, MO 65101; and B. Davidson, Mark Twain National Forest, US Forest Service, Rolla, MO 65401.

Lincoln University (NPP) and the US Forest Service signed an agreement to produce native plant seed and nursery stock from the Mark Twain National Forest (MTNF) as part of the US Forest Service Celebrating Wildflowers program. Emphasis is given to species of conservation concern, rare and conservative Ozark endemics and those important for pollinators. Objectives are to provide genetically appropriate native plant materials for conservation to enhance biodiversity on the MTNF, provide educational and curriculum opportunities to Lincoln University and provide information to the public on the importance of native plants for pollinators and other wildlife. During this project the NPP, the US Forest Service and collaborators will help to maintain biodiversity and ecosystem health through use of locally adapted populations of native species for restoration, rehabilitation and revegetation in the MTNF and establish demonstration gardens for education. In 2011, seed from three locations within the MTNF was collected. Seed was identified and processed for propagation. Fifty-six species including grasses, shrubs and wildflowers were collected. Seed germination between scarified seed and non-scarified seed was evaluated on 16 species. Germination was 65% for scarified seed and 35% for non-scarified seed. Responses varied among species. Most plants produced were established in production plots at Lincoln University George Washington Carver Farm in fall 2012. Some plants were included in garden established at the US Forest Service office grounds in Rolla, Missouri as part of an Earth Day event. This project will be continued to increase plant species number from different locations.

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Environmental Monitoring of Water Quality Conditions in East Central Texas. R. Somers*, and R. W. Griffin, Cooperative Agricultural Research Center, Prairie View A&M University, Prairie View, TX 77446.

The purpose of this research study was to monitor environmental conditions in the surface water to determine quality standards in East Central Texas. The objective of this research was to monitor pH, DO, Eh, NO₃ and PO₄ levels at five selected sites. The sites included the University Pond (north and south ends), a 90-acre Pond (west end), Pasture Pond (east of Poultry Center) and Pond's Creek at the North Bridge. To collect the results a multi-parameter probe system with a data logger was used to test the water from each site. The preliminary results are expected to be acidic due to the acidic nature of the soils and vegetation in the surrounding ecosystems from which the water flows and inadequate calcium ions to maintain alkalinity. DO is expected to be moderate due to microbial decomposition of organic matter and nutrients in the water.

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Analyses of Spatial Variability of Iron and Manganese in a Seasonally Ponded Wetland in East Central Texas. C. Stewart*, R. W. Griffin, and W. H. Anthony, Cooperative Agricultural Research Center, Prairie View A&M University, Prairie View, TX 77446.

This study was focused on spatial variability of iron and manganese ions in a seasonally wet soilscape. Secondary data analysis was conducted using primary data collected directly from the field study site. Analyses were focused on the research hypothesis related to ion diffusion gradients based on movement within a wetland system that created concentrations zones. Study objectives were: 1) to quantitatively measure iron and manganese features present in 8 horizontal and 5 vertical profiles at selected sites; and 2) to conduct spatial and statistical analyses on iron and manganese features data with an aim of identifying a geographical distribution of the ions within and across the seasonally wet landscape. Results indicated that a definite pattern existed with the occurrence of iron and manganese concentrations zones. This data builds the knowledge base within the wetlands and the seasonally wet soils disciplines in both the applied and theoretical components. RA of Iron was greatest in 3W and 3S sites (Vertical Description), which represented the wetland boundary. RA of Iron was greatest in 3W and 3E sites (Horizontal Description). RA of Manganese was greatest in 3E and 3S Sites (Vertical Description). RA of Manganese was greatest in 3S and 4E Sites (Horizontal Description). Crayfish Krotovinas were greatest in 0N and Center sites (Vertical Description). Crayfish Krotovinas were greatest in Center and 2E sites (Horizontal Description).

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Temporary Variation of Stream Water Quality as Affected by Land Use in a Mid-West Watershed. R. Thompson*, J. Hargrove, B. Hua, J. Yang, and F. J. Liu, Department of Agriculture & Environmental Science, Lincoln University of Missouri, Jefferson City, MO 65102.

Stream water quality in watersheds is dependent on land use, climate, watershed hydrology, and soil conditions. However the relative importance of various types of land use and organic matter source on water quality is not yet ascertained and quantified. This field study attempts to assess the impacts of land use and varying organic matter (OM) sources on surface water quality. Hinckson Creek watershed located at Columbia, MO, which combines a variety of land uses or ecosystems, was selected as a study site. Stream water samples in the creek near each of land uses were collected monthly and analyzed for total organic carbon (TOC), total nitrogen (TN), pH, dissolved oxygen (DO), and electrical conductivity (EC). Results indicated that water quality near agricultural land was more variable as compared to those near forestry, rangelands, and urban areas. In presentation, temporal and spatial variations of the surface water quality in the watershed will be assessed, water quality among various land uses compared, and their relationships with land use and OM sources explored. Data generated from this field study would provide scientific information for watershed management that leads to control elevated OM content in surface water and improve regional water quality.

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Genetic Variation of Copper Tolerance in Purslane (*Portulaca oleracea*). L. White*, S. Weeda, and S. Ren, Virginia State University, Petersburg, VA 23806.

Copper-based fungicides are widely used in agriculture to control crop fungal diseases, especially in citrus orchards. Applications of the copper-based chemicals caused copper over-accumulation leading to soil contaminations. Although copper is an essential element that is required for all plants, over-accumulation could cause toxicity to crops including root damage, leaf chlorosis and growth reduction. Understanding the mechanisms of how plants respond to copper will warrant new strategies to efficiently use those heavily copper-contaminated lands or remove copper from the lands. Nine Purslane accessions collected from geographically different regions were tested for their abilities of copper tolerance at both germination and adult stages. Six out of nine accessions (Eritrea Keran, Golden T, Greece, P.O., P.S., and Turkey) showed consistent tolerance to copper at all concentrations below 1000 ppm during germination. High concentrations (800 and 1000 ppm) delayed germination for accession Golden G. Tokombia and Egyptum accessions showed significant sensitivity to copper with higher concentrations (above 600 ppm) completely inhibiting germination. Coppers also significantly inhibited hypocotyl elongation for all accessions. For the adult stage test, 600 ppm CuSO₄ was applied to each pot for two weeks. No visible damages were observed for all accessions. However, biomass for both shoots and roots were significantly reduced or remained unchanged for most accessions. On the contrary, accessions Egyptum and Golden T

showed significant increase of biomass production for shoots and roots, indicating their strong tolerance to copper at adult stage. The results indicate that different mechanisms were involved in control of copper tolerance in Purslane.

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Continuing the Search for a Renewable/Biodegradable Hydroponic Substrate. B. J. Wooten*, and B. E. Liedl, Gus R. Douglass Institute, Agricultural and Environmental Research Station, West Virginia State University, Institute, WV 25112.

Hydroponic systems utilizing substrates have traditionally used products that are not renewable or biodegradable. Coir, a coconut production by-product, is biodegradable and renewable but not produced in the US. Kenaf has similar properties to coir and is utilized as its replacement for hanging baskets liners, but has not been used in hydroponics. Our question is if kenaf could be used as a coir replacement in substrates. A vertical hydroponic system with four substrates consisting of approximately 85% perlite or PBH and 15% coir or kenaf was used. The first experiment had two towers with eight pots each planted with parsley, violas, foxgloves, snapdragons and pansies for each substrate. Basil was harvested weekly and flowers were harvested when petals were open. Fresh weight and flower/stem number of the plants in each pot were weighed and counted. No significant differences were found for number or weight of basil stems. Coir was a better component for pansy weight production than kenaf, but no difference was found for number of stems. Violas produced more stems and weight in perlite substrates. Foxgloves and snapdragons produced were not useable for the cut flower industry. A second experiment using a day-neutral strawberry cultivar with five towers for each substrate was undertaken. The percent plant survival and total berry weight was statistically significant with perlite substrates best. The number of berries produced with the substrates was not statistically significant. This suggests that kenaf might be used as a replacement but it will be crop dependent.

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Transition to Organic Fruit Production with Animal and Forest Wastes: Impact on Yield and Environmental Performance of Muscadine (*Vitis rotundifolia*) in a Heavy Soil. J. Banks*, and G. K. Panicker, Department of Agriculture, Alcorn State University, Alcorn State, MS 39096; J. L. Silva, Department of Food Technology, and F.B. Matta, Department of Plant and Soil Sciences, Mississippi State University, Mississippi State, MS 39762.

Transition from conventional to organic production is a major field in organic research. Increased concerns on environmental quality have stimulated farmers to accept organic farming as an alternative. Muscadine (*Vitis rotundifolia* var. Summit) was grown on Memphis Silt Loam and conducted studies with animal and forest wastes for over 10 years. Three treatments of organic manures (cow-C; poultry-P; cow+poultry-CP) with pine mulch were applied in basins around each plant in a C.R. design. Control treatment received regular inorganic fertilizers. There was no pathogenic organism from manures found on the grapes. Soil compaction was always higher in control with lower soil moisture content, and the compaction was lower in organic treatments with higher levels of organic matter buildup. Concentrations of nitrate-N and P were higher in the surface layers of organic treatments. The yield of organic plants continued to be higher after the transition period, and control remained with the lowest yield. The results suggest that the controlled application of manures in basins of fruit trees can be an agronomically and environmentally sound practice.

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Quantification of Soil Color and Redoximorphic Features in Four Soil Treatments on the Texas Gulf Coast Prairie. A. R. Bryant*, and R. W. Griffin, Cooperative Agricultural Research Center, Prairie View A&M University, Prairie View, TX 77446.

Dust from distant sources is believed to be responsible for a large portion of the soils in arid and humid areas. Iron plays a critical role in the ocean biological processes and also should play a significant role in soil surfaces. This project focused on quantification of soil color and redox features in four soil treatments on the Texas Gulf Coast Prairie. Specific objectives included: 1) quantification of redox features in the upper 50 cm of selected sites; 2) determination of iron versus manganese related redox features; 3) determination of soil matrix and percent of soil redox features; and 4) determination of microbes present in individual treatments using descriptive analyses. Materials used in the study included field equipment and supplies. The center of each individual treatment site (Control, Encased, Encased and Replaced, and

Replaced) was cored and the soils were described for matrix color and redox features (number, size, color, and type). The dominant background color for Control (C) and Encased (E) treatments was 7.5YR. Encased and Replaced (ER) treatments which were composed of white mortar sand had a dominant soil color of 10YR; the Replaced (R) treatments also had a dominant soil color of 10YR. Iron related redoximorphic features were identified which were absent in the previous phase of the study; the dominant redox color was brown. This fourth phase of the project was focused on accumulation of red iron bearing dust particles easily identified against white mortar sand.

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Microbial Diversity and Biogeography of Freshwater Sediments in the Desert of Cuatro Ciénegas, Coahuila, México. A. Cervantes*, N. Balagurusamy, Escuela de Ciencias Biológicas, Universidad Autónoma de Coahuila, México; and D. H. Huber, Department of Biology, Gus R. Douglass Institute, West Virginia State University, Institute, WV 25112.

The majority of microbial ecology studies of freshwater sediments have been done at northern latitudes where there is abundant surface water. However, little is known about the biodiversity of the rare freshwater ecosystems located in southern dry environments. Cuatro Ciénegas valley in the state of Coahuila, México, is a relatively small area (840 km²) with a variety of ancient oligotrophic aquatic environments. This unique valley harbors several endemic plant and animal species, indicating its prolonged biogeographical isolation. The distinct geochemistry and isolation of the freshwater environments also implies that their microbial diversity may be unique. We sampled microbial communities in sediments taken from 5 different *pozas* (small lakes) using 454 pyrosequencing that targeted 16S rRNA gene diversity. Approximately 4000 sequences per sample were analyzed. Phylogenetic analysis of the sediment diversity was done with the RDP (Ribosomal Data Base Project). Chao 1 statistical analysis projected more than 1,600 phylotypes (97% similarity level) per sample. A large fraction of the sequences were Unclassified Bacteria in each sediment sample: range 27-44%. The most abundant phyla in the sediments were *Proteobacteria*, *Firmicutes*, *Verrucomicrobia* and *Chloroflexi*. Some groups, including *Synergistetes* and *Thermodesulfobacteria*, were found in the sediment of only one *poza*. Jaccard similarity analysis did not show biodiversity clustered by proximity, indicating biogeographical differences in the microbial diversity of these isolated freshwater lakes.

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Sustainability in Urban-Rural Interface. R. Chambers*, and Z. Ning, Urban Forestry Program, Southern University Agricultural Research and Extension Center, Baton Rouge, LA 70813.

To sustain natural resources in the urban-rural interface, we studied the urban-rural interface issues including land use change, forests, fire, water, wildlife habitat, and environmental factors. The study results indicate that the South is undergoing tremendous change and resource professionals have the opportunity to garner support and influence for policies that support natural resource management and conservation. It is clear that increased human influence is changing forest ecosystems and creating new challenges and opportunities for natural resource professionals. To sustain natural resources in the urban-rural interface, we must develop better policies, effective management strategies, and changing the way we treat the natural resources. Management options that need to be formulated and implemented to achieve a secure goal of the ideal urban-rural interface were suggested.

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Evaluating Variability in Overload Stress Responses and Bioenergy Production in Replicate Thermophilic Anaerobic Digesters. E. Chavarría*, and D. H. Huber, Department of Biology, Gus R. Douglass Institute, West Virginia State University, Institute, WV 25112.

Currently society utilizes 13 terrawatts of energy worldwide per year and this is expected to increase 50% by 2025. Waste biomass, including agricultural wastes, can be used as a source of bio-based energy to help meet this demand at local levels. In 2011, 8.6 billion chickens were farmed in the US, producing 2 kg/day/bird of poultry litter waste. This waste represents a resource that can be converted into bioenergy using methane-producing anaerobic microbial consortia. In this study, we tested for variability in the performance of replicate anaerobic bioreactors using organic overload stress to amplify and detect subtle differences in the metabolic network. During the study, six replicate laboratory-scale thermophilic continuous stirred-tank reactors (CSTR) were started-up and operated for 428 days using poultry litter substrate. Differences in the metabolic network organization were evaluated by assessing the relative

relationships of the primary system metabolites using multivariate ordination (Principal Component Analysis). PCA revealed three distinct periods: an initial stage (days 0-202) during low organic loading with similar performance for each digester; a first overload stress period (days 203-307) where the replicate digesters exhibited low methane production, low pH and volatile acids accumulation; and a second overload stress (days 308-428) response different from the first. We found that variability in the metabolic networks of presumably identical bioenergy systems can be identified by using induced environmental stress as a tool. This type of evaluation could help to improve the reliability of anaerobic digestion technology for farms and industries where operational stresses are common.

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Monitoring of Resistance Allele Frequencies in the Glassy-Wing Sharpshooter, *Homalodisca vitripennis*, the Destructive Pest of Grape. G. Chelliah*, R. Abanja, and L. H. B. Kanga, College of Agriculture and Food Sciences, Florida A&M University, Tallahassee, FL 32307.

The Glassy-winged sharpshooter (GWSS), *Homalodisca vitripennis*, is a major vector of the strain of *Xylella fastidiosa* causing the deadly Pierce's disease in grapes. Costs associated with prevention and control of GWSS and Pierce's disease represent substantial economic losses to the grape industry. Increased applications of pesticides for control seem to select for populations with insecticide resistant traits and apparent chemical control failure. To evaluate the frequency of resistant traits in field populations of GWSS, we reared laboratory colonies from adult GWSS collected from vineyards of North Florida. Colonies were reared on cowpea *Vigna unguiculata*, Okra *Abelmoschus esculentus* and sunflower *Helianthus annuus*. Adult GWSS were exposed to residues of insecticides coated inside glass vials and their responses were recorded 6 hours later. Mortality of GWSS was highest with the carbamate carbaryl ($LC_{50} = 0.04 \mu\text{g/vial}$) and higher for the organophosphate malathion ($LC_{50} = 0.09 \mu\text{g/vial}$) than either the pyrethroid cypermethrin ($LC_{50} = 0.14 \mu\text{g/vial}$) or the cyclodiene endosulfan ($LC_{50} = 0.14 \mu\text{g/vial}$). Diagnostic concentrations needed to separate susceptible genotypes from resistant individuals were determined using the LC_{99} and these values were used to monitor for resistance in GWSS. The seasonal patterns of response to insecticides in field collected GWSS indicated that resistance to malathion is evolving in GWSS populations from North Florida. The results validate use of the glass vial bioassay to monitor for resistance in GWSS and provide the basis for the development of a resistance management strategy designed to extend the efficacy of all classes of insecticides used for control of GWSS.

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Subsurface Soil Application of Dry Poultry Litter: A Novel Nutrient Management Technology.

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The Delmarva Peninsula, a major poultry production area, provides income for many small family farms and an abundance of poultry litter. Poultry litter provides an excellent source of cheap crop nutrients used primarily to fertilize perennial pastures and other agronomic crops. However, surface application by broadcasting on no-till croplands has created water pollution issues, due to nutrient losses in runoff. Thus, water bodies, e.g., the Chesapeake Bay, are heavily polluted. There are a variety of tools and equipment used to inject liquid manure below the soil surface with minimum disturbance. Until recently, there were no such options for dry poultry litter other than disking after applying it onto the soil surface. Researchers at UMES, USDA-ARS, and other institutions have developed a new technology (the "Subsurfer") for applying poultry litter beneath the soil surface. Benefits of this technology include increased soil water holding capacity, decreased phosphorus levels in runoff between 50 and 90%, and reduced volatilization of odorous gases. Increased agronomic production efficiency is another economic benefit of this technology, since subsurface placement of dry litter seats nutrients, e.g., nitrogen and phosphorus, closer to crop rooting zones, resulting in increased crop yields. During the 2012 growing season, yield data showed that subsurface-banded litter increased corn yield by 21% compared to the control. The other experimental treatments were surface applied litter followed by disking, and broadcast. After 2013, farmers in Maryland will no longer be able to broadcast poultry litter, thus this technology holds promise for aiding them in meeting this requirement.

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Biodiesel Production by Transestrification of Non-Edible Triglycerides. E. S. Dilworth*, and M. Gyamerah, Department of Chemical Engineering; and R. W. Griffin, and S. Woldeesenbet, Cooperative Agricultural Research Center, Prairie View A&M University, Prairie View, TX 77446.

Biodiesel consists of mono-alkyl esters of long chain fatty acids derived from animal fats and vegetable oils. Due to its similarity to diesel from fossil fuels it can be mixed in any proportions with petrodiesel. The use of biodiesel, derived from renewable materials includes *Jatropha*, sunflower, soya and corn, etc., has the following advantages as compared to petrodiesel: 1) biodegradable with lower exhaust emissions and lubricating properties, thus reducing friction, hence longer life of engines; 2) biodiesel reduces emissions of unburnt hydrocarbons; and 3) low particulate emissions which increase catalytic converter efficiency. Depletion of fossil fuels with absorbant high prices has increased interest in biodiesel production from non-edible renewable resources to aid our energy sector. The benefits include: 1) opportunity for farmers to grow more crops, especially on rough terrain with lower inputs as compared to food crops which require agronomic cultural practices; and 2) more employment for both field and factory workers. This research work focused on the use of two non-edible oils and the use of the Gas Chromatography - Mass Spectrometer (GC-MS) that enabled us to determine the composition of non-edible oils. This process separated the chemical mixtures and identified the components at their molecular level. The GC works on the principle that a mixture will separate into individual substances when heated and the heated gases are carried through a column with an inert gas. Mass spectrometry (MS) identifies compounds by the mass of the analyte molecule and uses the library of known mass spectra.

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Global Sensitivity Analysis (GSA) Applied to the Anaerobic Digestion Process. R. Domínguez-Puerto*, Unidad Profesional Interdisciplinaria de Biotecnología (UPIBI-IPN), México; T. Espinosa-Solares, Universidad Autónoma Chapingo, México; and E. Chavarria, and D. H. Huber, Department of Biology, Gus R. Douglass Institute, West Virginia State University, Institute, WV 25112.

Anaerobic digestion is a complex process that involves many steps to transform organic matter into methane. The Anaerobic Digestion Model No1 (ADM1) is a structured model that considers the main biochemical and physicochemical processes, and is formed by 36 Ordinary Differential Equations (ODE) with more than 110 parameters to represent the anaerobic digestion process. However, these characteristics make ADM1 a difficult model to handle. Therefore, the parameters with major influence in the outputs of the process need to be identified. This can be performed through a Global Sensitivity Analysis (GSA). First, the ADM1 was fitted to the thermophilic anaerobic digestion process for poultry litter in a laboratory scale digester. In addition, GSA was applied to ADM1 using Matlab® 7.14 with Simlab® 3.2 Toolbox in order to perform simulations. The nominal value of each parameter was considered with an upper and lower variation of 50%. Sobol's method was used to obtain the first and total sensitivity indices. A total of 3150 simulations were done. The results showed that the most linked parameters to these state variables are those that have the most sensitivity. For example, the parameters with major influence on methane production are K_{S_st} , K_{m_st} , K_{S_h2} and K_{m_h2} , which are the consumption rate and saturation constants for acetate oxidizers and hydrogen consumers, respectively. The GSA allowed us to identify the most important parameters in ADM1 for numerical and experimental estimations.

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Downstream Movement of Urea in Estuarine Zones of the Manokin River. B. Edje*, and E. B. May, Department of Natural Sciences, and A. L. Allen, and L. C. Kibet, Department of Agriculture, Food and Resource Sciences, University of Maryland Eastern Shore, Princess Anne, MD 21853; and A. R. Buda, and R. B. Bryant, USDA-ARS, Pasture Systems and Watershed Management Research Unit, University Park, PA 16802.

The persistence and mobility of urea, an organic form of nitrogen present in animal manures and commercial fertilizers, has rarely been studied and measured because it is assumed to undergo rapid hydrolysis to ammonia in soils. However, studies have shown urea to exist in runoff several days after manure applications. Our hypothesis is that urea will move downstream and enter estuarine zones. Urea in small amounts can trigger the diatom *Pseudo-nitzschia* spp. to produce shellfish poisoning, which is of concern in the Chesapeake Bay region. We have tracked urea in runoff from farmlands into freshwater zones within the Manokin River watershed over the past several months. Preliminary results indicate that urea levels increased in concentration following rain events of greater than 1" in 24 hours. At 16 sites in the

main stem estuarine zones of the Manokin River, additional monitoring was established to determine the degree to which urea moves into areas where *Pseudo-nitzschia* spp. should be found. At these sites, urea has been consistently detected at background or insignificant concentrations (< 90 µg nitrogen/liter) as opposed to freshwater zones. Presently, water samples taken following hurricane Sandy are being analyzed, and these samples should demonstrate a significant input of urea into the system, as Sandy resulted in rainfall of > 9" over 48 hours. The impact of this study is to track levels of urea in the Manokin River watershed to determine if problems will evolve relative to the diatom *Pseudo-nitzschia* spp. triggering shell-fish poisoning.

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Natuculture: Growth of Sedum and Grasses and Nutrient Losses from an Ecoroof. L. Hok*, C. Oakley, and M. R. Reyes, Department of Natural Resources and Environmental Design, North Carolina Agricultural and Technical State University, Greensboro, NC 27411.

Ecoroof is a name used for a green roof. It is a biologically engineered roof that provides a biologically diverse and artificial chemical free habitat. It reduces stormwater runoff, cleans rainwater polluted by industrialization, buffers temperature, and sequesters carbon. Ecoroofs mimic a forest. A study has been done at North Carolina A&T State University using four types of sedums and two grasses, and two kinds of growing media – permatil, and permatil and soil mix. Before starting the research, growing media were sampled for nutrient analysis. Water was measured and sampled from each growing media whenever a significant rain event occurred. The amount of rain was also measured, and samples of rainwater were also collected. Nitrogen and phosphorous concentrations as well as pH were measured in: rainwater, water runoff from permatil, and water runoff from the permatil and soil mix. Results show that there are no differences in the pH of water from the three samples. However, concentrations of nitrogen and phosphorous in water were highest in the permatil and soil mix, followed by permatil medium and with lowest from rainwater. Plant growth and health from the two media will also be presented. Initial visual observations indicated that plants grown in the permatil and soil medium looked healthier than the permatil medium. In addition, the design and cost of the Ecoroof built at N.C. A&T will be presented.

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Evaluation of the Impacts of Long Term Cotton Rotation on Soil Enzyme Activities and Microbial Diversity. A. Howard*, R. Shange, and R. Ankumah, Department of Agricultural and Environmental Sciences, Tuskegee University, Tuskegee, AL 36088.

An increased interest in agronomic practices and their affect on soil degradation has captured attention worldwide. Many agricultural scientists have been focusing on the most efficient farming method that would enhance crop yield. Because of the focus on intensive agronomic techniques to increase crop yield, soil ecosystems have historically been degraded all over the United States. As researchers look for sustainable alternatives, it is important to find biological and biochemical assessments that can direct the researcher to the quality of the soil ecosystem. The "Old Rotation" is the longest continuous cotton experiment testing agronomic treatments to assess impacts on soil degradation and sustainability. Soil samples were collected from the "Old Rotation" (Auburn University, Auburn, AL), and were assessed for soil biochemical, chemical and biological characteristics related to soil quality. Out of the 13 plots that constituted the experiment, soil samples were taken from 3 treatments of the experimental site; which were winter legumes, inorganic Nitrogen (N), and a 3-yr cotton-corn-soybean rotation with wheat and winter legumes in addition to a control with no legumes or N fertilizer. Assays were performed measuring phosphomonoesterases activities, soil organic matter, soil nutrients, and microbial diversity. The differences in microbial communities' structure, membership as well as chemical and biochemical activity will be reported.

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Mississippi River Basin Healthy Watershed Initiative: Bayou Meto Watershed. Y. Huang*, and E. R. Buckner. Agriculture Department, University of Arkansas at Pine Bluff, Pine Bluff, AR 71601.

The Mississippi River Basin Healthy Watershed Initiative (MRBI) is a project lead by the Natural Resources Conservation Service (NRCS) of the United States Department of Agriculture (USDA). This project focuses on implementing conservation practices and systems to improve the water quality, water quantity and wildlife habitat of the Mississippi River Basin of 13 states including Arkansas. In Arkansas,

the concentration of nitrogen in surface water runoff is one of the largest water quality concerns. These additional nutrients appeared in the runoff and in some cases drinking water, indicating large nutrient loss, primarily attributed to agricultural runoff. This poses the potential for harm to human health and decreasing agricultural productivity. Thus, in order to analyze the nutrient loading (particularly the nitrogen and phosphorous) generated from the agricultural runoff, we plan to set up automatic samplers at selected sites with strict sites selection criteria. Within the study area, we will measure the water quantity applied to agricultural fields through the rain and irrigation and the concentration of the nitrogen and phosphorous in the runoff. Through this process, we will provide suggestions for management that will help improve the agricultural productivity and water quality management by implementing appropriate best management practices.

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The Kentucky State University Campus Community Water Survey. J. Hubbard-Sánchez*, J. D. Sedlacek, B. May, and M. Silitonga, College of Agriculture, Food Science, and Sustainable Systems, Atwood Research Facility, Kentucky State University, Frankfort, KY 40601.

The Kentucky State University water survey was initiated on our campus during spring 2012 to help guide university education efforts regarding the importance of water resources. Two hundred and twelve individuals from the campus community completed the survey between April 17, 2012 and May 25, 2012. Approximately 11% were freshmen; 18% were sophomores; 11% were juniors; 8% were seniors; 9% were graduate students; 7% were KSU faculty; 33% identified themselves as KSU staff; and 3% were administrators. Additionally, 58% of the respondents were female and the 18-20 year old and 21-29 year old age groups comprised roughly 52% of all responses. Interestingly, 48% reported that their drinking water was derived from bottled water, followed by 34% claiming to drink tap water. Around 57% of respondents reported knowing the source of their drinking water. A little over 37% responded that surface water/river is the source for drinking water from the tap; while one third responded that they do not know where tap water comes from. About 40% believe they only use between three and five gallons of water per day, while 11% selected one gallon or less per day. Around 65% of all respondents claim to make attempts to conserve water and 63% recycle. Around 53% of all respondents reported knowing what happens to trash after pickup. Finally, 91% of all respondents are concerned about runoff water from the Benson Valley Landfill directly flowing into the source of their drinking water.

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Use of Rainfall Simulation to Determine Urea Persistence and Mobility in a Coastal Plain Soil.

L. C. Kibet*, A. L. Allen, and F. M. Hashem, Department of Agriculture, Food and Resource Sciences, and E. B. May, Department of Natural Sciences, University of Maryland Eastern Shore, Princess Anne, MD 21853; and R. B. Bryant, P. J. Kleinman, and A. R. Buda, Pasture Systems and Watershed Management Research Unit, USDA-ARS, University Park, PA 16802.

The persistence and mobility of urea in animal manures and commercial fertilizers has rarely been studied because it is assumed to undergo rapid hydrolysis to ammonia in soils. However, studies have shown urea to exist in runoff several days after manure applications. Urea in small amounts can trigger the diatom *Pseudo-nitzschia* spp. to produce domoic acid, the toxin that causes amnesic shellfish poisoning in humans. Our hypothesis is that urea in soils amended with manures and commercial urea fertilizers can persist long enough to be transported in runoff to surface waters. A rainfall simulation runoff experiment was performed; treatments included urea prill, super urea, poultry litter surface applied and incorporated broiler manure, dairy manure, and a control. In the first rainfall simulation, super urea yielded the highest urea-N runoff rate and showed a consistent slow decline over subsequent events. Poultry litter and urea prill both had a high urea-N runoff rate during the first rainfall simulation; however runoff rates were substantially lower in subsequent rainfall events. The urea-N runoff rate from the dairy manure treatment was intermediate during the first rainfall event, and slowly declined over subsequent rainfall events. Broiler manure and poultry litter incorporated had the lowest urea-N runoff rates in the first event, and were similar to the control. Quantitative information on fertilizer forms and time after application on the amounts of urea found in runoff will be used to identify practices that have the potential to minimize urea losses to surface water.

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Natuculture: Experiential Learning System. M. R. Reyes, L. N. Kieu*, L. Hok, D. I. A. Edralin, and M. Williams, North Carolina Agricultural and Technical State University, Greensboro, NC 27411.

Natuculture is any human made system that mimics nature in human disturbed landscapes, it is making the unnatural natural, and it is biomimicry in urban landscapes. Natuculture experiential learning systems (NELS) are being established at North Carolina Agricultural and Technical State University and several high school campuses. We will present the scientific studies we are conducting, examples of which are in several posters in this meeting. Furthermore, we will relate how NELS is being used to experientially teach agriculture as the science, technology, engineering and math of human survival. A poster will show collaborative projects conducted by graduate, undergraduate and high school students with supervision from N.C. A&T faculty and high school faculty in partnership with USDA and the North Carolina Cooperative Extension Service. Partnership with art, engineering, English and agriculture faculty will also be shown. Lastly, NELS's potential to recruit high school students to major in agriculture and participate in the high school research apprentice program in agriculture will be demonstrated as well.

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Using *Escherichia coli* and Newly Identified Ecological Indicators to Assess the Impacts of Land Users on Stream Water Quality. J. M. Lester*, G. Zheng, B. Hua, and J. Yang, Department of Agriculture and Environmental Science, Lincoln University of Missouri, Jefferson City, MO 65010.

This study aims to understand the impacts of land uses on stream water quality at the watershed scale and to develop a novel microbial/genetic tool for assessing the impacts. The densities of various microorganisms, including *Escherichia coli*, and selected functional genes associated with nitrogen cycling were analyzed for their links to different land uses and anthropogenic activities. The conventional polymerase chain reaction (PCR), quantitative PCR, and EPA-approved culture enumeration were used as the primary methodology for the analyses. Linear relationships between concentrations of the in-stream ecological indicators (functional genes and microbial indicators) and the land uses (forestland, cropland, grassland, urban and suburban) are explored for the Hinkson Creek watershed of Mid-Missouri. The preliminary result indicates that in-stream *E. coli* concentration is indicative for anthropogenic activity and that certain functional genes and microorganisms may be useful for measuring and tracking the impacts of land use on stream water quality.

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Impact of a Fish Protein Based Organic Amendment on Soil Enzyme Activity and Microbial Community. L. Lindsey*, D. D. Mortley, R. Shange, and R. Ankumah, Department of Agricultural and Environmental Sciences, Tuskegee University, Tuskegee, AL 36088.

Agriculture practices impact many important properties of soil ecosystems such as soil pH, organic carbon, and bacterial community structure and function. Organic farming has become an attractive alternative due to the increased public awareness of the negative environmental impacts that conventional farming has along with food safety. However, small organic farming's impact on the environment, specifically, the soil bacterial habitat has not been studied. Soil bacterial communities are functionally critical as they provide the enzymes essential for nutrients recycling, plant growth, and matter decomposition. The purpose of this study is to evaluate the impact of poultry litter, megabloom (fish protein), and convention (NPK) fertilizer on soil bacterial community structure and function. The field study will use four varieties of sweetpotato: J66 (white flesh), NCC-58 (orange flesh), BH (purple flesh), and Watley Lauret (orange flesh) which will be grown for 120 days. Experiments were conducted as a randomized complete block design with four blocks and four treatments with three replications totaling 48 plants per replication. Organic amendments and conventional fertilizer were split applied at the rate of 54.7305 kilogram/acre (kg/ac) based on soil tests one week after planting and at four weeks as single bands 15cm from the plant and covered. Bulk soil samples will be collected at 14 weeks and at harvest. Rhizosphere samples of sweetpotato plants will also be taken at harvest. Soil parameters including pH, phosphatase enzyme activity, organic carbon, total nitrogen content, bacterial community structure. Results of these measurements will be presented.

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Evaluation of Long-Term Impacts of Herbicide Use on Forest Soil Bacterial Community.

C. McKoy*, R. Shange, R. Ankumah, L. Githinji, and R. Smith, Department of Agricultural and Environmental Sciences, Tuskegee University, Tuskegee, AL 36088.

Herbicides are widely used in agriculture as a silvicultural technique to achieve greater productivity by improving and increasing forest stands. Though the use of herbicides is effective in agricultural practices, there are many concerns about the long-term environmental effects of using such chemicals in a forest habitat. The study was conducted to assess the impacts of herbicides on soil microbial communities and their accompanying activities. Soil samples were obtained from the Escambia Experimental Forest, located in Brewton, AL, under a total of three herbicide treatments including Hexazonine [ULW], Triclopyr [Garlon XRT], Imazapyr [Chopper EC] and two fertilizer regimes (+NPK - NPK) under a randomized complete block design. Soil samples were assessed for phosphodiesterase [PD] and phosphomonoesterases [PM] [acid and alkaline] activity, as well as soil chemical parameters (soil carbon content, total nitrogen, phosphorous, and soil pH). In the assessment of PM (alkaline) the only significant difference amongst herbicides was triclopyr having greater activity than Imazapyr. A significant difference was observed between fertilized and unfertilized plots for PD and PM (acid). Also, enzyme activity was observed as being higher in soils where no fertilizer has been applied compared to soil containing no fertilizer treatment. Impacts on soil bacterial communities will also be reported.

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Testing the Effects of Carbohydrate Perturbations on the Stability of Thermophilic Anaerobic Digestion.

N. Montenegro*, and D. H. Huber, Department of Biology, Gus R. Douglass Institute, West Virginia State University, Institute, WV 25112.

Anaerobic digestion is a widely used bioenergy technology worldwide. WVSU operates a pilot-scale thermophilic digester that has been stabilized on poultry litter that contains plant biomass as well as animal waste. Previous studies have found that the digester metagenome contains a diverse suite of carbohydrate-active enzymes. We tested whether a modest carbohydrate (glucose) pulse, which represents a major component of plant biomass, would affect the metabolic stability of the system. Three replicate 10-liter stable thermophilic digesters were fed 25,000 mg/L COD poultry litter. Each bioreactor was subjected to a single glucose pulse perturbation. Immediately after the disturbance, total volatile acids decreased in each bioreactor while the pH increased. However, after day 240, volatile acids (VA) began to accumulate, methane percentage dropped precipitously, and pH decreased, indicating system inhibition. A Principal Component Analysis with two components was able to explain 82.86% of the variability. PC1 explained 69.98% with pH as the variable; PC2 explained 12.88% with VA, CH₄, and COD-removed as variables. Therefore, the glucose perturbation in the digesters caused long-term instability in terms of pH, VA, CODr, and bioenergy. In spite of prior adaptation to a complex substrate containing carbohydrates, and a diverse metagenome, the glucose pulse disturbance induced a slow progressive instability in the system and dramatically reduced bioenergy production.

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Assessing the Expansion and Impact of the Common Reed *Phragmites australis* on Blue Crab (*Callinectes sapidus*) Population of Blackbird Creek, Delaware.

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Blue crab (*Callinectes sapidus*) is a very distinctive and commercially important species found throughout the Delaware and Chesapeake bays. *C. sapidus* is known to utilize different habitats throughout the duration of its life, including benthic areas and various tidal marsh locales. Blackbird Creek, located in northern Delaware, is characterized by extensive salt marshes and large native populations of the saltmarsh cordgrass (*Spartina alterniflora*). Blue crabs along with various other species, flourish in salt marsh environments where leaves, roots, and stems of native plants provide much needed sources of food and shelter from a number of predators. The study location has lost biodiversity over the past several decades due largely to invasion of the common reed (*Phragmites australis*). This study aims to evaluate impact *P. australis* has on habitat quality using the blue crab as an indicator species. Sites for sampling were selected based on the relative abundance of *Phragmites*. Otter trawl and crab traps were used biweekly at all

locations from May through November and the sex, carapace width (CW) including tips of lateral spines (mm), maturity stage (mature, pre-pubertal, juvenile), and molt stage were measured. Average CW from *Spartina*, *Phragmites*, and intermediate *Phragmites* invasion sites were 111, 111.53 and 125 cm, respectively. The total number of crabs caught at *Spartina*, *Phragmites*, and mixed sites were 38, 66, and 16 individuals, respectively. 58%, 65%, and 43% of the crabs from *Spartina*, *Phragmites*, and intermediate *Phragmites* invasion sites were female.

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The Impact of Cyanide Treatment on Soil Microbial Community Composition and Function. M.

Scott*, R. Shange, and R. O. Ankumah, Department of Agricultural and Environmental Sciences, Tuskegee University, Tuskegee, AL 36088; and Y. Maiga, International Institute of Engineering and the Environment, Ouagadougou, Burkina Faso.

Cyanide was first introduced commercially over a century ago, and since has been used or produced in many industries including metal plating, gold mining, gas production, and pharmaceutical production. In the USA 10 million tons of road salt representing an environmental input of 700 tons of iron cyanide are used each year. The known problem with cyanide is that it poses a threat to both human and environmental health. Studies have shown that some of the environmental risks of cyanide are related to its release from mining and finishing facilities into soil environments. The objective of this study is to evaluate the effect of cyanide treatment on soil microbial community composition and soil function. A microcosm study was performed in which replicate soil microcosms were treated with 2 different cyanide compounds, and then subjected to phosphodiesterase enzyme assays and 16S rRNA gene studies. Sequencing and bioinformatic analysis of soil DNA qualified the presence of unique communities in soils treated with cyanide, signifying the survival of microbial populations. Phosphatase enzyme activity displayed significant differences between the control and the treated cyanide soil samples. Further study will reveal the identities of potential bioremediators in the surviving microbial communities, as their metabolic/survival strategies will also be of interest.

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Carbon Dioxide Fluxes in a Forest Soil in the Citronella Oil Field, South Alabama. L. T. Staley*, and

E. Z. Nyakatawa, Department of Biological and Environmental Sciences, Alabama A&M University, Normal, AL 35762; and L. J. Lyte, US-Forest Service, Wayne National Forest, Nelsonville, OH 45764.

Anthropogenic greenhouse effect is the enhancement of earth's natural greenhouse effect by the addition of greenhouse gases from the burning of fossil fuels. This rising atmospheric concentration of gases, mainly carbon dioxide (CO₂), methane (CH₄), nitrous oxide (N₂O) and water vapor results in global warming which can negatively impact the environment. Carbon sequestration in terrestrial sinks such as forest soil ecosystems presents an opportunity to mitigate global warming. The state of Alabama is endowed with a wealth of potential geological CO₂ sinks which presents an opportunity to sequester C in underground geological formations using CO₂ enhanced oil recovery (EOR). The objectives of this study are to measure and document soil CO₂ fluxes in a forest soil around oil wells in the Citronella Oil Field in South Alabama before and after CO₂ injection for EOR and relate them to soil chemical and hydrological properties. Soil gas samples were collected using static PVC chambers and analyzed for CO₂ concentration using a Varian GC equipped with an FID coupled to a methanizer. The results indicated higher carbon dioxide fluxes in the warmer months, which had a mean of 0.95 mg CO₂ m⁻² min⁻¹ and lower in the cooler months which had a mean of -0.06 mg CO₂ m⁻² min⁻¹. Our study shows that soil CO₂ fluxes were generally influenced by soil temperatures and moisture content during gas sampling periods, with variation from well to well.

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Establishment of *Paulownia elongata* as a Potential Forage Crop. W. M. Stewart*, T. H. Terrill, A. K.

Mahapatra, and N. Joshee, Agricultural Research Station, Fort Valley State University, Fort Valley, GA 31030.

Paulownia genus is a group of fast growing trees that grow well in the southern United States. They have potential as a source of bioenergy and also as a feed for livestock. We carried out research to evaluate the possible use of *Paulownia* leaves as a source of forage for livestock. Leaves of *P. elongata* were collected each month (April to November 2012) from a five-acre *Paulownia* demonstration plot at Fort Valley State University in Fort Valley, GA. The leaves were dried at 50°C in a hot air oven, ground to

1 mm particle size, and analyzed for neutral detergent fiber (NDF), acid detergent fiber (ADF), acid detergent lignin (ADL), dry matter and ash content. The NDF, ADF, ADL, dry matter and ash content ranged from 29-55%, 18-42%, 18-42%, 92-97%, and 6-9%, respectively, for dried *P. elongata*, indicating that *Paulownia* leaves have potential as feed resource for livestock.

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Green Report Card of an HBCU Campus: Assessment of Sustainability Practices and Campus Initiatives. B. Talley*, and B. Herbert, Department of Community and Regional Planning, College of Agricultural, Life and Natural Sciences, Alabama A&M University, Normal, AL 35762.

Higher educational institutions, as major players in sustainability arena, are being challenged to strengthen their roles and responsibility as innovators, problem-solvers and societal leaders. They generate knowledge and shape social and scientific paradigms that influence everyday life and are well positioned to transcend disciplinary boundaries and influence development at the local, regional and global scales. The current challenge of making progress towards these ideals poses a great opportunity for Alabama A&M University (AAMU). As a land grant university focused on practical agriculture, science and engineering, AAMU must be committed to embedding sustainability principles and practices as a fundamental bases of its mission. The purpose of this study is to evaluate and document the current status of the sustainability movement at AAMU, one of the largest HBCU's in Alabama. Located within the second fastest growing metropolitan regions of the State where the sustainability dialogue is in high gear, the University is at a critical juncture in which it has now to examine its own operations. To be truly engaged as a powerful player in this arena, the institution needs to turn the lens internally to critically determine its direction. The end product will be a framework with the key elements for a long-term sustainability master plan for the campus which would guide development of the institution as it moves forward towards a future promoting sustainable stewardship of resources based on a commitment to the environment, economic health and quality of life of its community.

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Factors that Affect the Willingness to Pay for Biogas in Burkina Faso. M. T. Traore*, and E. Kebede, Department of Agricultural and Environmental Sciences, Tuskegee University, Tuskegee, AL 36088.

Energy plays a critical role in the development process, not only as a domestic necessity but also as a factor that affects cost of other goods and services and household wellbeing. Energy supply is a major challenge and wood energy accounts for more than 80% of the energy used in Africa. Burkina Faso is one of countries in West Africa where wood remains the most preferred energy source for cooking and household use. Wood energy leads to the loss of forest cover and health problem associated with indoor pollution. The Burkina Faso government has developed a Biogas Program to introduce biodigester and encourage the use and the production of biogas from animal manure and other waste to meet the household energy demand of the various communities. Community participation is one of the major elements of the Program and the success rests on the strength of community participation. The purpose of this study was to assess households' willingness to pay for biogas. The region with the largest size of animal production was selected for this study and data was collected from 118 households in the region. A contingent valuation method was used to estimate the demand function. The regression result showed that level of income, education and the average cooking time positively and significantly affects willingness to pay. In the short run community members with a higher education and income level are the probable participants.

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Effects of Crawfish Waste Amendments in Compacted Urban Soils on Sunflower Plants. L. Wells*, and Y. Ghebreyessus, Southern University Agricultural Research and Extension Center, Baton Rouge, LA 70813.

Urban areas are considered the fastest growing land use and tend to have highly compacted soils. Crawfish production is major source of income for many Louisiana small farmers, but only 15% of the crawfish is consumed and the rest is dumped in bayous, rivers, and swamps, polluting the environment. This study evaluated the effect of soil compaction and crawfish waste meal on growth of sunflower plants. The compaction treatments were control (no compaction), 1.3 g/cm³ and 1.5 g/cm³ bulk density. The crawfish soil amendment was used at three different levels: 0, 1 and 3 tons/hectare, respectively. Sunflower seeds were planted in thirty-six pots made of PVC piping (25 cm in height and 15 cm diameter). Preliminary results indicate that 70% of seeds germinated in low compacted soil and soil with low crawfish

waste amendment. The highest average plant height of 92 cm was found in high compacted soil and in soil with high crawfish waste amendment. High compacted soil and soil with high crawfish waste amendment displayed the highest chlorophyll content averages over all the other treatments at 75 cm. The average plant height for the treatment with no compaction-no crawfish waste was lower at 52 cm than all treatments with the exception of low compaction-high crawfish waste at 50.0 cm. Additional measurements will be taken of shoot diameter as well as root, shoot, and leaf dry weights.

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Natuculture: The Benefits of Practicing Conservation Agriculture in Urban Landscapes.

M. Williams*, D. I. A. Edralin, O. Yeboah, and M. R. Reyes, North Carolina Agricultural and Technical State University, Greensboro, NC 27411.

In the United States, almost every house has a lawn of about 8,712 square feet costing on the average \$780 a year to maintain. Other than its aesthetic value, lawns do not benefit the households in terms of food security and income. Instead it becomes a sink of resources. Practicing conservation agriculture in urban areas offers food for the family without undermining the perceived aesthetics. A lawn was converted into a conservation agriculture experiment to see the savings and benefits that the family could get from converting part of their lawn to conservation agriculture plots. To measure the aesthetic value of a lawn, a random sampling of surveys will be distributed to the target population. The results of this experiment will show the amount of money invested per square foot of turf lawn and the benefits that one could get from converting parts of the lawn to conservation agriculture plots. Benefits such as the amount of money saved from buying vegetables outside will be shown. In addition, estimates of environmental benefits due to non-use of lawn chemicals will be provided as well. Furthermore, we will investigate the profitability of a landscaping business that builds and maintains urban conservation agriculture vegetable production systems for homeowners.

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Mineral Properties and Arbuscular Mycorrhizal Infectivity of Soils Associated with Appalachian Ramp and Black Cohosh Populations. H. Wynn*, School of Agriculture and Human Ecology, Virginia State University, Petersburg, VA 23806; L. K. Rutto, and S. Ren, Agriculture Research Station, Virginia State University, Petersburg, VA 23806; and J. Chamberlain, USDA Forest Service, Southern Research Station, Blacksburg, VA 24060.

Plants exist in beneficial associations with a diversity of endophytic fungi and bacteria. Among such symbiotic relationships, the association between a majority of vascular plants and mycorrhizal fungi has been extensively studied and reported to be essential for the mobilization of phosphorus and other immobile elements like copper and zinc. The symbiosis plays a critical role in growth and survival during periods of biotic or abiotic stress, and among plant species adapted to niche growth environments. Ramps (*Allium tricoccum*) and black cohosh (*Actaea racemosa*), among species found growing in the understory of Appalachian forests, are such species. In this study, mineral properties and arbuscular mycorrhizal (AM) infectivity of Appalachian forest soils associated with the two species was evaluated. Black cohosh soils obtained from Jefferson National Forest in Wytheville, VA and ramp soils from Waynesville, NC were analyzed to determine chemical and mineral properties. Further, trap cultures using corn (*Zea mays*), soybean (*Glycine max*), leek (*Allium porrum*), and tomato (*Lycopersicon esculentum*) as trap plants were established to determine AM infectivity. Soil properties within the two Appalachian sites were similar with high organic matter and trace element content. There was low infectivity (20-30%) among trap culture plants irrespective of soil sampling time suggesting a certain degree of host specificity in AM species colonizing target ramp and black cohosh populations. Arrangements are being made to identify the AM isolates using molecular tools.

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Characterization of Slow Pyrolysis Bio-Oil from Different Organic Wastes. P. Xiao*, Department of Agriculture and Natural Resources, Delaware State University, Dover, DE 19901.

A major product from pyrolysis of vegetative biomass is bio-oil, a renewable liquid fuel alternative to fossil petroleum. To develop efficient techniques for refining and upgrading pyrolysis bio-oil to a quality fuel, the chemical and energy characteristics of the material need to be known. However, pyrolysis bio-oils from different organic feedstocks demonstrate varied physical properties, chemical composition, and latent energy. In this study, agricultural byproducts including crop residues (corn stover),

animal manure (poultry litter), and forest debris (waste wood) were converted to bio-oil through slow pyrolysis at 300-500°C. The bio-oils were extensively characterized for various characteristics such as yield, color, particulate content, moisture content, ash content, organic carbon content, acidity, viscosity, density, stability, and heating value. Primary results show that typical yields of bio-oil from corn stover, poultry litter, and waste wood were 45%, 30%, and 40% of the feedstock biomass, respectively. The pyrolysis bio-oils from the tested organic residues presented similar chemical and fuel characteristics, with pH 2-2.5, ash content 0.05-0.10%, moisture content 30-50%, organic carbon content 50-55%, and heating value 15-20MJ/kg. The results provide a base for further upgrading crude pyrolysis bio-oil to an utilizable quality fuel.

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Design and Development of a Field Applicable Gold Nanosensor for the Detection of Luteinizing Hormone in Sheep. Z. Afrasiabi*, Department of Life and Physical Sciences, Lincoln University, Jefferson City, MO 65101; A. Zambre, and R. Kannan, Department of Radiology, University of Missouri, Columbia, MO 65212; S. Prayaga, Antibody Research Corporation, St. Charles, MO 63304; and A. Upendran, Nanoparticle BioChem. Inc., Columbia, MO 65211.

In the present study, we describe a novel strategy for the fabrication of a nanosensor for detecting luteinizing hormone (LH) of sheep using a gold nanoparticle-peptide conjugate. A new peptide sequence has been identified to detect antibody of LH (sheep). The peptide has been synthesized, characterized and its affinity towards anti-LH was established using ELISA techniques. Detailed physicochemical analysis of gold nanoparticle-peptide construct was determined using various analytical techniques. Nanosensor using gold nanoparticle-peptide (AuNP-LHP) conjugate was developed based on competitive binding of AuNP-LHP and LH towards anti-LH. The AuNP-LHP based nanosensor will be a simple, portable, effective and low cost technique for infield applications.

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Use of Meat Goats to Control Undesirable Plants in Hill Side Pastures. K. M. Andries*, T. Hutchens, K. Bates, B. Gyawali, M.E. Evans, and T. A. Gipson, College of Agriculture, Food Science, and Sustainable Systems, Kentucky State University, Frankfort KY 40601; Cooperative Extension Service Carter Co., University of Kentucky, Grayson KY 41143; and Langston University, Langston, OK 73050.

Pasture weed control is complicated by the steep hill side topography found in many areas of Kentucky. Meat goats (*Capra hircus*) have been considered as one possible alternative to mechanical or chemical control in these pasture situations. A study was conducted in Carter Co., KY to determine the impact of meat goats on undesirable plant species. The major target species were blackberry brambles (*Rubus fruticosus*). Five areas were identified to measure plant population and canopy density. Plant species in the upper, middle, and lower canopy were measured every 13 cm for a distance of 240 m. Plant measurements were collected at the start, middle, and end of the grazing season for three years. Bramble population in the upper and middle canopy decreased during the study while brambles in the lower canopy increased during the second year but decreased in the third year. Grass in the middle and lower canopy increased during the grazing season and had an overall increase during the study. In 2011, a group of goats were fitted with GPS collars for 4 days to determine the time spent in different activities and locations during the day. The goats spent the majority of their time in over night locations (53.54%) and 9.63% of the day time in resting or rumination locations. They spent 32.05% of their time grazing during the 4 days of GPS collar use. Of that time they spend 19.88% of their time on western exposure slopes and 12.17% on eastern exposure locations.

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Sensory Evaluation of Dark and White Meat from Broilers Fed Different Levels of Sweet Potato Root Meal. J. R. Bartlett*, R. C. Beckford, V. A. Khan, N. L. Dawkins, and E. G. Rhoden, Department of Agricultural and Environmental Sciences, Tuskegee University, Tuskegee, AL 36088.

This study evaluated the effect of a partial replacement of corn in the diet of broilers with sweet potato root meal (SPRM) on consumers' sensory perception of the meat. Birds were fed the following diets; (diets A = 0%; B = 10%; C = 20%; and D = 30% SPRM) for 49 days and slaughtered on day 50. Dark meat and white meat from each treatment were collected for the sensory tests. Meat samples were cooked in a convection oven at 166.67°C. Juiciness, tenderness, flavor, and acceptability were evaluated based on a 9-point hedonic scale. Sensory attributes of dark meat were not significantly affected by income, gender, and

educational level of respondents. However, respondents, >70 years old rated the flavor significantly lower in the control. For white meat, those earning <\$10,000 found meat from diet C to be less juicy. Males found no differences in tenderness, flavor, and acceptability of white meat among diets; however, they found meat from diet C to be less juicy. Females found diet C to be less acceptable. Educational level had no effect on the tenderness, juiciness, and acceptability of white meat among diets, however, those in 'some college' and college degree' categories rated diet C as less juicy. Respondents in the <18 and 18 – 29 age group rated white meat from diet C to be less tender and juicy. Addition of SPRM up to 30% did not alter consumer acceptance. Therefore, SPRM could serve as an alternative to corn in the diet of broilers.

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Nutritional Analysis of Leaves and Stems of Four Sweet Potato Cultivars as a Potential Source of Livestock Feed. R. C. Beckford*, G. N. Gaymon, J. R. Bartlett, and V. A. Khan, Department of Agriculture and Environmental Science, Tuskegee University, Tuskegee AL 36088.

Sweet potatoes (*Ipomoea batatas* L.) are grown for their storage roots while the above ground biomass is incorporated into the soil as green manure. This biomass represents a potential source of livestock feed. Therefore, the objective of this study was to evaluate the nutritive value of the leaves and vines of "Carver", "Whatley – Loretan", "Georgia-Jet", and "TU-1892" sweet potatoes as an alternative feed source. Vines and leaves of the cultivars were analyzed for dry matter (DM), acid (ADF) and neutral detergent fiber (NDF), crude protein (CP), digestible protein (DP), total digestible nutrients (TDN) and minerals. The ADF and NDF values were used to determine digestible dry matter (DDM), dry matter intake (DMI), relative feed value (RFV) and relative feed quality (RFQ). Results indicated that there were no significant difference in DM between leaves and stems. However, there were significant differences among cultivars with "Carver" having the highest leaf and stem DM. The ADF, NDF, CP, and DP were significantly greater in the leaves compared to the stems for all cultivars. There were no significant differences for TDN in the stems versus the leaves. There were significant differences between leaves and stems, for minerals. The calculated DDM, DMI, RFV and RFQ values were comparable to or exceeded the standards established by American Forage and Grassland Council, National Alfalfa Hay Testing and the National Hay Associations. Based on the results, it can be concluded that the nutrient values of sweet potato leaves and vines can meet the nutritional need as livestock feed.

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Evaluation of Forage Yield and Quality in Mixed Cattle and Goats Grazing Practices. Y. Ghebreyessus*, S. Gebrelul, M. Berhane, R. Payne, and R. Marshal, Southern University Ag Center, Baton Rouge, LA 70813.

Eighty Spanish goats and 28 Brangus cows were randomly assigned to continuous or rotational grazing systems, and three grazing schemes (goats-alone, cattle-alone and goats mixed with cattle) in a 2 x 3 factorial arrangement of treatments. A forage field of 31 ha of Bermuda grass was divided into six pastures, 8 ha each (continuous and rotational) for mixed-species grazing, 2 ha each for goats-alone grazing and 5.5 ha each for cattle-alone grazing. The rotational pastures were further divided into four paddocks and each paddock was grazed for 7d and allowed to rest for 21d. Animals were stocked at 0.8 ha/AU. Available forage yield range was 756 to 2,394 kg/ha in June and April, respectively, while forage available for consumption ranged from 253 to 841 kg/ha for the same period. There was no difference in available forage between cattle-alone and goats mixed with cattle, indicating that the presence of goats did not negatively affect the potentially available forage. However, consumption per cow was higher in cattle-alone treatment. Goat consumption was the lowest despite the highest available forage. Crude protein content ranged from 8.9 to 11.8%. Acid detergent fiber and NDF values ranged from 31.9% to 39.1%, and 47.1 to 62.2%, respectively. None of the forage quality measures were affected due to the effects of months, years, grazing species, grazing systems or interactions. Results demonstrated that goats could graze with cattle without having negative effects on cattle performance.

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GIS Grid Analysis of Utilization of Adjacent Pastures by Two Herds of Goats. T. A. Gipson*, and S. P. Hart, American Institute for Goat Research, Langston University, Langston, OK 73050; and R. Heinemann, Kiamichi Forestry Research Station, Oklahoma State University, Idabel, OK 74745.

A 15.8-ha pasture was stocked with 36 Spanish goats and 12 Angus cows (GC), and a 14.1-ha pasture was stocked with 36 Spanish goats without cattle (GO) to observe spatial patterns. The pastures

consisted of fescue, bermudagrass, various *Panicum* such as switchgrass, bahiagrass, and broomsedge bluestem, but areas were reverting to woody plant species such as sapling-sized trees of pecan, elm, and honey locust. GPS collars used recorded a fix every 5 minutes in the first 2 weeks. A GIS point-in-polygon analysis using a 10 × 10 m grid was conducted for each pasture. The GO had greater explored space compared with GC. Of the grids explored, GO had a higher percentage with a density of 100 or more fixes than did GC, indicating a wider area of methodical exploration or habituation. Goats in GO preferred pasture locations closer to the water point than did GC; however, GC came to the water point earlier than did GO. The favored location in the morning for each pasture was near the water point in the eastern intersection of the pastures. During the remainder of the day GC favored the southwestern-most corner of their pasture near a central fence line. In the afternoon, GO preferred the location near GC but also had a favorite location shaded by trees in the center of the pasture. The spatial behavior of the groups of goats appeared to be influenced by each other, and presence of cattle may have inhibited GC from fully exploring their pasture.

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Different Supplement Treatments for Lactating Meat Goat Does Grazing Grass -Forb Pastures. A. L. Goetsch*, G. D. Detweiler, Z. Wang, J. Hayes, K. Tesfai, and T. A. Gipson, American Institute for Goat Research, Langston University, Langston, OK 73050.

Lactating meat goats grazing 0.4-ha grass/forb pastures were used to determine effects on performance of different supplement treatments. Boer does with one or two kids were used in a study with four 4-week periods starting 22 days after birth. Treatments were no supplementation, access to a 20% protein supplement block, and placement in a supplement pasture with mimosa (*Albizia julibrissin*) trees for 6 hours 1 day/week or twice weekly for 3 hours/day. Forage mass was high and forage samples averaged 15% protein. Treatment did not affect doe average daily gain (ADG), although that by kids in the first three periods differed between type of supplement and frequency of supplement pasture access. Spanish does nursing two kids were used in a study with three 4-week periods starting 66 days after kidding. Access to supplement pastures was for 24 hours 1 day/week or 2 days for 6 hours/day. Forage mass was relatively low (i.e., 750 to 1,530 kg/ha) and, thus, grass hay was supplemented. Forage composition was similar to earlier levels. Kid ADG in periods 1 and 2 was not affected by treatment. Doe ADG was increased by supplementation and greater with access to mimosa trees than the supplement block, which resulted from effects in period 3 after weaning rather than earlier. In conclusion, use of the supplement block was not beneficial, and infrequent access to supplement pastures had relatively small effects on average daily gain, perhaps because forage availability and nutritive value were not severely limiting.

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Efficacy of a Bovine Colostrum Replacement Product for Goat Kids. S. Hart*, American Institute for Goat Research, Langston University, Langston, OK 73050; S. Genova, Boren Veterinary Teaching Hospital, Oklahoma State University, Stillwater, OK 74078; D. M. Haines, Department of Veterinary Microbiology, Western College of Veterinary Medicine and The Saskatoon Colostrum Co., Saskatoon, Saskatchewan, Canada; and B. Bah, American Institute for Goat Research, Langston University, Langston, OK 73050.

When adequate doe colostrum is not available for neonatal goat kids an alternative source of colostrum is necessary. The objective of this study was to determine the efficacy of a commercially available bovine colostrum replacement product (Land O'Lakes Colostrum Replacement manufactured by The Saskatoon Colostrum Co., Ltd., Saskatoon, Canada) in neonatal goat kids. Goat kids were removed from the doe at birth and a jugular blood sample taken for analysis of serum IgG. The colostrum replacement was reconstituted with water. Kids were fed reconstituted colostrum replacement at 10% of their body weight divided into three feedings over a 16-hour period. Six hours after the last feeding another blood sample was collected for determination of serum IgG. Kids were observed for 10 minutes after each feeding for any adverse reactions. After the three feedings of colostrum kids were fed a milk replacer and offered starter feed. Health and weight gains were compared to other kids fed heat-treated goat colostrum up to 3 weeks of age. Postfeeding level of IgG was much greater than prefeeding, and the level post-feeding was the same for both colostrum treatments. There were no cases of scours or off-feed conditions. Weight gain was similar for both treatments as well. In conclusion, the bovine colostrum substitute resulted in satisfactory blood levels of IgG and kids that with similar weight gains were equally healthy to cohorts.

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Evaluation of Burnt Corn Gluten Meal in Layers Diets. S. Manuel*, C. V. Chisley, R. Marshall, G. S. Simon, C. R. Walker, and S. Gebrelul, Southern University Agricultural Research and Extension Center, Baton Rouge, LA 70813.

Finding and utilizing low cost feed and fertilizers is important to sustainable farm production operations. In Louisiana, feed and fertilizer are the two top costs of agricultural production. The use of burnt corn gluten meal (BCGM) could be a low cost alternative for sustainable farmers in Louisiana and the Southern Region. BCGM is the end product of corn gluten meal (CGM) that catches on fire as it is transported in barges from the Midwest down the Mississippi River to the Port of New Orleans for shipment to Europe. The protein range of 20-25% is common. BCGM can cost from \$0 to \$8/ton. An ongoing poultry research trial is assessing BCGM in layers' diets at Southern University Poultry Farm. A total of 92 pullets beginning at 18 weeks of age were randomly allocated to two experimental diet groups. The experiment was replicated twice. The experimental groups were (1) corn-soybean basal diet (Control) and (2) BCGM. The control group was fed a 100% ration of the commercial diet. The BCGM diet group was fed an experimental diet containing 94% of the commercial diet and 6% BCGM. Preliminary results have shown that the number of eggs produced and egg weights were the highest in the BCGM diet. The results show that BCGM is a viable alternative protein supplement for laying hens. Future studies include cost analysis and sensory evaluations of eggs.

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Effects of Level and Length of Supplementation on Body Weight and Harvest Characteristics of Yearling Boer and Spanish Wethers. R. C. Merkel*, T. A. Gipson, Z. Wang, and A. L. Goetsch, American Institute for Goat Research, Langston University, Langston, OK 73050.

Yearling Spanish and Boer wethers were used to determine effects of level and length of supplementation on body weight and harvest characteristics. The experiment started in January, with wethers residing in four pastures primarily with warm season grasses. Alfalfa hay was given as free-choice and a pelleted diet was supplemented at 0.5 or 1.5% of body weight. Wethers were harvested at the beginning of the study and after 110 and 218 days. Live and carcass weight were greater initially for Boer than for Spanish wethers. Average daily gain was greater for Boer vs. Spanish wethers in the first part of the study but was similar thereafter. Body weight was greater with the high than low level of supplementation, as was also true for weight of the carcass and noncarcass components. Digestive tract and mass relative to empty body weight were similar between breeds. Liver mass was lower for the high vs. low level of supplementation and less at the end of period 2 than 1. Mass of internal fat was increased by the high level of supplementation in period 2 but not period 1. In summary, advantages of Boer in body weight and carcass weight were similar after periods 1 and 2, breed had little effect on noncarcass components relative to empty body weight, and a long feeding period was required for effect of the high level of supplementation on mass of internal fat.

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Changes in Small, Medium and Large Follicle Numbers in Response to Co-Synch and Select-Synch Synchronization Treatments in Dairy Goats. L. C. Nuti*, D. Washington, C. Palmer, K. Baker, S. Schuman, and G. R. Newton, International Goat Research Center, College of Agriculture and Human Sciences, Prairie View A&M University, Prairie View, TX 77446.

Our objective was to evaluate the effects of short-term progesterone treatment with prostaglandin F2alpha (PGF) and gonadotropin-releasing hormone (GnRH) treatments on fertility in dairy goats. Goats were randomly assigned to: Select-Synch (CIDR insert for 7 days with GnRH injection at CIDR insertion, followed by a PGF injection at CIDR removal; n = 20) and Co-Synch (Select-Synch plus second GnRH injection at first sign of estrus; n = 20). Ten goats in the two treatment groups were subjected to daily ultrasound (US) examination beginning on day of CIDR insertion, to evaluate changes in ovarian follicle populations over the subsequent 26 days. Follicles were classified as small (3.0-5.0 mm) medium (5.1-7.0 mm) or large (>7.0 mm). Heat checks were conducted twice daily on all animals after CIDR removal and animals were AI'd 24 hr after first detection of estrus. There were no differences between ES protocols for total length of estrus (2228 ± 239 min.), interval from CIDR removal to estrus (2075 ± 192 min.) or mean length of estrus after AI (726 ± 179 min.). Pregnancy rates were not different with Select-Synch (9/20, 45.0%) compared to the Co-Synch protocol (5/18, 27.8%). Small, medium or large follicle populations

were not influenced by treatment. The number of small and medium follicles varied over the sampling interval, independent of synchronization protocol. The number of small follicles peaked three days after CIDR insertion (4.8 ± 0.42) and medium follicles peaked (3.57 ± 0.48) during early diestrus of the subsequent luteal phase. Therefore, short-term progesterone treatment in conjunction with PGF and GnRH treatments can modify small and medium follicle populations.

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Ruminal Methane Emission by Boer and Spanish Does Supplemented with Garlic. R. Puchala*, Z. Wang, A. L. Goetsch, and T. Sahlu, American Institute for Goat Research, Langston University, Langston, OK 73050.

Twenty Boer and 20 Spanish does were used to examine effects of garlic on ruminal methane emission and heat production. All does received 200 g/day (as-fed basis) of a concentrate mixture, and one-half of the does also received 20 g/day of garlic powder. For at least 2 months does grazed grass/forb pastures in the summer. Thereafter, sets of four does consisting of one doe per treatment were sequentially placed in metabolism crates for 2 weeks, continued to receive supplements, and were fed coarsely ground alfalfa hay free-choice. Gas exchange was measured on the last day for 24 hours in an indirect, open circuit respiration calorimetry system with four metabolism cages fitted with head-boxes. There were no interactions between breed and supplement treatment. Intake of alfalfa hay during the calorimetry measurement period was greater for garlic than for control does. Ruminal methane emission was less for garlic than for control in g/day and relative to intake of dry matter and energy. Treatment did not affect the respiratory quotient, heart rate, heat production, or the ratio of heat production to heart rate. In conclusion, supplementation with garlic decreased ruminal methane emission and increased dry matter intake by Boer and Spanish does consuming alfalfa hay.

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Use of Garlic as a Potential Natural Dewormer in Small Ruminants. J. G. Schwarz*, D. O'Brien, and M. Gooden, Department of Agriculture, Food and Resource Sciences, University of Maryland Eastern Shore; Department of Agriculture and Natural Resources, Delaware State University, Dover, DE; College of Agriculture, Science and Engineering, Portland, Jamaica.

Gastrointestinal nematode parasitism (worms) has been a major constraint to sheep and goat (small ruminant) producers throughout the world. The use of chemical anthelmintics (dewormers) has been the traditional method used to control these internal parasites. However, overuse and misuse of dewormers have led to an increase in the resistance of worms in many parts of the world, including the United States. Consequently, new methods to control or modulate internal parasites must be found. Research conducted in countries around the world have indicated some success in using garlic for its anthelmintic properties. It was the objective of this study to evaluate the efficacy of garlic in reducing fecal egg counts (FEC) in sheep (Exp 1) and goats (Exp 2). In Exp 1, 18 Katahdin ewe lambs were placed in individual pens and were administered either 3 ml of garlic juice (GAR; n=8) or water (CON; n = 10) daily for 21 days. In Exp 2, 23 crossbred Boer goat kids of mixed sexes were placed into a CON (n = 11) or GAR (n = 12) group, and a fecal egg count reduction test (FECRT) was conducted to determine efficacy of treatment. In both studies, garlic was not effective in reducing fecal egg counts in lambs and kids. More studies are needed to evaluate the use of natural plant dewormers in small ruminants. The effect of garlic as a feed additive on the sensory attributes of the meat will be analyzed using samples collected during this study.

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Anthelmintic Efficacy of Medicinal Herbs in Goats Infected with Nematode Parasites. R. Z. Zhong, Northeast Institute of Geography and Agroecology, Chinese Academy of Sciences, Changchun, China and American Institute for Goat Research, Langston University, Langston, OK 73050; Z. Wang*, American Institute for Goat Research, Langston University, Langston, OK 73050; and D. Zhou, Northeast Institute of Geography and Agroecology, Chinese Academy of Sciences, Changchun, China.

Boer does naturally infected with *Haemonchus contortus* from grazing pasture were allocated to five groups and moved to a barn to investigate anthelmintic efficacy of three medicinal herbs; *Rheum palmatum* L. (rhubarb), *Meliae cortex* (melia bark), and *Quisqualis indica* L. (rangoon creeper). Does were given ad libitum access to grass hay and water and a limited amount of a concentrate-based supplement. Treatments were control, rhubarb, melia bark, rangoon creeper, and a 1:1:1 mixture of the three herbs. The herbs in powder form were mixed with water just before drenching. After being acclimated for 7 days, does

were drenched with water alone or with the respective herbs at 20 g/day for 10 days. Fecal samples were collected on days 0, 3, 6, 9, 13, and 16 after the start of drenching for worm egg count. Blood samples were taken on days 0 and 13 for measuring packed cell volume. After 10 days of treatment, none of the herbs showed anthelmintic effects. Compared with control does, does treatment with rhubarb and the mixture had higher packed cell volume; however, the increases may have been due to scouring in response to treatment with rhubarb. In conclusion, these herbs were not effective anthelmintics for the most problematic internal parasite of goats (*H. contortus*) in much of the United States.

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Nutrition and Pathogens Affect Honey Bee Peritrophic Matrix Integrity. T. C. Webster*, M. A. Matisoff, and C. Spalding, College of Agriculture, Food Science, and Sustainable Systems, Kentucky State University, Frankfort, 40601.

The honey bee *Apis mellifera* is affected by numerous pathogens, some of which have contributed to recent “colony collapse disorder” and consequent reduced colony productivity. One significant structure in the midgut of the honey bee is the peritrophic matrix (PM), which consists of a series of tube-like sheets surrounding the food after it is ingested. The PM protects the midgut from pathogens and abrasive material in the food, moves the food through the midgut to facilitate digestion, and acts as a substrate for digestive enzymes. Hence it is critical to the health and vitality of the bee. We found that starvation for short time periods inhibited PM development. This is important when we consider reports by others that poor nutrition correlates with pathogen infection in bees. It is likely that diminished PM secretion leads to vulnerability of the midgut to the pathogens. Also, bees we inoculated with the spore form of a widespread pathogen, *Nosema ceranae*, suffered from poorly formed PM. *N. ceranae* probably acts by infecting and interfering with the midgut cells which secrete the PM. Our results may help to explain why *N. ceranae*-infected bees are more vulnerable to virus infection.

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Use of Liquid Semen for Vaginal Artificial Insemination in Hair Sheep. S. Wildeus*, Agricultural Research Station, Virginia State University, Petersburg, VA 23806.

The anatomical structure of the ewe cervix makes it difficult to pass an insemination pipette, reducing the feasibility of frozen semen artificial insemination in sheep. Here we evaluated the use of liquid-stored semen in combination with simple vaginal insemination in hair sheep. In all trials, semen was extended in skim milk and egg yolk (5%) and packaged at 175 million sperm per straw. Ewes were bred at spontaneous estrus following estrus synchronization of the previous cycle 12 hours after estrus was detected using harnessed teaser rams. A pilot experiment conducted in October with 39 mixed-breed yearling hair sheep ewes used semen within 2 hours of collection and achieved an overall pregnancy rate of 75%, and improved to 86% twice-inseminated ewes. In a second experiment, a larger group of 110 mature ewes also in October were inseminated once with either fresh semen or semen stored at 5° for 12 hours. Pregnancy rates were higher for fresh (59%) than 12-hour stored semen (39%). In a third experiment, 40 yearling ewes were inseminated with semen stored at 5° for 12 hours in December, with half the ewes inseminated with a second dose of semen after 24 hours of storage. Pregnancy rates were 41 and 53% for once- and twice-inseminated ewes, respectively. Vaginal artificial insemination with liquid semen in hair sheep can result in pregnancy rates over 60% with fresh semen, but declines by 20% once semen is stored for 12 hours.

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Evaluation of the Health Promoting Effects of Moringa Olifera in Goats. M. Worku*, K. Gyenai, H. Ismail, J. Reddy, J. Idassi, J. Williams, R Merriot, A. Abdella, and A. Chaney, North Carolina Agricultural and Technical State University, Greensboro, NC 27411.

In goats, the *Moringa oleifera* (moringa) plant has been reported to be an alternative protein supplement and a potential source of antioxidants. Gastrointestinal parasites pose a serious threat to the goat industry due to inefficacy of existing anthelmintics. Plant-based anthelmintics are promising alternatives. The efficacy of plant-based anthelmintics is influenced by the method of extraction and goat genetics. This study evaluated the effect of aqueous extracts of dried moringa leaves on Boer goats infected with gastrointestinal parasites. Following initial screening for infection, goats were assigned to three groups of five each (N = 15). Powdered Moringa leaves were soaked in hot or cold water with stirring. Sterile filtered extracts were prepared. Goats were drenched daily with 10 ml of the hot (Treatment I) or cold

extract (Treatment II) for a 4 week period, a control group of five age matched goats received sterile water (Treatment III). Body weight, FAMACHA Score, Packed Cell Volume (PCV), White Blood Differential Count (WBC), Total white blood cells (TWBC) and Haemonchus and Coccidia fecal egg counts were determined once a week, for a 4-week period. There was no difference in Coccidia oocyte counts, FAMACHA score, and PCV or body weight. Moringa treatment increased mononuclear cells and decreased Haemonchus eggs. The hot extract had a greater anthelmintic effect than the cold extract and increased TWBC ($P < 0.05$). Aqueous extracts containing water soluble proteins from Moringa may aid in the reduction of parasite burden in a species specific manner and impact cell mediated immunity. Molecular targets are under study.

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Genetic Marker Assisted Selection for Foot-Rot Disease Resistance in Sheep Flocks. T. Wuliji*, Lincoln University, Jefferson City, MO 65101; W. Lamberson, University of Missouri, Columbia, MO 65205; B. Shanks, J. Caldwell, C. Clifford-Rathert, J. Pennington, H. Swartz, S. Azarqajouh, A. Bax, and D. Sommerer, Lincoln University, Jefferson City, MO 65101.

A genetic marker assisted selection of footrot resistance in sheep presents a greater advantage over traditional selection techniques. The aim of this study was to evaluate the feasibility and effectiveness of genetic marker assisted selection for footrot disease resistance in sheep flocks. The genetic markers (footrot gene marker test: FDMT) developed in New Zealand were used to screen for footrot resistance and susceptibility genotype within Lincoln University experimental flocks. Initially, 120 Katahdin ewes and 16 rams were selected for marker assisted selection of footrot resistance. We screened and evaluated 7 genotypes including three sheep breeds (Katahdin, Dorper, and Texel) and their crosses. All animals were blood tested for the DNA marker screening. Katahdin were bred with Dorpers and F_1 lambing was completed in May 2012. Footrot marker test were conducted on 192 blood samples of sheep including the footrot resistant selection ($n = 82$) and control ($n = 110$) flocks. The preliminary DNA marker screening results were classed into five gene allelic categories (F) ranging from a high, moderate, or low resistance. The allelic frequency distribution by category was analyzed using Chi-square. The frequency distribution ratios differed ($P < 0.01$) among groups (F1, F2, E3, F4, and F5). The sample population frequency presented normal distribution mode. Therefore, a high selection differential and genetic gain may be achieved once animals are identified for these markers.

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Effects of Trans-10, CIS-12 Conjugated Linoleic Acid Dietary Supplementation on Fat Content and Fatty Acid Profile of Goat Colostrum Milk. S. X. Chen, College of Food & Bioengineering, Henan University of Science & Technology, Luoyang, China 471003; K. Tesfai, and S. S. Zeng*, American Institute for Goat Research, Langston University, Langston, OK 73050.

Dietary supplementation of *trans*-10, *cis*-12 conjugated linoleic acid (CLA) has been reported to affect milk composition by milk fat depression in dairy cows, sheep, and goats. In this study, effects of *trans*-10, *cis*-12 CLA dietary supplementation on composition (i.e., fat, protein and total solids) and fatty acid profile of goat colostrum milk were investigated. Pregnant Alpine does in Parity 1 and Parity 2 were randomly assigned to three treatments and fed diets supplemented with lipid-encapsulated *trans*-10, *cis*-12 CLA at dosages of 0 (control), 30 (CLA-1), and 60 g/d per doe (CLA-2) for two weeks prior to the predicted date of parturition. Following kidding, colostrum milk samples were collected and analyzed in duplicate for 14 consecutive milkings. Results indicated that both levels of CLA dietary supplementation depressed fat content significantly ($P < 0.05$) in goat colostrum milk, especially during the first 48 h after parturition. Significantly higher contents of CLA were observed in milk of treated goats than in that of control goats ($P < 0.05$), especially 48 h after parturition. CLA supplementation also affected fatty acid profile of colostrum. It is concluded that a 2-week dietary supplementation of *trans*-10, *cis*-12 CLA decreased fat content and increased CLA content of goat colostrum milk.

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Level of Acculturation and Body Weight Status of Chinese Immigrants in Kentucky. C. Butler*, L. Huang, and C. Wang, College of Agriculture, Food Science, and Sustainable Systems, Division of Food and Animal Science, Atwood Research Facility, Kentucky State University, Frankfort, KY 40601.

The objective was to assess the acculturation and body weight status of Chinese immigrants in Kentucky. Chinese Americans were recruited to participate in the study at a community event. The subjects

were asked to fill out a questionnaire before they were given a free analysis of their body composition (body fat %) with a Tanita TBF-521 body composition analyzer. 84% of the participants were within normal body weight range; only 10.5% were overweight and 5% in the obese category. Close to 50% speak Chinese and English about the same but 28% speak mostly English. 46% read better in Chinese and speak mostly Chinese at home, but another 46% read better in English and speak mostly English at home. 38% speak Chinese only with friends, 53% speak only English or mostly English to friends. 30% think in mostly Chinese, 23% think in Chinese and English about the same, and 45% think in mostly English. 54% watch TV mostly in English, 30% do so mostly in Chinese. Over 73% listen to radio mostly in English with none listening to radio in Chinese. 54% identify themselves as Chinese American with 23% identifying with Chinese or American. 38% have mostly Chinese friends and 46% have some non-Chinese friends. 69% are proud or very proud of their Chinese background. 69% eat mostly Chinese foods. 58% percent celebrate Chinese holidays most of the time. In conclusion, while degrees of acculturation differ among Chinese immigrants, acculturation did not seem to affect their body weight status.

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Aqueous Extract of Roselle Hibiscus Calyces on Food-Borne Bacteria. K. L. Chin*, Southern University Agricultural Research and Extension Center; D. Jaroni, Department of Animal Science, Oklahoma State University, Stillwater, OK 74078; and Y. Qi, V. A. Ferchaud, and R. Payne, Jr., Southern University Agricultural and Research Extension Center, Baton Rouge, LA 70813.

Much is known about the medicinal properties of roselle hibiscus (*Hibiscus sabdariffa*) for its reduction on hypertension and carcinogenic action. Limited information is available on its antimicrobial properties against food-borne pathogens. Interest in the use of natural plant products such as aqueous extract of roselle hibiscus as an anti-bacteria washing agent has been fueled by the concern for health safety caused by the use synthetic chemicals and the recent bacterial contamination of spinach and cantaloupe. Antibacterial effects of roselle calyx aqueous extracts against *Escherichia coli* O157:H7, *Salmonella* Newport, and *Listeria monocytogenes* at 4, 8, and 25 °C were investigated in-vitro over 72 hours. Approximately 150 uL of the bacterial sub-culture containing about 10⁹ colony forming units/mL of each of the test bacteria, respectively was incubated in 15 mL of roselle hibiscus aqueous extract. The calyce aqueous extracts with pH of 2.4 were obtained from Jamaica-originated accession which have about 0.33% of anthocyanin and 3.41% antioxidant content. No *E. coli* O157:H7 and *Salmonella* survivors were detected in calyces extract at 24 hours and all temperatures. *L. monocytogenes* population was significantly reduced by 5 and 3 logs in calyces extracts at 24 hours and all temperatures, and by 4-6 logs at 4 and 8°C, and to undetectable levels at 25°C, at 48 hours. Future studies will be directed towards testing on the potential antimicrobial effects of roselle hibiscus calyces and leaf extracts, concoction, seasoning and tea as antimicrobials in various food applications.

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Developing a Community Garden at Tennessee State University. A. Clardy*, and S. Crudup, College of Agriculture, Human and Natural Sciences, Tennessee State University, Nashville, TN 37209.

Tennessee State University implemented a Community Garden in March of 2011 for the local North Nashville community, employees and students to grow their own fruits and vegetables. Tennessee ranks high in the top ten of the states with the greatest numbers of citizen who are obese. We believe by allowing people to grow their own produce, the Community Gardeners will make better food choices, working in their gardens will provide exercise and the garden has become a social outing. Initially, in 2011 the Community Garden plots were 30' X 30' and 20' X 25' in 2012 and gardeners were able to grow their own fruits and vegetables from April to December of each year. At the beginning of each year, gardeners attend three workshops: Beginning Gardening, Weed Control and Irrigation. Over the past two years we have had over 270 people working individually or in groups to plant, grow and maintain their own garden plots. Evaluation of how much produce was grown and the amount of saving to each gardener is being evaluated by surveying each Community Gardener.

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Survival of Non-Pathogenic *Escherichia coli* And *Escherichia coli* O157:H7 in Delmarva Field Plots Amended with Poultry Litter and Dairy Manure. C. Cotton*, F. Hashem, and K. Jones, Department of Agriculture, Food and Resource Sciences, University of Maryland Eastern Shore, Princess Anne, MD 21853; and M. Sharma, and P. Millner, USDA-ARS, Beltsville, MD 20705.

Land application of raw animal manure may pose a food safety risk from pathogenic microorganisms that survive and contact fresh produce grown on the soils. This study was conducted to evaluate and compare the survival and persistence of a multi-strain cocktail of non-pathogenic *E. coli* (*Ec*) and attenuated *E. coli* O157:H7 (attO157) as influenced by the application of poultry litter (PL) or dairy manure (DM) on field plots on the Delmarva Peninsula. A field experiment comprising eight treatments with four replications each was conducted at the University of Maryland Eastern Shore Agricultural Experiment Station. Soil plots were individually amended with or without PL or DM in late fall. Individual plots, except controls, received spray inoculum at either low, 5×10^6 CFU/m², or high, 5×10^8 CFU/m², cell densities; inocula contained three rifampicin-resistant (Rif^R) strains of *Ec* and two Rif^R strains of attO157 grown in dairy manure extract. Soil samples collected for 30 days post-inoculation were analyzed for viable *E. coli* by direct plating and/or mini-MPN. Survival of *Ec* and attO157 populations declined more rapidly in DM compared to PL treatments. By 30 days, at high inoculum densities, *Ec* counts on PL and DM declined to 4.6 and 2.43 log₁₀ CFU/g, respectively, and attO157 counts declined to 3.83 and 0.46 log₁₀ CFU/g, respectively. Manure type influenced survival of *E. coli* in soil, with attO157 declining more rapidly than *Ec*. These findings should be taken into consideration when setting guidelines for fresh produce safety relative to PL and DM application to soil.

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Potential of Social Media to Influence Nutrition Information in Rural Areas. P. E. Faulkner*, Department of Agribusiness, Applied Economics and Agriscience Education; P. A. Lynch*, and K. Brooks, Department of Family and Consumer Sciences, North Carolina Agricultural and Technical State University, Greensboro, NC 27411.

The prevalence of obesity among many of North Carolina's rural youth has continued to rise despite the national attention directed toward prevention. The mode delivery of relevant nutrition education may be instrumental in promoting lifelong healthy eating choices for youth. The purpose of this study was to determine the changes in knowledge through pre/post test scores of youth participating in a Cooperative Extension 4-H program, and to examine the potential of social media in reinforcing nutrition information to promote healthy eating practices. Rural youth (grades 6-8th) of African American and Native American decent were recruited from centers to participate in a control and/or social media intervention group where nine nutrition lessons were given along with pre and post-tests. Although an increase in knowledge was seen, results show significant improvements in scores for particular nutrition lessons. These lessons included: *The Low Down on Fat*, *Eating on the Run*, and *Cultural Foods Count* reflecting the participants' choices in high fat foods, fast foods, and preparation of foods from particular cultures. For rural youth social media may be more effective in improving scores and reinforcing nutrition information of certain topics when compared to the standard face-to-face curriculum delivery.

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Barriers to Sustainable Food Systems: Do Food System Performance Measures Matter?

R. J. Fricano*, Department of Community and Regional Planning, Alabama A&M University, Normal, AL 35762.

The traditional food system relies on a predominance of large corporate farms, refrigeration and bulk storage, and long distance food transport. Concerns over resource depletion, air pollution, energy consumption, access to nutritious and locally grown foods and impacts on small farms are changing the traditional food system paradigm. The new paradigm places priorities on food security, the sale of organic and locally grown and produced nutritious foods and food production and transport conducted in an environmentally sensitive fashion. Performance measures that govern the operation of food markets reflect corporate goals and values. Previous research of European supermarkets found that five indicators were consistent upon members of the chain or network: Efficiency, Flexibility, Responsiveness, Food Quality and Environmental Aspects. This research hypothesizes that obstacles towards a more sustainable food system relate to differences in how food systems performance criteria are measured between vendors of conventional versus organic produce. Differences in food system performance measures were tested through a comparative analysis of the ratings of performance criteria of a supermarket selling conventional food products and a market chain selling organic foods. Two analyses were conducted on operational performance criteria and sustainability indicators. In each case, no significant differences were found between both vendors. The study concluded that the supermarket chain that sold organic food items focused primarily on business-oriented criteria in the similar fashion as chain selling conventional food

products. The sale of organic foods is more likely a response to consumer preference rather than values for sustainable practices.

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Enhancing Acid Tolerance of *Lactobacillus* spp. by Adaptive Evolution During Acid Stress.

D. A. Gad El-Rab*, and S. A. Ibrahim, North Carolina Agricultural and Technical State University, Greensboro, NC 27411.

Lactobacillus is the largest genus within the group of lactic acid bacteria isolated mainly from humans, animals, plants and foods. Survival under acidic conditions is positively affected by adaptation to low pH, a mechanism known as the acid tolerance response. The objective of this study was to enhance acid tolerance of *Lactobacillus* sp. by adaptive evolution in different pH values. Fifteen *Lactobacillus* isolates were selected from 71 samples collected from Giza governorate in Egypt. These isolates were grown in MRS broth at a pH of 6.4, and harvested in the mid-exponential growth phase (OD₆₁₀ 0.6). To induce acid adaptation, cells were continuously transferred into fresh MRS medium at least three times for each pH value adjusted to 6.0, 5.5, 5.0, 4.5 and 4.0. These acid adapted cells were further challenged in MRS broth containing pH values of 3.0, 3.2 and 3.6, in order to observe the enhanced acid tolerance response. Results showed the survival of acid adapted cells was higher when compared to the wild strains after 3 h of incubation in pH as low as 3.0. However, survival of adapted cells is strain dependent. This study suggests that acid adapted cells could be applied in different acidic environment and food systems to maintain viable populations during storage periods.

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Consumer Acceptability and Physicochemical Properties of Oatbran and Flaxseed-Enhanced Goat Patties. J. Gager*, C. Atkinson, P. Meynsse, and A. Howard, Southern University Agricultural Research and Extension Center, Baton Rouge, LA 70813.

Incorporation of fiber such as oatbran into meat products improves the nutritional composition, enhances water-binding capabilities, and preserves the sensory qualities of the products. Flaxseed has high fiber content but information on its use in meat products is lacking. The objective of this study was to compare the consumer acceptability and physicochemical properties of goat meat patties enhanced with oatbran and flaxseed. Goat patties were formulated with 100% goat meat (control), 5% oatbran, 5% flaxseed meal or 2.5% oatbran/flaxseed combination (1:1). The patties were grilled to an internal temperature of 80°C and evaluated for moisture, protein, fat, minerals, fiber, texture and fatty acid contents as well as tenderness, flavor, color, juiciness and acceptability. Data were analyzed with the GLM procedure of SAS with a level of significance of $P < 0.05$. The flaxseed and flaxseed:oatbran treated patties had the highest fiber and calcium and the lowest sodium levels. Sodium content and shear force were decreased in treated patties. Ash was significantly higher in treated patties. Protein content was reduced in patties with 5% flaxseed. Fat, moisture, and saturated fatty acids were significantly higher in the control and polyunsaturated fatty acids were significantly higher in flaxseed patties. Oat bran/flaxseed combination patties were most acceptable while juiciness and tenderness were higher in oatbran patties. Color and flavor ratings were similar for all. Addition of 5% oatbran or 2.5% oatbran/flaxseed to goat meat yields acceptable texture, nutrient content, and favorable acceptability scores.

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Snacks Promote Higher Intake Micronutrients in University Students. Y. H. Gao-Balch*, S. T.

Williams, and A. Gray, Department of Human Sciences, University of Arkansas at Pine Bluff, Pine Bluff, AR 71601.

Entering a university is a key transitional period for young adults. They face many challenges including getting accustomed to a new environment and academic study loads. These challenges sometimes lead to poor nutritional habits and are strongly linked to the excessive consumption of macronutrients leading to obesity. We investigated whether snack foods promote higher micronutrients intake in university students. During the spring and fall of 2010, ninety-three (93) university students between the ages of 18-25 years who were enrolled in a basic nutrition class at the University Arkansas at Pine Bluff participated in the study. Participant's dietary intakes were assessed using 3-day dietary records and purchased food receipts. The study included the evaluation of a 24-hour recall and a questionnaire. The study was carried out Tuesday through Friday to take into account the dietary effects of weekend eating habits. Data were collected through a 24-hour recall with estimated quantities. Quantities were estimated using household

measures and standard weight. Results: The Basic Nutrition class at the University of Arkansas at Pine Bluff has 97 total students (male and female) this study consisted of only female (93) participants. Of the 93 female participants 23 had BMI values in the normal range (18.5-24.9), while 55 had a BMI in the overweight range (25-29.9) and 8 had BMI's >30 indicating obesity. The last 7 female participants had a BMI indicative of underweight (17.1-18.5). Participant's 3-day average daily intakes of meals and snacks were 2033.675±89 Kcal and 660±09 Kcal, respectively. Snack food intake was associated with increased intake of the micronutrients calcium and sodium as well as decreased intake of Vitamins A, D, B and iron in the female students. The snack eating pattern increased in the University of Arkansas students overall, with a significant increase with female students.

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Effect of Caffeine on Survival and Growth of *Escherichia coli* O157:H7. R. Gyawali^{1*}, A. Adkins¹, R. C. Minor², and S. A. Ibrahim¹, ¹Food Microbiology and Biotechnology Laboratory, and ²Department of Animal Sciences, North Carolina Agricultural and Technical State University, Greensboro, NC 27411.

In recent years, there has been a growing consumer demand for natural methods to control foodborne pathogens. Caffeine can be used in food products as a natural preservative. The objective of this study was to investigate the effect of caffeine on survival and growth of *E. coli* O157:H7 in a laboratory medium and in skim milk. In addition, flow cytometry was applied to detect changes in the shape of *E. coli* O157:H7 in the presence of caffeine. The inhibitory effect of caffeine at different concentrations was determined by inoculating *E. coli* O157:H7 in tryptic soy broth (TSB) and skim milk samples. Samples were incubated at 37°C for 48 h, and the *E. coli* O157:H7 population was enumerated by plating onto trypticase soy agar. Our results showed that caffeine significantly inhibited the growth of *E. coli* O157:H7 in laboratory media (TSB) and milk samples. A greater than 3.0 log cfu/mL inhibition was observed in milk containing 0.5% caffeine within 12 h of incubation. Moreover, using flow cytometry, marked changes in the morphology of *E. coli* O157:H7 also were observed. Caffeine has potential as an antimicrobial agent, and could be used as an effective natural preservative to improve the safety of food products.

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Identifying Carotenoids in Chinese Cabbage. B. Huang^{*1}, A. Zelalem¹, S. Islam¹, and L. Li², ¹Department of Agriculture, University of Arkansas at Pine Bluff, Pine Bluff, AR 71601; and ²Department of Plant Breeding and Genetics, Cornell University, Ithaca, NY 14850.

Carotenoids are indispensable to plants and play a critical role in human nutrition and health. Carotenoids have long been recognized as essential nutrients and important health beneficial compounds. As humans are unable to synthesize carotenoids, they have to depend on diet for these essential products. "Pro-vitamin A" carotenoids, such as β -carotene, provide the primary dietary sources of vitamin A. The deficiency of vitamin A is one of the most noticeable nutritional problems in many parts of the world. Over recent years there has been considerable interest in dietary carotenoids with respect to their potential in alleviating age-related diseases in humans. Food biofortification with enhanced pro-vitamin A carotenoids offers a sustainable way to combat vitamin A deficiency in developing countries. It has been known that food sources of carotenoids include carrots, sweet potatoes, spinach, kale, collard greens, and tomatoes. Less research has reported the carotenoids in Chinese cabbage. Chinese cabbage is a member of the Cruciferae family, and is more closely related to mustard than to cabbage. Though seemingly new to Southern diets, Chinese cabbage has been cultivated in North America for more than a century and in China for almost 1,500 years. Chinese cabbage is low in calories and low in sodium, but high in vitamin A, and is an excellent source of provitamin A carotenoids. Nine varieties of Chinese cabbage had been planted in green house of UAPB to identify the carotenoids in Chinese cabbage. β -Carotene, Zeaxanthin, Lutein, and Violaxanthin had been determined by HPLC Chromatogram.

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Development of Food Protection and Defense Educational Materials and Workshops for Middle, High School and Undergraduate Students. S. A. Ibrahim^{*}, M. Cheek-Crook, S. Hayek, R. Gyawali, and M. Tajkarimi, Department of Family and Consumer Sciences, North Carolina Agricultural and Technical State University, Greensboro, NC 27411.

In order to protect American food supplies, there is a need to educate our middle, high school and undergraduate college students in food and agriculture-related fields about food protection and defense. The food and nutritional sciences program at North Carolina A&T State University has received several

educational grants to develop instructional materials for middle/high and undergraduate students, and to start a new food protection and defense curriculum. Three food defense and protection courses have been approved for teaching as part of the food science curriculum. A new educational manual was also developed and used in these educational activities. Our educational activities demonstrated the public's interest in learning about the importance of food protection. Most of the students participating in these activities showed interest in taking more formal training in this area and would recommend these educational activities to others. The food and nutritional sciences program at North Carolina A&T State University plans to expand these activities and include graduate students.

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Use of Copper and Ascorbic Acid Alone or in Combination with Organic Acids to Inactivate *Escherichia coli* O157:H7 and *Salmonella* sp. on Fresh Leafy Greens. S. Besong, Delaware State University, Dover, DE 19901; F. M. Hashem, and C. P. Cotton, University of Maryland Eastern Shore, Princess Anne, MD 21853; S. A. Ibrahim*, and R. Gyawali, North Carolina Agricultural and Technical State University, Greensboro, NC 27411; M.A. Lihono, University of Arkansas at Pine Bluff, Pine Bluff, AR 71601; A. K. Mahapatra, and G. Kannan, Fort Valley State University, Fort Valley, GA 31030; B. Min, Tuskegee University, Tuskegee, AL 36088; M. S. Thomas, Florida A&M University, Tallahassee, FL 32307; and S. Zeng, Langston University, OK 73050.

Several scientists from the 1890 universities have recently formed a Food Safety Consortium that addresses a research priority for the ARD and NIFA. A food safety project was funded to address the microbiological safety of food products. The objective of this study was to investigate the antimicrobial effect of a chemical (50 ppm copper) and natural treatments (ascorbic acid 0.2%) alone or in combination with organic acids (0.2% lactic acid and 0.2% acetic acid) against *Escherichia coli* O157:H7, and *Salmonella* sp. Fresh leafy herbs (cilantro, parsley, and dill), were individually inoculated with a cocktail of 3 strains of each foodborne pathogen to achieve at least 6-7 log₁₀ CFU/g. To allow attachment, inoculated food samples were air dried under a biosafety hood for 1 h and then stored at 4°C for 24 h before exposure to various treatment solutions. Our preliminary results indicate that at least 3 log₁₀ CFU/g reductions of tested pathogens were achieved when a combination of 50 ppm copper or 0.2% ascorbic acid and organic acids were applied. These results suggest that the combination treatment of copper and acids could be useful for improving the microbial safety of leafy greens.

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Obesity Trends in Pregnant Women in South Carolina Affecting Health Outcomes for Mothers and Infants. R. Idris*, and K. Stephenson Gooden, Department of Family and Consumer Sciences, South Carolina State University, Orangeburg, SC 29117.

Obesity in pregnancy is an important issue affecting the U.S. population, as obese women are more likely to have a caesarean delivery or to develop preeclampsia or gestational diabetes. In 2004, 24.4% of SC pregnant women were obese before pregnancy, and 14.2% were overweight. Pre-pregnancy obesity was recorded in 31.5% of those in the 20-34 age category and in 26.6% of women ≥35. In South Carolina, 47.8% of pregnant women were overweight or obese [body mass index (BMI) of 26.1 or more]; 45.7% gained more than the recommended weight gain for their weight class. Compared to women with normal weight (BMI 18.5-24.9), overweight or obese women who become pregnant are at about 18% more risk of having a baby with a heart defect. Women who were severely obese were at a 30% increased risk of having babies with such defects. The Institute of Medicine recommends that obese women gain 11-20 pounds during pregnancy. Managing gestational weight gain in obese, glucose-tolerant women could result in more normal-weight births. A 2011 study showed that lifestyle intervention – dietary counseling and physical activity – significantly reduced gestational weight gain. This report summarizes trends in obesity among SC pregnant women as the background to a pilot study at South Carolina State University that the 1890 Research Program is launching on lifestyle intervention for obese pregnant women in South Carolina: an investigation of the effects of intervention on health outcomes in infants. It will be developed into a full-blown cohort study based on the results.

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Anti-Diabetic and Antioxidant Potential of Orange and Purple Fleshed Sweetpotatoes (*Ipomoea batatas* L.) Using Different Methods. S. Islam*, and J. Everette, Department of Agriculture, University of Arkansas at Pine Bluff, Pine Bluff, AR 71601.

The antioxidant and antidiabetic activities of the five orange and two purple fleshed sweetpotato genotypes were examined. The anti-diabetic activity was tested for inhibitory activity with the enzyme α -glucosidase obtained from rat intestine using the substrate *p*-nitrophenyl- α -D-glucopyranoside (PNP-G). The antioxidant activity was investigated with three different screening methods: the 2,2'-azinobis (3-ethylbenzothiazoline-6-sulfonic acid) (ABTS), 2,2-diphenyl-1-picrylhydrazyl (DPPH), and oxygen radical absorbance capacity (ORAC). It was found that the antioxidant activity of sweetpotato extracts in hydrophilic fraction have a significant antioxidant effect when tested by each method. There was a relationship between total polyphenol content and antioxidant function in case of ABTS and ORAC. The hydrophilic ABTS values correlate significantly with the hydrophilic DPPH values and the hydrophilic ORAC values correlate reasonably well with the hydrophilic ABTS values. In case of the hydrophilic DPPH values and hydrophilic ORAC values also showed a strong correlation. However, antioxidant activities with the lipophilic extracts were not significantly correlated. Among the methods examined, ABTS proved the best for antioxidant determination in orange fleshed sweetpotatoes followed by ORAC method. The information provided by this research will also facilitate the genetic and chemical breeding study for improvement of the desired quality criteria of orange fleshed sweetpotatoes as well as other produces. The purple fleshed sweetpotato varieties showed higher both anti-diabetic and antioxidant activities compared to orange fleshed varieties.

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Effect of Chitosan and Hydroxypropyl Methylcellulose-Based Edible Coatings on Microbiological Quality of Fresh-Cut Sweet Potatoes under Modified Atmosphere Packaging. S. Jongrattananon*, and J. Koo, Department of Agriculture, University of Arkansas at Pine Bluff, Pine Bluff, AR 71601.

This study was conducted to determine the effect of edible coatings or sanitizers on quality of fresh cut sweet potatoes. Freshly cut sweet potatoes (cv. *Beauregard*) were treated with 1% chitosan, 1% hydroxypropyl methylcellulose, 100 ppm sodium hypochlorite, or 40 ppm peroxyacetic/octanoic acid mixture. Quality characteristics were evaluated under modified atmosphere packaging (MAP) in low O₂ permeability bags and flushed with gas composed of 2% O₂ and 5% CO₂ with a balance of N₂ or air packaging in high O₂ permeability bags during 14 days at 4°C. Color, headspace gas, aerobic plate counts, and yeast and mold counts were measured during storage. Surface color of FCSPs did not show significant changes during 14 days of storage regardless of treatment. O₂ concentration in air packaged samples decreased 19% to 10% during storage, while O₂ concentration in modified atmosphere packaged samples increased 2% to 10%. CO₂ concentration in air packaged samples increased 0.2% up to 2% during storage, while CO₂ concentration in MAP samples decreased 4.0% up to 2.0%. Sweet potatoes treated with sodium hypochlorite had slightly lower aerobic plate counts compared to those with other treatments during storage. Sweet potatoes treated with chitosan had slightly lower yeast and mold counts than those with other treatments during storage. Microbiological quality of fresh cut sweet potatoes could be maintained up to 11 days at 4°C regardless of gas composition in packaging bags. Overall, no significant beneficial effect of MAP was observed on quality characteristics of fresh cut sweet potatoes.

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Visualization Method on Hypothesis Tests in Repeated Measure Experiments. Y. S. Jung*, and V. J. McWhinney, Cooperative Agricultural Research Center, Prairie View A&M University, Prairie View, TX 77446.

The time trend of individual responses to treatment is an important aspect of many experiments. As a popular experimental design in agricultural researches, the repeated measures design has been developed to track the time trend. The multiple observations over time on the same subject often give us good advantages; 1) it yields a more efficient use of experimental resources than using a different subject for each observation time; that is, it makes more efficient and reduces the variability of estimates of treatment effects, 2) it can reduce the subject cost because fewer subjects are required, and 3) additionally, the estimation of time trends will be measured with a greater degree of precision. By now, numerical values such as *t*- or *F*-test statistics values and *p*-values through ANOVA are used to test treatment effects and interaction effect in repeated measure design. The graphical approach to test treatment effect is so rare. Hypothesis error (HE) plots use ellipses to represent hypothesis and error sums of squares. The effect of heating on the oxidation of fresh oils (10 types and 12 brands) was measured for a total of 6 time points within 12 hours of heating over a 2 day time period. Oxidative parameters were measured and subjected to

the HE plots. HE plots is a good tool for testing multivariate linear model (MVLN) hypothesis for general multivariate responses for one or more within subject factors in repeated measure design.

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Water Stress Responsive Leaf Proteins Showing Potential Interactions in Drought Tolerant Peanut.

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Peanut (*Arachis hypogaea* L.) is primarily grown for high quality edible oil and protein. Most of the peanut production occurs in semiarid regions of the world, where seasonal drought causes considerable reduction in plant growth, yield, and quality. Water stress (WS) induces changes in cellular and biochemical components during which signaling cascades are initiated leading to the activation or suppression of certain genes. The changes in gene expression lead to modulation of proteins involved in WS. Therefore, analysis of proteins is critical to define the function of their gene/s, and linking of proteins to genome sequence information is very useful for functional genomics. Leaf samples at different stress intervals were subjected to proteome analysis using two-dimensional electrophoresis complemented with MALDI/TOF mass spectrometry. A total of 96 proteins were differentially expressed in response to water stress in both cultivars. Three proteins, glutamine ammonia ligase, chitin class II and actin isoform B, were unique to tolerant cultivar. Four proteins, serine/threonine protein phosphate PP1, choline monooxygenase, peroxidase 43 and SNF1-related protein kinase regulatory subunit beta-2, which play a role as cryoprotectants through signal transduction and defense in plants, were induced in drought tolerant cultivar following WS. Protein interaction prediction analysis suggests that more proteins interacting in tolerant cultivar were shown to activate other proteins in directed system response networks.

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Antioxidant Activity and Simultaneous Determination of Vitamin E and Cholesterol in Rice Bran Added Goat Meat Products. F. Malekian, M. Khachaturyan*, and S. Craige, Southern University Agricultural Research and Extension Center, Baton Rouge, LA 70813.

A scientific consensus on the relationship between diet and obesity related diseases such as diabetes, heart disease, stroke, and some forms of cancers has emerged. Obesity, a growing problem in the United States, is a major risk factor for cardiovascular disease, which is due to the consumption of the primary red meats, pork and beef. Goat meat has the potential to replace these traditionally consumed meats. Rice bran, a by-product of the rice milling process, is a naturally rich source of antioxidants (Vitamin E), other vitamins, and minerals. Vitamin E may protect low density lipoprotein (LDL) and tissues from oxidative stress. In this study, 0%, 1.5% and 3% of stabilized rice bran were incorporated into the formulation of goat meat sausages. Antioxidant activities of raw and cooked sausages with different amount of rice bran were measured on Beckman Coulter UV Spectrometer using DPPH free radical scavenging method. Vitamin E and cholesterol were simultaneously determined using Agilent 1100 HPLC system using α -tocopherol and 3 β -Hydroxy-5-cholestene as standards. The results showed that concentration of Vitamin E and antioxidant activity increased in raw and cooked sausages after adding rice bran while the amount of cholesterol remained the same.

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Optimization of Multiplex Real-Time PCR Assay for Detection and Quantification of *Vibrio* spp. and Total Bacteria. J. Y. Kim*, and J. L. Lee, Department of Human Ecology, College of Agricultural and Related Sciences, Delaware State University, Dover, DE 19901.

Vibrio spp. are the leading cause of bacteria-associated illness and mortality from seafood consumption in the U.S. and worldwide. Total bacteria counts are closely correlated with seafood spoilage. This study developed a multiplex real-time PCR assay for simultaneous detection and quantification of total bacteria and three kinds of *Vibrio* spp., such as *Vibrio vulnificus*, *V. parahaemolyticus*, and *V. anguillarum*. For the multiplex assay, 4 sets of primer pair and probe were designed and the real-time PCR cycling protocol, fluorescent detection parameters, and reaction mixture component concentrations were optimized. The species-specific marker genes, *vhA*, *tlh*, and *ToxR*, were selected to detect *V. vulnificus*, *V. parahaemolyticus*, and *V. anguillarum*, while conserved 16S rDNA sequences were used to quantify the

total bacteria population. The optimal conditions of PCR were run for a 25 μ l using the following concentrations: 800 nM of the *ToxR*, 200 nM of the 16S rDNA, 100 nM of the *vvhA*, and 50 nM of the *tlh* forward and reverse primers and probe. The optimal cycling parameters consisted of 95°C hold for 2 min for the initial denaturation followed by 40 cycles of DNA amplification. Each cycle followed denaturation step at 95°C for 15 s and combined annealing/extension step at 64°C for 50 s.

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***Salmonella* Population Rebound and its Prevention on Spray-Washed and Non-Washed Jalapeño Peppers and Roma Tomatoes in Humid Storage.** C. Kim*, and S. Pao, Agricultural Research Station, Virginia State University, Petersburg, VA 23806; W. Long III, Environmental Microbial and Food Safety Laboratory, USDA-ARS BARC-EAST, Beltsville, MD 20705; and A. R. Rafie, Cooperative Extension, Virginia State University, Petersburg, VA 23806.

The potential of *Salmonella* population to rebound on non-washed and washed roma tomatoes and jalapeño peppers in humid storage at 4°C, 10°C, 15°C, 21°C, or 35°C for ≤ 12 days was investigated. The initial inoculation levels of *Salmonella* on peppers and tomatoes were 5.6 and 5.2 log CFU/cm², respectively. Air-drying of fruit surfaces resulted in contamination levels of 3.9 and 3.7 log CFU/cm² on inoculated peppers and tomatoes, respectively. At 21°C and 35°C, the levels of air-dried *Salmonella* inoculums on produce surfaces increased ≥ 2 log cycles, with the most rapid growth in the first 3 days. Mechanical washing on rollers (rinsing; R-treatment) or revolving brushes (rinsing and brushing; RB-treatment) with water decreased *Salmonella* counts by ≥ 2.5 log CFU/cm² on both peppers and tomatoes. After R- or RB-treatment, peppers stored at 21°C and 35°C permitted residual *Salmonella* (≤ 1.4 log CFU/cm²) to grow to 2.6–3.9 log CFU/cm². During storage, residual *Salmonella* (≤ 1.0 log CFU/cm²) on washed tomatoes increased to 3.1 log CFU/cm² at 35°C following R-treatment and 3.8 log CFU/cm² at 21°C following RB-treatment. Cold storage at 4°C and 10°C effectively prevented the proliferation of *Salmonella* on both washed and non-washed produce. This study on jalapeño peppers and roma tomatoes demonstrated that *Salmonella* population can rebound on produce in humid storage before or after washing. The finding highlights the benefit of uninterrupted cold storage for safer produce operations.

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Effects of Conventional and Ultra-High Temperature Pasteurization Processing on Volatile Profiles of Goat Milk. C. E. McGhee, B. B. Lemma, J. H. Lee*, and B. Kouakou, Agricultural Research Station, Fort Valley State University, Fort Valley, GA 31030.

Pasteurization has been primarily used to achieve microbial safety and shelf-life stability of milk. However, pasteurization may result in decreased nutritional quality and flavor characteristics of milk. The objective of this study was to investigate volatiles derived from goat milk during conventional and ultra-high temperature pasteurization processing. Goat milk was obtained from the university milking parlor for 3 consecutive days and then pasteurized using bench top heat exchanger processing units (Armfield, UK). Three batches of low-temperature, long-time (LTLT; 63°C for 30 min), high-temperature, short time (HTST; 72°C for 15 s), and ultra-high temperature (UHT; 138°C for 2 s) pasteurized goat milk were produced. The volatile compounds were analyzed using solid-phase microextraction (SPME) and gas chromatography (GC) with mass spectrometry (MS). Analysis of thermally derived volatile compounds revealed 5 aldehydes (hexanal, heptanal, octanal, nonanal, and decanal) and 7 ketones (2-pentanone, 2-hexanone, 2-heptanone, 2-octanone, 2-nonanone, 2-decanone, and 2-undecanone), in the raw and pasteurized goat milk samples. The levels of 2-heptanone and 2-nonanone in UHT pasteurized milk (15.0% and 52.5%) were higher ($P < 0.05$) compared to raw (10.6% and 42.6%) and HTST pasteurized (13.0% and 46.3%) milk. The results indicate that UHT processing may increase the formation of ketones compared to other pasteurization processing methods, but this process may not adversely influence goat milk qualities.

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Results of a Short Nutrition Education Program in Increasing Dairy Products in Lactose Intolerant College Students. M. A. Lihono*, and F. Stigger, Department of Human Sciences, University of Arkansas at Pine Bluff, Pine Bluff, AR 71601.

Fifteen African American students enrolled in the University of Arkansas at Pine Bluff who had been either clinically diagnosed or self-diagnosed as lactose intolerant participated in two, one-hour education, sessions on the benefits of consuming dairy products. At the beginning of the first session, the

group was asked to recall all foods consumed the previous 24 hours. After, the group was given information on ways to incorporate dairy products into their diets. At the end, participants tasted dairy products they could tolerate such as probiotic yogurt and fresh strawberry parfaits. During the second session, returning participants (13) tasted cheddar cheese with crackers and calcium fortified orange juice. They were informed about the advantages of consuming a diet balanced in calcium and were given a list of dairy products they could tolerate (low in lactose). At the end of the session, they were asked through a survey if they planned to include more dairy products in their diets. Twelve of the 13 students said they would. Reasons for inclusion of more dairy products varied from “having strong bones to prevent osteoporosis” to “being made aware of the importance of calcium in the diet”. Six weeks later, ten of the participants submitted a second 24-hour recall. Recalls from the first and second sessions of the 10 participants were analyzed and compared using the USDA SuperTracker. Results showed an increase from 0.7 cup to 1.85 cup per person and per day. The average daily intake of calcium increased from approximately 500 mg to 800 mg. There was an increase in vitamin D intake from 1.3 µg per to 2.5 µg. We recommend a large study to confirm results of this study.

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Effects of Housing System on Production and Quality of Eggs. F. Malekian*, J. McNitt, J. Gager, and M. Khachatryan, Southern University Agricultural Research and Extension Center, Baton Rouge, LA 70813.

The effects of housing on egg production and quality from birds housed in cages, on pasture in “day range” units, or in deep litter pens were carried out on the Southern University Poultry Farm. Yolks and whites were subjected to proximate and fatty acid analyses. Consumer acceptability trials evaluated the yolk color, texture, taste/texture and overall acceptability of the eggs from the three housing treatments. Eggs from caged hens were heavier than eggs from deep litter and pastured hens. Eggs from hens on deep litter were darker (higher L*) than eggs from caged or pastured hens. Pastured eggs were more red (higher a*) than eggs from caged hens or those on deep litter. The only difference in the proximate analysis was that the moisture content of eggs from deep litter was higher than that of eggs from cages or pasture. The linolenic acid content of eggs from caged hens was higher than the deep litter and pastured eggs. There were no other differences among the fatty acids, total n-6 and n-3 fatty acids, the n6/n3 ratio and the consumer acceptability of the eggs from the three housing systems. In conclusion, despite the beliefs of the consumers, there is little physical, nutritional or taste difference for eggs produced by hens among the three housing systems.

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Effect of Hydrothermal Processing on Antioxidant Contents and Capacities in Pigmented Rice (*Oryza sativa* L.). B. Min*, Food Science and Technology Program, Department of Agriculture, Food and Resource Sciences, University of Maryland Eastern Shore, Princess Anne, MD 21853; and M. H. Chen, USDA/ARS Dale Bumpers National Rice Research Center, Stuttgart, AR 72160.

Purple and red bran rice cultivars (*Oryza sativa* L.) are rich sources of antioxidants, including lipophilic antioxidants (vitamin E homologues and γ -oryzanol), soluble phenolics (including anthocyanins and proanthocyanidins), and cell-wall-bound phenolics. This study investigated impacts of hydrothermal processing on antioxidant contents and capacities (DPPH radical-scavenging, oxygen radical absorbance, and iron-chelating capacities) in purple, red, and common light-brown bran rice. Rice cultivars were subjected to hydrothermal processing as follows: rough (with hull) and brown (without hull) rice were parboiled and, subsequently, wet-cooked. Non-parboiled brown rice was also wet-cooked. Raw (non-hydrothermal processed) purple and red bran rice had 4- to 20-fold higher soluble phenolics and antioxidant capacities compared to raw light-brown rice. Parboiling increased the lipophilic antioxidant contents in all cultivars. However, parboiling decreased the soluble phenolic contents, leading to reductions in antioxidant capacities, and their decreasing rate were more prominent in pigmented rice than in light-brown rice due to losses of heat-sensitive anthocyanins and proanthocyanidins. Yet, hydrothermal-processed pigmented rice contained more phenolics and antioxidant capacities compared to hydrothermal-processed light-brown rice. Parboiled brown rice showed greater reductions in soluble phenolics than parboiled rough rice, suggesting protection by hulls against thermal degradation and/or leaching of soluble phenolics. Wet-cooking further decreased soluble phenolic contents and antioxidant capacities. Parboiling and wet-cooking appeared to cause increases in the extractability and/or release of bound phenolics. These results suggest that parboiled

and wet-cooked brown rice can be an excellent dietary source of lipophilic antioxidants, and parboiling rough rice was preferable over parboiling brown rice for preserving soluble antioxidants.

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Youth Active and Media Savvy (YAMS) 2012 Summer Camp Sessions: Preliminary Findings.

V. Oates*, R. Fleming, T. Miller, and A. Franklin, College of Agriculture and Human, Science, Department of Family & Consumer Sciences, Tennessee State University, Nashville, TN 37209.

African Americans have higher rates of obesity, and reportedly watch more television than other Americans. Media may have an especially powerful impact on increasing food and beverage consumption. Youth Active and Media Savvy (YAMS) serves to launch a legacy of healthy behaviors. Participating youth engage in culturally relevant activities that increase: (1) media literacy; (2) healthy cooking skills; (3) food safety knowledge; (4) physical activity; and (5) self-esteem. Using an adaptive model, camp sessions were held in the summer of 2012. Each camper received a journal to record their thoughts regarding the daily media, diet and physical activity lessons. Camp participants were instructed using the Media Smart Youth© curriculum, and created and presented media concerning deceitful food marketing, healthy habits, and positive self-images of their culture. Recipes, nutrition lessons, and cooking were involved in 60-Minutes of physical activity. Campers participated in cultural and self-esteem empowering activities in gender specific social circles. Observations and self-reports from camp participants and their parents/guardians affirm that campers were motivated to implement and share healthier food alternatives at home. Findings reveal that adaptation of Media Smart Lessons is not appropriate for delivering media literacy education to this population. Participant observations revealed that use of peer educators in delivering the camp requires revisiting.

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Reduction of Alpha-Glucosidase Activity by Chardonnay, Tinta Cao, and Cabernet Franc Grape Pomace Extracted Using Water and Fermented at Different Brix Levels. J. Parry*, H. Li, L. Rutto, and M. Brandt, Virginia State University, Petersburg, VA 23806.

One difference between the production of white and red wines is that the pomace (seed, skin, and pericarp) is fermented with red wines, but not with white wines. Chardonnay is a white grape, Tinta Cao and Cabernet Franc are red. Previous studies using yeast and rat α -glucosidase enzymes have shown that white grape pomace extracts were more effective at inhibiting α -glucosidases than red grape pomace samples. It is suspected that the α -glucosidase inhibitors are very similar in structure to common drugs such as Acarbose, which is very similar in structure to sugars. The question was whether fermented white grape pomace, seed, and skin were similar to fermented red grapes. Wine grapes were fermented, and were obtained at different Brix levels during fermentation (sucrose concentration, 1 Brix unit = 1g sucrose/100mL). Samples were dried and extracted with water at different Brix levels (from ~20 ~10 to 0). During fermentation, pomace, seed, and skin from these different Brix levels were tested. The results showed that most seed extracts maintained over 95% α -glucosidase inhibition at all Brix levels. The exceptions were the Cabernet Franc and Tinta Cao, with 0% and 60.5% inhibition at zero Brix, respectively. The skin from all samples was slightly lower than the seed at 20 Brix with the Cabernet Franc having 96% inhibition but dropped to zero at 10 and 0 Brix. All samples had the highest alpha-glucosidase inhibition at the 20 Brix level. These results suggest that the α -glucosidase inhibitor in grape pomace may be an oligosaccharide analog.

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Rheological Behavior of Select Dairy Products. E. Risch*, and A. Hubbard, Cooperative Agricultural Research Center, Prairie View A & M University, Prairie View, TX 77446.

Dairy products are typically viscoelastic in that they exhibit both liquid- and solid-like behavior when external force is applied. Mouth-feel is a major criterion for consumer perception and acceptance of food. Basic rheological properties of select goat and cow dairy products (ice cream, cream cheese, cheese and yogurt) were determined using the CVO Rheometer and the Instron Universal Testing Machine. Tests performed included scoopability, creaminess and hardness (ice cream); spreadability and creep/recovery (cream cheese); yield point and zero shear viscosity (yogurt); and hardness, stress relaxation, storage modulus (cheese). Ice cream tests were performed at -10°C to cancel out the tendency of increased hardness at lower temperatures. Stress relaxation tests were performed on the cheeses by measurement of the force-decay resulting from an imposed constant strain of 40%. A method utilizing a modified

Maxwellian model, with normalized axial force was used to compute time-dependent stress-decay. The storage moduli for goat milk cheese were found to be generally lower than those for cow milk cheese ($G = 11.5$ lb/sq. in., compared to $G = 20.4$ lb/sq. in.), and were found to exhibit an inverse correlation with moisture content ($r = -0.95$). These findings also confirmed the observation of generally higher moisture contents for goat milk cheese as compared to cow milk cheeses.

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Combating Childhood Obesity with Caregivers as Change Agents (CCOCCA) “Product Development Phase”. F. Malekian, J. J. Snowden*, S. Gebrelul, K. Cyrus, D. York Friendship, B. Kennedy, J. Losso, and J. E. Hine III, Southern University Agricultural Research and Extension Center, Baton Rouge, LA 70813.

Obesity is widely recognized as one of the most critical health threats to families and children around the globe. The occurrence of obesity has reached epidemic proportions affecting all populations and age groups in Louisiana, the United States and worldwide. Obesity is highest among African Americans with Hispanics and Caucasians tagging closely behind. The direct medical costs for obesity and obesity-associated chronic diseases are overwhelming. Therefore, the overall goal of this project is to investigate the mechanism by which whey protein (WP) and resistant starch (RS) synergistically affect satiety, energy expenditure, and body weight composition. This will be carried out by specific objectives which include: 1) formulating the best combination of WP and RS into different varieties of flavored smoothies/shakes and assessing consumer acceptability, 2) utilizing specific chemical analysis/software to assess nutrient content of smoothies/shakes, and 3) recruiting African American men and women whose body mass index (BMI) are greater than 30. Recruitment methods will incorporate newspaper and radio advertisements, health organizations, local churches, childcare facilities, football tailgates, and word of mouth. The participants will take smoothies/shakes containing WP and RS each morning for twenty-four weeks in the summer of 2013. Anticipated successful results for this phase of the study will permit the use of these natural bioactive compounds in developing a non-invasive, practical, consumer friendly and cost effective approach to combating the current epidemic of obesity that affects families nationwide.

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Ecological Approach to Examine Dietary Habits of Rural African American Families. M. Williams-Wheeler*, L. Tyson*, V. Giddings*, S. Cook, C. Cherry, and R. Robinson, North Carolina Agricultural and Technical State University, Greensboro, NC 27411.

Geographic isolation combined with high poverty rates in rural areas contributes to the lack of access to healthy and nutritious foods as well as information related to physical health and dietary habits. These concerns are heightened for African-American families and children in rural communities who are often poor and disproportionately affected with health-related problems including obesity. The purpose of this research is to address childhood obesity rates and other health risks in a limited resourced rural county in North Carolina. The identified county has the 5th highest obesity rate in the state. Project participants are the primary beneficiaries of the data gathered on family dietary habits and eating patterns. The benefits from the findings are provided via continuous feedback in culturally relevant and nutrition conscious health promotion model; inclusive of various environmental/contextual factors such as community demographic factors, i.e. SES, accessibility of restaurants and recreational facilities and ethnicity. Utilizing an ecological approach, the study addresses how physical activity and healthy eating behaviors of children and families in this community are impacted by (1) knowledge/availability/accessibility of nutritious foods (microsystem perspective); (2) the availability, accessibility and quality of nutritious foods in grocery stores, convenient stores, and or farmer’s markets as well as in school cafeterias (mesosystem perspective); (3) health and nutrition programming efforts at the county health departments, cooperative extension and other civic organizations (exosystem perspective); and (4) community and demographic factors, cultural beliefs, family practices/beliefs (macrosystem perspective).

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Development of Core Laboratory to Enhance Scientists Productivity at Cooperative Agricultural Research Center. S. Woldesenbet*, and R. W. Griffin, Cooperative Agricultural Research Center, Prairie View A&M University, Prairie View, TX 77446.

The Core Laboratory Facility at the Cooperative Agricultural Research Center (CARC) was developed to function as multi-user resources, dedicated to provide services for all research areas (Plant

and Environmental Sciences, and Animal and Food Sciences) at the College of Agriculture and Human Sciences. The main objective of this Core facility was to make available high performance and frequently needed multipurpose equipment to all CARC Research Scientists, their students, and research collaborators. Such equipment is set up for immediate use. The three major components of the facility include: Molecular Biology, Microbiology, and Analytical Chemistry. The Core personnel provide services by operating instruments for analysis of samples; as an information resource; troubleshooting; as an instructor, training researchers new to some techniques; and as a collaborator in multi-investigator projects. Accordingly, teaching and training graduate students, research technicians and research specialists about how to prepare samples is an integral part of this operation. The Microbiology Core lab is providing fast and quality microbiological diagnosis testing for the University Farm operations. The Core personnel are committed to maintaining all equipment and instruments at high-levels of performance. Some of the equipment in the Core laboratory includes: High-performance Liquid Chromatography (HPLC), Gas Chromatography-Mass Spectroscopy (GC-MS), Differential Scanning Calorimeter (DSC), KingFisher Flex Magnetic Particle Processors, Real Time PCR Systems, Bioanalyzer, Nanodrop Spectrophotometer, Biolog GEN III MicroStation, Automated Colony Counter, Stationary and Shaking Incubator, and general laboratory equipment.

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Economic and Behavioral Factors that Influence Sustainable Consumer Practices within the Home Among African American Adults. P. Young*, Family and Consumer Sciences, Alabama A&M University, Normal, AL 35762.

There is increasing societal pressure to adopt a sustainability conscious lifestyle in the United States. However there are many factors that may negatively affect the level of participation in the sustainability conscious lifestyle among minority consumers. The purpose of this paper is to examine the economic and behavioral factors prevalent within the African American community that may affect the adoption of sustainable consumer practices. The research method utilized for this project was a survey instrument that was developed by the researcher. A pilot test was conducted to determine the content validity and reliability of the survey instrument. Upon further modification of the research instrument, data was collected with a sample of 250 participants. The survey instrument consisted of 28 total items with 24 items that addressed sustainable consumer beliefs and behaviors. The instrument also included 4 items to gather data regarding the demographic background of the participants. Data analysis indicates that participants have a high level of concern for the future of the environment. However the consumption behavior reported among the participants is not reflective of a sustainable lifestyle. The results of the study may suggest the need for further education initiatives within the African American community regarding sustainable consumption practices within the home.

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Agricultural Outreach Program: Student Awareness Through Participation. B. M. Green*, G. S. Shorter, and C. P. Cotton, Department of Agriculture, Food and Resource Sciences, University of Maryland Eastern Shore, Princess Anne, MD 21853.

Agriculture, the sustainable backbone of the cultivating world, faces an unfair challenge – misconceptions about careers in modern agriculture globally. The University of Maryland Eastern Shore has aggressively addressed this challenge due to the low enrollment and retention of agriculture students. Our approach was to negate the attitude of indifference toward agriculture professions by increasing the awareness of diverse careers in plant biotechnology and related career opportunities in water quality, nutrient management, and horticulture, especially for women and minorities. Therefore, a two-week residential agricultural summer outreach program (July 15 to July 28, 2012) was developed to target diverse populations of students (14-17 years of age) from across the United States. This program was funded by USDA APHIS and supported by NRCS. Sixteen students from seven states with different backgrounds and career goals had hands-on experience on and off campus farms (Global Positioning System, GIS-technology included), interaction with the staff and research scientists in a laboratory environment, and lasting experiences of campus life. Other activities included field trips to conservation research laboratories, USDA ARS facility to discuss career opportunities, and local sport centers to network and relax. After two weeks, students participated in a survey to evaluate the summer program. Responses to questions on overall quality of the program were very good (54%), good (42%), and adequate (4%). Fifty percent of participants would consider agricultural related careers in the future. This new

venture was challenging, but gave the agriculture department a positive path to increased student enrollment and future agriculturalists.

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Assessing Students' Importance Rankings of the Dietary Guidelines for Americans. P. E. McLean-Meyinsse*, and J. V. Gager, Southern University Agricultural Research and Extension Center, Southern University, Baton Rouge, LA 70813.

The *Dietary Guidelines* provide science-based knowledge to facilitate and promote healthy eating habits and physical activity to improve the health of Americans. Because of the overweight and obesity epidemic, diet-related chronic diseases such as diabetes, cardiovascular disease, hypertension, cancer, and osteoporosis are rising. These illnesses are costly to treat. Therefore, our study examines (1) students' importance rankings of the dietary recommendations; (2) relationships among the recommendations, perceptions of health status, and frequency of reading labels; and (3) factors influencing the number of minutes students exercised. The study's data are analyzed with Friedman and Kruskal-Wallis nonparametric tests and the Ordinary Least Squares technique from the *SPSS* software package. The results suggest that importance rankings of the dietary recommendations are statistically significant at the one percent level of probability. Further, the recommendations for maintaining a healthy weight, eating a variety of fruits and vegetables, and a variety of foods were ranked, first, second, and third, respectively. When grouped with label use and perceptions of health status, the recommendations for cholesterol was significant for label use, while those pertaining to weight, low fat, and grains were statistically significant for perceptions of overall health status. Minutes exercised were invariant to the dietary recommendation for physical activity and perceptions of weight, but were statistically significantly influenced by body mass index, gender, marital status, academic classification, and age. Overweight and obesity are taking a heavy toll on the country's health and resources. Therefore, we must all endeavor to eat healthier and to become more physically active.

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Dissemination of Research and Extension Information Related to the Kentucky State University Research and Demonstration Farm. E. Reed*, College of Agriculture, Food Science, and Sustainable Systems, Research and Demonstration Farm, Kentucky State University, Frankfort, KY 40601.

The Kentucky State University Research and Demonstration Farm disseminates research findings and extension assistance through various means. The 300 plus acre farm, 12 acres certified for organic production, consists of gently rolling hills with ponds, wooded areas, orchards, vineyards, cropland, and pastures. Facilities complement research and Extension missions with easily accessible areas for the public, students, staff, and faculty. Throughout the year the farm is used for events to showcase the research conducted. The areas of research include agroforestry, animal science, apiculture, entomology, horticulture, mobile processing, organic and sustainable farming. Numerous events, field days, tours and the Third Thursday Thing are conducted on site. Agroforestry includes using livestock to lower brush from areas that are not accessible by mechanical means, such as fence-rows and rocky terrain. Temporary flex-netting is used to exclude and rotate livestock in farm forage areas. Animal science includes modern livestock production of goat and cattle where hands on training in areas such as FAMACHA, internal parasite identification, and artificial insemination techniques. Apiculture research is conducted on honeybee parasite and disease control, colony collapse disorder, and honey production and extraction methods. Honey collected is used as sweetener and an added ingredient in meals prepared on the farm. Entomology includes conservation biology approaches to insect management using attractants for beneficial insects in vegetable and fruit production. Horticulture research includes developing production and breeding approaches for high quality fruit and vegetable crops in sustainable and organic production systems; research crops include pawpaw, blackberries, hazelnuts, grapes, and vegetables crops.

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Strategies to Improve Farm and Business Efficiency through Integrated Communication. B. O. Udoh*, Southern University Agricultural Research and Extension Center, Baton Rouge, LA 70813.

The goal of this project was to better coordinate between digital and traditional communications media to increase the bottom line among limited resource producers and business owners. The primary objective was to strengthen the capacity of the Southern University Agricultural Research and Extension Center communication apparatus for packaging, refining and disseminating research information through

innovative Extension methods and evaluating the effect of new media on quality of life indicators among limited-resource producers in Louisiana. A survey instrument was developed and used to collect data on demographics of limited-resource farmers and entrepreneurs in ten selected Louisiana parishes. Information was also collected on current sources of information available to project participants, including preferred methods of receiving information and the frequency of their access to information. Analysis showed that participants preferred face-to-face interaction, followed by print and postal mail, radio, and TV with Internet being the least preferred medium. At the conclusion of this project, the participants will be able to identify multiple sources of information available to them in user-friendly formats, have increased ability to access information by utilizing multi-media information delivery methods and locating USDA, SU Ag Center and other program information. The results will help to more appropriately coordinate digital and traditional communication between researchers, extension agents and limited resource farmers and business owners. This project was funded for three years by the National Institute of Food and Agriculture, US Department of Agriculture.

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Variables that Effect Perinatal Outcomes Among Low-Income African American Women: a Mixed Methodology. J. R. Wheat^{*1}, and V. Carter², ¹Department of Human Sciences, University of Arkansas at Pine Bluff, Pine Bluff, AR 71601; and ²College of Human and Environmental Sciences, University of Alabama, Tuscaloosa, AL 35487.

Black infants are twice as more likely to die within the first year of life than their white counterparts. The majority of these infant mortalities occur within the perinatal stage of pregnancy. The purpose of this study was to determine the variables that effect perinatal outcomes among low-income African American women. A convenience sample of 19 women in Jefferson County participated in the exploratory study. It was hypothesized that the variables that effect perinatal outcomes among African American women are adequate prenatal care, childbirth classes leading up to the pregnancy, father involvement, and maternal experiences with the perinatal health staff. A survey was conducted that yielded both quantitative and qualitative results. Single women were more likely to have never attended birth/education classes during their pregnancy. Mothers, who reported that their partners were involved in their pregnancies, consistently reported positive experiences with the perinatal health staff. Adequate prenatal care, regular attendance at childbirth classes, and father involvement were necessary for healthy birth outcomes. However, more research is needed to determine reasons for late initiation of prenatal care, and low attendance rates at childbirth classes in order to eradicate health disparities among African American women.

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Chemical Protective Gloves for Pesticide Handlers. A. Shaw*, University of Maryland Eastern Shore, Princess Anne, MD 21853.

Personal Protective Equipment (PPE) is commonly used to protect the health of the pesticide handlers. EPA's Worker Protection Standard for Agricultural Pesticides requires that PPE requirements (including gloves) be stated on the product label. This information is designed to assist in the selection of appropriate PPE. According to the EPA *Label Review Manual*, the no glove requirement is the lowest level of protection for gloves followed by chemical resistant gloves. The label specifies the required type of chemical resistant glove based on the solvent in the product; reference is made to the category included in a chemical resistance chart. The chart has eight categories, eight types of materials, and four levels for each material. A database with data from 1,868 pesticide products was developed to identify issues related to the selection of gloves and other PPE. A total of 1,552 of the 1,868 products require chemical resistant gloves; 174 require waterproof gloves; 2 labels just stated gloves; and no gloves were required for 140 products. Glove descriptions varied considerably; for many, the terms waterproof and chemical resistant were used interchangeably. Many products listed gloves such as thin inexpensive polyethylene gloves typically used for handling food to Viton® gloves that cost over \$60. Another database was developed to better understand the types of chemical resistant gloves. Nitrile is the most commonly used material for unlined gloves. Information gained from the analysis of pesticide labels and availability of the gloves is being used to develop a performance-based approach for glove selection.

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Development of a Semi-Artificial Rearing System for the Granulate Ambrosia Beetle. K. M.

Addesso*, Otis L. Floyd Nursery Research Center, Tennessee State University, McMinnville, TN 37110.

The granulate ambrosia beetle, *Xylosandrus crassiusculus* (Mot.), is a pest of nursery trees in Tennessee. GAB females bore into tree trunks where they create galleries. The beetles and their larvae do not feed directly on the tree, but on a symbiotic fungus they carry which in turn feeds on the tree. GAB primarily attacks stressed trees during early spring with peak activity in Tennessee occurring in April. The narrow window of activity makes it impossible to field collect beetles year round for experimentation. A semi-artificial rearing system, therefore, would allow for laboratory production of GAB year round while optimizing both lab space and research time. The challenges in developing an artificial rearing system for GAB is in creating a medium acceptable to the females and the symbiotic fungus, as well as a diet that will remain unspoiled for the entirety of the larval lifecycle (approximately 6 weeks). Traditionally, artificial diets are formulated with antifungal compounds to prevent diet spoilage, but the necessity of the symbiotic fungus as the larval food source requires that fungal preservatives not be used and that the diet be handled under sterile conditions. Two rearing formulas modified from production systems of related ambrosia beetles were tested and designated as follows, (1) simple diet and (2) layered diet. The layered diet included the same medium as the simple diet but with the addition of a top layer of less nutritious medium in order to decrease surface contamination of the diet. Reproductive outputs for both formulas are discussed.

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The Effects of Salinity on *Phytophthora ramorum* Viability and Infectivity. D. Collins*, Department of Agriculture, Alcorn State University, Alcorn State, MS 39097; J. Preuett, Urban Forestry Program, Southern University, Baton Rouge, LA; D. Luster, and T. Widmer, USDA ARS Foreign Disease-Weed Science Research Unit, Fort Detrick, MD.

Phytophthora ramorum, a threat to Eastern U.S. forests, has been found in waterways outside the boundaries of infested ornamental nurseries outside of California and Oregon. Very little is known about what factors are conducive to its survival and sporulation in water. Water collected from various sources with different salinity was used to better understand what effect salinity has on the life cycle of *P. ramorum* and its ability to infect tissue. Water samples, collected from natural bodies of water in May 2010 that had measured conductivity values of 5.6, 30.5, 32.3, and 35.3 ms, were added to cups containing *P. ramorum*-infested sand (1,000 chlamydospores/cm³). Rhododendron leaf disks were placed on the water surface for 1 week at 20°C and then plated on a *Phytophthora*-selective medium (PARPH+V8). Very few leaf disks ($\leq 3\%$) were infected at the three highest conductivity levels while 100% infection occurred at the lowest level (5.6 ms). Similarly, Rhododendron leaf disks were placed on the surface of different salt solutions (conductivities of 10.3, 26.5, 36.0, 57.2, and 67.9 ms) added to *P. ramorum*-infested sand at two chlamydospore levels (100 and 1,000/cm³) for 1 week and plated on PARPH+V8. The percentage of leaf disks infected exposed to 100 chlamydospores/cm³ were 61.1, 23.1, 3.3, 0, and 0%, respective of the above conductivity values, while the percentage of infection at 1,000 chlamydospores/cm³ was 100, 70.0, 55.6, 2.2, and 0%, respectively. This research demonstrates that *P. ramorum* can form infective propagules that infect plant tissue at high salt concentrations gaining an insight as to the survival and factors affecting infectivity of *P. ramorum*.

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The Effects of Two Slow-Release Fertilizers on Fruit Growth, Development and Weight of Twelve Pepper Varieties. A. E. Clardy, and S. Crudup*, College of Agriculture, Human and Natural Sciences, Cooperative Extension Program, Tennessee State University, Nashville, TN 37209.

Alternative crop production and marketing strategies for new, small and/or limited resource producers and farmers to supplement their incomes need to be explored and developed. Growing specialty vegetables, especially peppers, as an alternative crop in Tennessee could be a potential answer to the alternative or niche market for new, limited resources and small growers. We will evaluate two (2) different slow release fertilizers to see which fertilizer develop healthier plants for the lowest cost and minimum labor. We evaluated twelve (12) different varieties of specialty peppers for their number of fruits per plant and weigh of fruit to determine potential marketing value for each specialty pepper variety as a potential alternative crop.

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Comparative Leaf Growth and Yield Response of Collards to Nutrient Solution Withholding or Concentration Increase during Hydroponic Culture. J. N. Egilla*, and I. Nyirakabibi, Cooperative Research Programs, Lincoln University of Missouri, Jefferson City, MO 65101; and R. A. Ogutu, Department of Agriculture & Natural Resources, Delaware State University, Dover, DE 19901.

Growth and leaf yield response of collards to nutrient solution withholding, or increase in nutrient solution concentration was evaluated in Nutrient Film Technique (NFT) hydroponic culture over a 52-day cropping cycle. Seedlings of collards (*Brassica oleracea* L. Acephala ‘Champion’) raised in 2.5-cm Rockwool cubes were transferred into NFT culture at the second true-leaf stage and grown for 16 days with a conditioning nutrient solution (15N–2.2P–12.5K at 200 mg N L⁻¹ plus micronutrients [N₂₀₀]). Between 17 and 68 days after transfer (DAT) into NFT culture, three nutrient treatments were initiated by (1) withholding N₂₀₀ (N₀), (2) refreshing N₂₀₀, or (3) replacing N₂₀₀ with 15N–2.2P–12.5K at 300 mg N L⁻¹ (N₃₀₀). The irrigation water (N₀), N₂₀₀ and N₃₀₀ were renewed at 33–DAT, and the pH was maintained between 6.5 and 7.0. At 20 days after initiation of nutrient treatment (DNT), marketable leaf fresh weight (LFW) yield, leaf dry weight (LDW), and leaf area (LA) were significantly ($p < 0.05$) reduced at N₀ compared with N₂₀₀ and N₃₀₀. By 52-DNT, all growth parameters, as well as leaf chlorophyll index estimated by the SPAD meter were lower at N₀ than both N₂₀₀ and N₃₀₀. Whereas between 20 and 52-DNT LFW and LA increased at N₃₀₀, they decreased at N₀ and N₂₀₀, while LDW decreased in all treatments ($p < 0.05$). Withholding nutrient supply for 32 days caused reduction in growth, and thus the marketable yield of collards despite culture in liquid hydroponic system.

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Survey of Stink Bug Species Found in Organically Grown Primocane-Fruiting Blackberry Plantings in Central Kentucky. J. D. Sedlacek, K. L. Friley*, K. W. Pomper, J. D. Lowe, S. B. Crabtree, I. Howard, and M. K. Bomford, College of Agriculture, Food Science, and Sustainable Systems, Kentucky State University, Frankfort, KY 40601.

Primocane-fruiting blackberries produce fruit on the current-season canes as well as on the floricanes, thus having the capability to produce two “crops” per year. Organic primocane blackberry production has great potential for small-scale commercial growers, as well as Community Supported Agriculture programs, and farmers’ markets. Stink bugs (Hemiptera: Pentatomidae) are pests of blackberries. These insects suck the juice out of drupelets as well as leave a foul odor and taste on the fruit. Primocane blackberry production may result in greater fruit damage by stink bugs in the late-summer and fall than with only summer floricanes fruiting. The objective of this study was to identify and quantify stink bug species in organically managed ‘Prime Jim’ and ‘Prime Jan’ cultivars using two collection methods. Florida stink bug traps were used to collect stink bugs as well as visual inspection and hand collecting in each plot weekly. Four stink bug species were identified. The red shouldered stink bug, *Thyanta custator*, was most abundant, followed by the twice stabbed stink bug, *Cosmopepla lintneriana*, brown stink bug, *Euschistus servus*, and green stink bug, *Acrosternum hilare*. Both visual inspection and hand collection of stink bugs, as well as Florida stink bug traps, resulted in capture of stink bugs. Although hand collecting required more time, more stink bugs were captured compared to the Florida stink bug traps, at 86% and 14%, respectively. Year to year populations of stink bug species may vary. Therefore, we will continue to monitor stink bug incidence in blackberry plantings.

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in vitro Anticancer Effect of Unique Plant Extracts in Cancer Cells. G. Hacisalihoglu*, and L. Washington, Department of Biological Sciences, Florida A&M University, Tallahassee, FL 32307.

For centuries, medicinal plants have been widely used by humans for healing diseases including cancer. Lung cancer is one of the leading cancer sites with 16% survival rate. Therefore, research into developing more effective lung cancer drugs is becoming increasingly important. Due to their renewable material source, and relatively low toxicity, plant based drugs are could be advantageous compared with microbial or marine sources. Therefore, in the present study, we decided to screen several medicinal plant species for their potential possession of anticancer properties. Results showed that ethanol extraction of one particular plant species tested inhibited the growth of A549 lung cancer cells. Furthermore, cell apoptosis was measured by annexin V assay as well. Further research to elucidate the mechanism is underway and will be presented and discussed.

Survey of the Invasive Rice Stem Stink Bug *Tibraca limbativentris* and *Oebalus* spp. (Hemiptera: Pentatomidae) in Rice Fields in the Dominican Republic. R. L. Hix^{*1}, M. T. K. Kairo², and E. German-Ramirez¹, ¹Center for Biological Control, Florida A&M University, Tallahassee, FL 32317; and ²University of Maryland Eastern Shore, Princess Anne, MD 2113.

The primary aim of this project was to make risk assessments and contingency plans for potential alien invasive stink bug species that could be introduced into the rice growing areas of the U.S.A. The rice stalk stink bug, *Tibraca limbativentris* (Hemiptera: Pentatomidae), was introduced into the Dominican Republic. Unlike *Oebalus* spp. which affect individual seeds, *T. limbativentris* feed on plants causing complete panicle loss during harvest affecting yield. While stink bugs are reported of agricultural significance in South America, few data are available on the economic importance and damage functions of *T. limbativentris* in rice. Growers in South America typically control it with various insecticides. In the past 20 years, two invasive stink bug pests of rice have been introduced into the U.S. *Oebalus ypsilongriseus* was reported in Florida in 1994; *O. insularis* was first reported in Florida in 2006. So far, *O. ypsilongriseus* and *O. insularis* do not occur in the rest of U.S. rice growing areas. *Oebalus* species feed on the developing grains reducing yield and quality. With the exception of a vector of a disease causing organism, *T. limbativentris* could be one of the worst insect pests in U.S. rice fields. U.S. rice growers don't normally monitor for *O. pugnax* before rice heading. The introduction of this insect would necessitate a change in sampling periods due to *T. limbativentris* feeding at the base of the plants in the vegetative stage. Four rice fields in six provinces were surveyed for stink bugs.

Differences in Phenolic Content and Antioxidant Capacity Among Spicebush (*Lindera benzoin* L.) Populations. H. Kobayashi*, C. Wang, and G. F. Antonious, College of Agriculture, Food Science, and Sustainable Systems, Kentucky State University, Frankfort, KY 40601.

Green tea (GT), made from *Camellia sinensis* (L.) Kunze, is a rich source of phenolic compounds with a high antioxidant capacity. Consumption in GT has been steadily increasing, partly due to health benefits such as lowering cholesterol, weight loss, and anticancer property. Nevertheless, domestic production of GT is confined to South Carolina and Hawaii, and thus consumption largely depends on imported tea. Possible contamination with heavy metals and pesticides in imported tea further complicate a stable supply of GT, and thus other species must be investigated as potential tea sources. Of those, spicebush (*Lindera benzoin* (L.) Blume) is native to the eastern part of the U.S. from Maine to Texas, and has been occasionally used as a tea. The objective of the study was to examine phenolic content and antioxidant capacity of spicebush teas (ST), harvested in Kentucky. Folin-Ciocalteu assay was performed to determine phenolic content, which was 19.0 for GT and 0.7 to 8.2 for ST's in g gallic acid equivalent/100 g dry weight. Similarly, Ferric Reducing Antioxidant Power assay was performed to assess antioxidant capacity of these teas, determined as 1068.1 (GT). Antioxidant capacity of ST's ranged from 59.3 to 273.7, expressed in μ mol of Trolox equivalent per g of dry weight. While phenolic content and antioxidant capacity of ST were less than those of GT, domestic production of ST potentially creates opportunities for both farmers and health-conscious consumers.

Comparison of the Mode of Action to Downy Mildew Disease After *Plasmopara viticola* Infection Between Resistant and Susceptible Grapevines. J. Lu^{*1}, Y. Ying², L. Yin², X. Xu¹, and Y. Zhang², ¹Center for Viticulture and Small Fruit Research, Florida A&M University, Tallahassee, FL 32317; and ²College of Food Science and Nutritional Engineering, China Agricultural University, Beijing, 100083, China.

The resistance/susceptibility of grapevines to the downy mildew (DM) disease caused by *Plasmopara viticola* (Pv) were investigated in susceptible *Vitis vinifera* and resistant *Vitis rotundifolia* grapevines. After inoculation with Pv pathogen, no symptom was found in *V. rotundifolia* grapevines at all, while *V. vinifera* showed severe symptom of the downy mildew disease. Microscopy studies revealed that no *P. viticola* hypha was observed in pv-inoculated *V. rotundifolia* leaves, while abundant hypha development and haustoria formation were observed in DM susceptible *V. vinifera* grapes. In addition, hypersensitive cell deaths were observed in *V. rotundifolia* and other highly DM resistant grapevines.

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An Efficient Micropropagation System for Alexandrian Laurel. G. Yang, Z. Lu*, and X. Shen, Department of Natural Resources and Environmental Design, North Carolina Agricultural and Technical State University, Greensboro, NC 27411.

Alexandrian laurel (*Danae racemosa* L.) is a popular evergreen shrub in the shade and woodland gardens for landscaping. The propagation issues for this highly desirable plant, slow germination, low germination rate, and slow growth, has limited its commercial availability. We developed an efficient micropropagation protocol that can rapidly produce this plant species. Our protocol enabled us to germinate Alexandrian laurel seeds in only 2 to 3 months compared with conventional methods that take 12 months or more, and achieved a much higher germination rate of 80 to 100% compared with conventional method of about 20%. Our micro-propagated plantlets also demonstrated more vigorous growth that was characterized by healthier looking and significantly more roots than conventionally seed-propagated plants. Plant growth regulators such as BA and TDZ were also tested as a means of increasing shoot multiplication and seedling quality enhancement with a more balanced shoot and root growth. Our data indicated that BA balanced seedling development by simultaneously accelerating shoot growth and slowing down root growth, whereas TDZ significantly promoted shoot multiplication and proliferation by producing about 30-40 shoots per seed. The micro-propagated plantlets were successfully acclimatized and grow vigorously under greenhouse and field conditions. Much progress has been made in our micropropagation of Alexandrian laurel, and the research is on-going to further improve the efficiency of our micropropagation protocol.

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Evaluation of the Fertilizer Value of a Legume Cover Crop on Sweetpotato Yield. S. Ntamatungiro*, and J. Davis, Department of Agriculture, University of Arkansas at Pine Bluff, Pine Bluff, AR 71601.

A legume crop grown before sweetpotato can fix nitrogen (N) and allow farmers to reduce the amount of N fertilizer to apply on the sweetpotato crop. A field study was conducted to evaluate the N requirement of sweetpotato grown after a legume cover crop. We evaluated a treatment receiving twice the recommended rate of N fertilizer on plots that did not have the legume crop during winter, and treatments receiving no N fertilizer, recommended N fertilizer, twice the recommended N fertilizer following a legume cover crop. Above ground dry matter and root yields at 40 and 60 days after planting as well as marketable yield components at harvest were determined. Results will be presented to show if using a legume cover crop can allow to produce sweetpotato at lower than recommended N fertilizers which will save money for the sweetpotato farmer.

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High Tunnel, Early Spring Production of Five Varieties of Tomato Using Three Different Trellising Systems. R. A. Ogutu*, and J. Challandes, Delaware State University, Dover DE, 19901.

The high demand of fresh tomatoes and value added tomato products has made early production of tomatoes in high tunnels a popular practice by Delaware small farmers. Five varieties of tomatoes were started in a 24 by 48 foot high tunnel using different trellising systems as follows; determinate variety 'Organic King' were caged; indeterminate varieties Mountain Fresh', 'Better Boy', 'Early Goliath' and 'Prudence Purple' were either trellised using Florida weave, or staked. Tomatoes were transplanted into back plastic-covered raised beds at a spacing of 2ft between plants. Plants were drip irrigated and fertigated using fish emulsion. Soil nutrient status was evaluated before and after production period and air temperatures in the high tunnel tracked. Tomato fruit yields from six harvests over a period of nine weeks were quantified by counting and weighing mature tomatoes ready for fresh market. The 'Organic King' produced the most highly marketable tomatoes, with the longest shelf lives, and tasted among the best. The 'Prudence Purple' grew very large and tall showed high yields. Trellising using Florida weave was less time consuming than staking for indeterminates, while caging required a larger spacing between plants, than was provided.

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Inheritance of Powdery Mildew Resistance and Screening for Resistance Markers in *Cornus florida*. L. P. Parikh*, Department of Agricultural Sciences, Tennessee State University, Nashville, TN 37209; and G. Zhang, Agriculture Research Center, Kansas State University, Manhattan, KS 66506.

Flowering dogwood (*Cornus florida*) is an economically important ornamental tree with 30 million dollars in annual total sales; 23.2% of the total US dogwood supplies come from Tennessee.

Powdery mildew is one of the most devastating diseases in nursery production of flowering dogwoods across the Southern US. Although, effective fungicides for powdery mildew control have been identified, routine applications are required season-long. This has increased production costs and forced small growers out of business. Powdery mildew resistance is the best method for controlling this disease; it reduces production costs, and is environmentally friendly. While efforts to breed for powdery mildew resistance are being taken, only a few cultivars have powdery mildew resistance; understanding the pattern of inheritance of powdery mildew resistance from parents to progeny is of utmost importance to facilitate breeding strategies. The aim of this research project was to study the inheritance of the powdery mildew resistance in previously selected plants (R14 and M19) that have consistently exhibited resistance at multiple locations. Controlled crosses from hand pollination were carried out between susceptible (Cherokee Princess) and resistant selections (R14, M19). Progeny seedlings were exposed to powdery mildew and rated for disease reaction. Genome wide analysis of the parents and the progeny was done using Simple Sequence Repeat markers (SSR's). The polymorphism pattern was studied in an effort to identify markers that are linked with powdery mildew resistance. Results from this study will facilitate marker assisted breeding (MAB) in *C. florida*.

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FamO28-22-5: a Selection for Premium Red Muscadine Wine in Florida. Z. Ren*, J. Lu, X. Xia, and F. Bradley, Florida A&M University, Tallahassee, FL 32317.

Poor and unstable color has been one of the major concerns in breeding for red muscadine wine. In the efforts to improve the wine industry in Florida, Florida A&M University's grape breeding program selected 'FamO28-22-5' as a potential premium red muscadine wine. Eight-year field data and five-year enology information proved that this breeding selection has great potential to become a premium red muscadine wine grape cultivar. Panel taste results of several years indicated that the wine possesses excellent quality, with even more attractive and stable color than "Noble", the best premium red muscadine wine in Florida. This selection is therefore worthy of further studies and more comprehensive testing.

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Techniques Necessary to Validate Molecular Markers for Breeding Programs. R. L. Turner*, and B. E. Liedl, Gus R. Douglass Institute, Agricultural and Environmental Research Station, West Virginia State University, Institute, WV 25112.

Our tomato breeding program focuses on developing lines incorporating insect and disease resistance as well as improved organoleptic traits for protected culture production. Several of the traits we are interested in are available in germplasm developed at other institutions and have molecular markers developed to assist with transfer of the trait. Tomato was one of the first crops where molecular markers were used for breeding purposes. Today the tomato genome is sequenced and numerous molecular markers have been associated with various important traits. However, not all of these markers are reliable or applicable for use outside of the populations for which they were developed. Thus bringing new markers for use in a breeding program will require evaluation of the genotypes for utility and reproducibility. PCR amplicons are relatively easy to obtain from most markers but optimization may be required for PCR or restriction digestion. Estimating size of restricted amplicons is often difficult due to less than 20 bp differences between the bands of interest. This is exacerbated when the ladder that estimates size is inaccurate. Further, band sizes do not always correlate with those reported in the literature. Confusion can also occur when bands other than those associated with the marker are mistakenly scored. Additional techniques are necessary to verify the marker. Sequencing of the amplicons may be essential to confirm the marker of interest aligns with the reported genomic region. Development of new markers may be required if the markers cannot be validated.

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Comparative Evaluation of Selected Vegetable Yields in Raised Bed Culture. G. Umar*, and B. R. Phills, Center for Viticulture and Small Fruit Research; and R. Said, and M. Haseeb, Center for Biological Control, College of Agriculture and Food Sciences, Florida A&M University, Tallahassee, FL 32317.

One of the most frequently asked questions by small farmers and home gardeners is what crops can I grow to maximize my yield during the late spring and summer months of the year. To answer these question and others related to vegetable production, a series of 36 raised beds were established as a part of FAMU's Raised Bed Vegetable culture using best management practices. Crops were planted in March and

grown for a period of five months ending in early August. Beds were established using either cement building blocks or 2" x 12" x 12' treated lumber. Bed size was 4' x 12' and equipped with individualized drip tape irrigation. Half of the beds received traditional fertilizer applications and half received organic rates. The vegetable crops consisted of okra, green and red bell pepper, green beans, mustard, turnips and collard greens, eggplants, and tomatoes. Results from this experiment showed that selected vegetables can be grown successfully throughout the spring and summer. Data showed that crops grown under traditional management systems were higher in yield and generally less impacted by pests possibly because of less growth stress. All plots received the same rate of irrigation and therefore were not a factor in yield or other growth comparisons. In terms of yield, all traditional crops were higher in production than the organic crops due in large measure to insufficient nutrient availability. Okra and bell pepper were the most productive and offers the greatest economic potential. Other crops offering good potential were snap beans and the greens.

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Breeding Barriers in Seedless Muscadine Grape Breeding. X. Xu*, J. Lu, Z. Ren, and F. Bradley, Center for Viticulture and Small Fruit Research, Florida A&M University, Tallahassee, FL 32317.

Muscadine grape (*Vitis rotundifolia* Michx.) is a native species of southeastern United States and has been identified as a major source of resistance to many primary grape fungal and bacterial diseases for improving other bunch grapes (*V. vinifera*, *V. labrusca* or their derivatives). It is also prized for its high levels of phenolic compounds such as resveratrol and ellagic acid. Due to its nutritional and medical values in anti-microbial, anti-aging, and anti-inflammatory activities, there is a tremendous demand for its fruits and products. Unfortunately, all muscadine grape cultivars contain large seeds, which shorten the consumers' expectation for table consumption. With the developmental potential to become a very important economic crop in the southeastern United States and to be introduced into the remainder of the US market, it is imperative to create the 'ideal seedless muscadine grape cultivar' in a muscadine grape breeding program. This research presented our six years' long seedless muscadine grape breeding results, barriers encountered and further improvement by traditional hybridization, protoplast fusion, and polyploidy breeding method.

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***in vitro* Shoot Regeneration and Genetic Stability Evaluation of Oriental Lily (*Lilium orientalis*) Using ISSR Markers.** G. Yang*, and X. Liu, Department of Natural Resources and Environmental Design, North Carolina A&T State University, Greensboro, NC 27411.

in vitro shoot regeneration of Oriental lily was established using leaf and bulb scales on a Murashige and Skoog (MS) medium containing thidiazuron (TDZ) or 6-benzylaminopurine (BA), and naphthaleneacetic acid (NAA). Leaf explants cultured on an MS medium containing 10.8 µM TDZ and 0.54 µM NAA produced the highest percent of shoot regeneration (74.2%). Bulb scale explants cultured on MS medium containing 0.54 µM TDZ and 0.54 µM NAA generated the highest average number of shoots (4.4). Shoots generated from both leaf and bulb sources were successfully rooted at rates ranging from 79.2 to 100%. The rooted plantlets were successfully acclimatized and grew vigorously in the greenhouse. In order to determine the genetic stability of the regenerated shoots to the original mother plant, eighteen ISSR markers were used for evaluation. Eleven primers produced 70 clear and reproducible bands. Genetic similarity indicators among the clonal derivatives and the mother plant ranged from 0.92 to 1.0. This marker approach enabled us to successfully group 15 micro-propagated progenies and the mother plant in a single major cluster with a similarity level of 92%. Among the regenerated plantlets, the somaclonal variation rate was estimated at 4.2%, indicating that *in vitro* shoot regeneration of oriental lily will produce "true-to-type" plantlets.

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Antioxidant Capacity of Eight Large-Seeded Soybean Breeding Lines in Virginia. B. Zhang*, J. Parry, T. Mebrahtu, H. Li, and L. Coral, Agriculture Research Station, Virginia State University, Petersburg, VA 23806.

Antioxidants have been reported to reduce the risk of human diseases caused by free radical-induced oxidative damage such as cardiovascular diseases, diabetes and cancer. Soybean (*Glycine max*) seeds have been shown to be the source of natural antioxidants in order to provide health advantages and therapeutic properties. The most popular soyfood, soy milk and tofu, requires large-seed soybeans.

However, the information on antioxidant capacity of large-seeded soybeans is very limited. Eight elite large-seeded (> 20 g/ 100 seeds) soybean breeding lines developed by Virginia State University were investigated in 2006 and 2007 for seed size, yield and antioxidant activity shown by total phenolic content (TPC), radical scavenging activities against free 1,1-diphenyl-2-picrylhydrazyl (DPPH) radical and oxygen radical absorbance capacity (ORAC). Seed size of all lines in 2006 was 26.0 g/ 100 seeds in average, larger than that in 2007 (21.3 g/ 100 seeds) due to better precipitation in 2006. The yield of most tested lines was not significantly different in 2006 and 2007 except for the largest breeding line VS03-688. The TPC value of all breeding lines had no significant difference, whereas the average TPC in 2006 was significantly lower than that in 2007. Significant differences of DPPH_{EC50} existed among soybean breeding lines. The yellow soybeans had significantly higher DPPH_{EC50} than other color soybeans. ORAC value was not different among all breeding lines, between years, or among different color beans. Seed size, yield, TPC, DPPH_{EC50} and ORAC were not significantly correlated, but seed coat color value and DPPH_{EC50} were significantly correlated.

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Evaluating the Impacts of Hydrologic Processes on the Water Quality in Goodwater Creek Watershed in Missouri. O. M. Al-Qudah*, and F. Liu, Department of Agriculture and Environmental Science and Cooperative Research Programs, Lincoln University, Jefferson City, MO 65101.

Goodwater Creek Watershed has a known and well-documented history of herbicide and sediment contamination problem. The naturally formed claypan soil that predominates within the basin creates a barrier to percolation and promotes surface runoff. This results in a high degree of vulnerability to surface transport of sediment, pesticides, herbicides, and nutrients. The primary research objective of the present work is to develop a baseline understanding of impact of hydrologic processes on water quality. Statistical and spatial analyses were employed to examine the temporal and spatial variations of water quality in the watershed. Nutrient and herbicide concentrations were analyzed for rainfall, surface water, and groundwater from samples collected at 25 locations from 1991 to 2004. The results showed that herbicide concentrations in groundwater were very low comparing to those in rain water and stream water because herbicide leaching was limited by the extent of its degradation in the soils during the growing season. In contrast, nitrogen concentrations in groundwater were highest. Herbicide concentrations in stream water were primarily from surface runoff and near-surface flow. These results suggest that the dominant process responsible for water pollution in the system is hydrologic pathways.

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Establishing an 1890s Land Grant Universities Water Center. A. Atalay*, Virginia State University (Lead); Alabama A&M University; Florida A&M University; Alcorn State University; Tennessee State University; Lincoln University; Tuskegee University; University of Maryland Eastern Shore; University of Arkansas at Pine Bluff; Kentucky State University; Delaware State University; and North Carolina A&T University.

An effective virtual Water Center has been established to transmit research, education, and extension activities of the 1890s Land Grant Universities. Its objectives are: to enhance and/or initiate integrated water programs at each 1890 LGU through collaborative research, teaching, and outreach efforts; to investigate and document water and related issues within rural and underserved communities; to develop a geo-spatial database on water-related issues that can be used as decision-making tools. Research, extension and academic programs can benefit a great deal from such a resource. The website bridges the gap among institutions by sharing education and outreach methods, tools and technologies, and other needed information on water and related environmental issues, thus enabling research, academic, and extension programs to become more visible, accessible, and effective. The following activities are currently underway at partnering 1890 institutions: NCA&T- "Research and Education in Rainwater as an Alternative Water Supply"; LU- "Enhanced Atrazine Removal from Water by Ordered Mesoporous Carbon"; FAMU- "Assessment of bacterial Impairment in two Rural Watersheds in North Florida"; AAMU- "Implementation of the Alabama Urban Home*a*Syst Program: An Environmental Risk Assessment Program for Urban Homeowners"; DESU- "Outreach Efforts on Water Quality Monitoring by Volunteer Oyster Gardeners and Infusion of GIS in Data Dissemination"; KSU- "Impact of Municipal Sewage Sludge and Chicken Manure on Metribuzin and Chlorpyrifos Mobility from Soils into Runoff and Seepage Water"; TSU- "Water

Smart: Water Resource Academy for 1890 County Agents”; and VSU- “A Feasibility Study for Simultaneous Fish and Lettuce Production in Ponds Using Floating Structures”.

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Molecular Characterization of Green Microalgal Isolates from Missouri in Prospective of Biodiesel Production and Culture Collection. B. Balakrishnan*, S. Palanisami, and K. Lee, Center for Bioenergy, Cooperative Research, Lincoln University, Jefferson City, MO 65101; and P. Nam Department of Chemistry, Missouri University of Science and Technology, Rolla, MO 65401.

Microalgae are extensively studied for their day-by-day increase of commercial values. Microalgae are promising source of renewable energy by producing energy rich oil. Among the microalgae green microalgae (*Chlorophyceae*) were widely recognized for its enhanced production of biodiesel and biomass. For the extended ways of this group of microalgal applications require further hunt from the natural environment. In this context, a total of 206 green algal isolates were isolated from the water samples collected from various ecological niches of Missouri. Based on the morphological and growth characters 97 isolates were selected for further identification. Further, selected unialgal cultures were subjected for molecular characterization using 18S rDNA and RuBisCO gene sequencing. Similarity searches were performed for all DNA sequences with microalgal type strains available in public databases and species representative sequences were submitted in GenBank database. From this 25 different species were identified and the relationships between the species were evaluated by phylogenetic analysis. Further the *axenic* cultures of species representatives were examined for their lipid production ability. Among the total population, genus *Scenedesmus* and *Chlorella* were dominated as well as recorded good growth in sense of biomass beside highest lipid production. Selected candidates from the study can be useful to large-scale outdoor cultures in the future. The study suggests the importance of culture collection in search of biofuels from *Chlorophyceae*.

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Solar Powered Anaerobic Digester for Biogas Production from Agricultural Residues.

S. Barizuddin*, M. Dweik, and H. El-Mashad, Cooperative Research Programs, Lincoln University, Jefferson City, MO 65101.

Anaerobic digestion is a mature technology that has been applied for decades for biogas production from manure and other organic wastes. However, little research has been done on optimizing the biogas production from scale digesters. To save some of the biogas that could be burned to keep the system at the desired temperature and to mix the reactor contents, solar heating and photovoltaic system have been proposed. A pilot scale integrated system has been designed and installed at Lincoln University. The integrated system is composed of 165 gallons anaerobic digester, a solar heating system and a photovoltaic system. The results of the laboratory scale CSTR will be validated using a pilot scale integrated system that is installed at Lincoln University. The pilot scale system is composed of a 165-gallon anaerobic digester heated with a 2 m² vacuum tube solar collector and mixed with a 1.5 KW photovoltaic system. The photovoltaic system has an electricity storage system (asset of batteries) to provide the required electricity required to operate the system during sun set hours. The system will treat a mixture of manure and food at mesophilic conditions (35°C). The characteristics of biogas and both liquid and solid fractions of the digestate will be determined and presented in the full article. It is expected that this system could be a good system that could be applied in small farms in remote areas.

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Enhancing Biodegradation of Pesticides Using Biofilter Materials. B. Chu*, and F. Eivazi, Cooperative Research, Lincoln University of Missouri, Jefferson City, MO 65102.

Although the use of agricultural chemicals has been an important factor in improving agricultural productivity, the indiscriminate use resulted and continues to lead to contamination of surface and ground water. Spillage and application of agricultural chemicals can become point and non-point sources of soil and water contamination. Biofilter technology utilizes soil amendments to enhance microbial degradation of agrochemicals. The goal of this study is to develop a biofilter system that adapts to the soil and environmental conditions of Missouri to treat and dispose of selected pesticide wastes on farm, and gain understanding of biofilter technology and its potential application to prevent the accumulation of pesticide contaminants. Several biofilter mixtures consisting of topsoil, straw and peat with different mixing ratios were tested in a laboratory scale pesticide degradation experiment. Two of the most commonly used

pesticides, atrazine and glyphosate, were added into biofilter mixtures contained in glass jars. Degradation kinetics over 3 months were analyzed and pesticide half life (DT_{50}) and degradation time for 90% removal (DT_{90}) were compared to determine the optimal biofilter materials composition for atrazine and glyphosate degradation. Future studies include additional degradation experiments of different pesticides, identification of microbes in the biofilter, and eventually establishment of an on-farm biofilter.

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Evaluating the Effectiveness of a Swine Waste Treatment System on the UAPB Farm.

W. Columbus*, and E. R. Buckner, Agriculture Department, University of Arkansas at Pine Bluff, Pine Bluff, AR 71601.

On the University of Arkansas at Pine Bluff (UAPB) Demonstration and Research Farm, a Swine Waste Treatment System (SWTS) has been implemented for treatment of solid and liquid swine waste. The SWTS consist of three 1,000 gallon septic tanks that will hold solid waste from the swine farrowing house and swine feed-out lots, and an anaerobic lagoon that has a storage volume of 2,637 cubic yards and a surface area of 0.29 acres, into which liquid waste and rain water flows. The system also consists of a three cell constructed wetland, which is located to the south of the anaerobic lagoon. The dimensions of each cell are 24 feet x 150 feet. The SWTS is intended to treat surface runoff water that is currently being used as a source of drinking water for farm animals. This project is a one-year study on the effectiveness of the SWTS in the removal of phosphorus, total nitrogen, nitrate, nitrite, and ammonia.

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Efficiency of Selected Genetically Diverse Plant Species in the Phytoremediation of Manure Enriched Soils. R. B. Dadson*, and F. M. Hashem, Department of Agriculture, Food and Resource Sciences, University of Maryland Eastern Shore, Princess Anne, MD 21853.

Poultry production is the major agricultural enterprise on Delmarva. Poultry manure has been used for decades to enhance soil fertility and improve crop production. The repeated application of poultry manure to croplands resulted in excess phosphorus (P), which is usually associated with undesirable effects such as pollution of the Chesapeake Bay, eutrophication, and fish kills in water bodies on the Delmarva Peninsula. Plant-based P remediation strategies have been suggested as an environmentally-friendly process to clean the bay. Corn, sorghum, Sudan grass, soybean, and cowpea were used in this study. Our main objective was to determine the difference in P uptake by the various genotypes of corn, soybean, and cowpea harvested at milk stage of grain formation in poultry manured enriched soils. Field experiments were conducted during three growing seasons at two sites. One site had annually received poultry manure over the last 10 years while the other site had not received any. Results showed that corn genotypes 57K14 and DKC 64-11 exhibited superior P uptake in both soil treatments. The superior P extraction of genotypes 57K14 and DKC 64-11 relative to that of other genotypes indicates a potential to improve P uptake by corn genotypes and the possibility of using this innovative approach for phytoremediation of soils. Further, some genotypes of corn, cowpea, and soybean could play significant roles in soil nutrient management. This would alleviate the concern of the movement of P from poultry-manured soils into ground water and drainage ditches, subsequently causing the degradation of aquatic system degradation.

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Identification of *Escherichia coli* DNA Marker for Tracking Sewage Pollution in Water. D. Deng*, and G. Zheng, Cooperative Research Programs, Lincoln University in Missouri, Jefferson City, MO 65101.

Identification of the human fecal contamination is extremely important for the prevention of disease outbreak and for the effective mitigation of impaired water systems. The goal of this study is to identify human specific *E. coli* genetic markers to develop a host-specific microbial source tracking (MST) method for tracking human fecal pollution in water. Using the approaches and tools of bioinformatics, a collection of over 20,000 genes and DNA fragments of *E. coli* associated with fecal and intestinal samples from different hosts (human, cattle, chicken, deer, duck, goose, horse, pig, turkey and other animals) were classed and calculated to search for the potential host-specific DNA markers. As a result, 10 candidate genes were identified *in silico* to be highly associated with human and were further evaluated for their host specificity by polymerase chain reaction (PCR) assays using a panel of over 500 *E. coli* strains, which were isolated from 12 different animal species including human. An *E. coli* DNA fragment, 2833, demonstrated by PCR assays, can be used to differentiate *E. coli* strains of human source from those of all others. This

result indicates that DNA fragment 2833 may be useful as a genetic marker for tracking sewage pollution in water.

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Watershed Academy for County Agents in Tennessee. S. O. Dennis*, and T. Byl, Tennessee State University, Nashville, TN 37209.

With increased stresses on the world's water resources, particularly with the impact of global climate change, farmers and others interested in safe, reliable water sources are paying attention to surface and groundwater vulnerability to contamination and availability. Farmers, landowners, and homeowners use chemicals such as pesticides and fertilizers for farming, gardening, lawn care, and pest management in their watershed(s). These chemicals can have a significant impact on water quality in rural and urbanizing watershed(s). Thus, increasing farmers, landowners and homeowners' awareness and knowledge of the impact these activities have on watersheds will influence their views on environmental stewardship and use of managed landscapes in their community. Traditionally, these end-users call on Extension Agents for information on the use of the chemical inputs. 1890 LGUs extension agents come from a variety of background and may not be comfortable with or know how to answer questions pertaining to point and non-point source pollution, well-head protection, low yielding water wells and other water resource issues. Therefore, the main thrust of the project is to educate Tennessee's Agriculture and Natural Resource (ANR) County Agents, thus fostering their decision process in communicating technical issues in water resources to clientele. The project objective is to have training workshops and webinars for ANR county extension agents. These agents will serve as the clearing house for information pertaining to water resource vulnerability to contamination and availability. In a post workshop survey questionnaire administered to the attendees (10), 100% of the ANR agents indicated that the information and skills presented will be useful in their execution of their job as an ANR County Agent. The same percentage indicated that their knowledge pertaining to surface water quality was enhanced.

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Dye-Sensitized Solar Cell. M. Dweik*, Cooperative Research Programs, Life & Physical Sciences, Lincoln University, Jefferson City, MO 65101.

The ever-increasing need for energy and the limited resources of fossil fuels has been the main motivation to find renewable and alternate energy sources. The development in the field of alternate energy and its potential to be a vital supplement to the fossil fuel supply, and solve the energy problem has generated immense interest in the area of photovoltaics. Photovoltaic is the direct conversion of light into electricity. Efficiency of photovoltaic cells has been a major problem in the move towards expanded use of solar energy as an energy source. There are many factors that affect the solar cell output, like bandgap of the material, absorption and wavelength being some of them. Different materials are being researched to alleviate the problem of limited efficiency. Especially, the use of nanoparticles offers unique properties like high carrier mobility, large surface areas, high current carrying capability, mechanical strength and chemical stability. In this study we report a simple solar cell assembled for academic purposes using ITO (indium tin oxide) coated glass slide, nanocrystalline metal oxide (TiO₂) and simple materials like red wine vinegar (dye) etc. The efficiency of these fabricated devices was measured. Many prototypes were fabricated and tested to check the principle and efficacy of the device. All of the devices generated a voltage output. The estimated output for such devices is expected to be around 0.45V, but we have been able to increase this average to 0.62V. The proposed device can advance the move towards efficient, renewable, cost effective and environmentally friendly energy source.

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Growth Kinetics of *Spirulina platensis* Cultivated in Different Media at Different Air Flow Rates. H. El-Mashad*, and M. Dweik, Cooperative Research Programs, Lincoln University, Jefferson City, MO 65101.

Algae and Cyanobacteria are the main feedstocks for the third generation biofuels. Optimization of algae production in photobioreactor is needed to reduce the production costs of bioenergy. *Spirulina algae* can be used as a human food or as a feedstock for the production of biogas and biohydrogen. The objective of this study was to study the growth kinetics of *Spirulina Platensis* cultivated in Zarrouk medium (ZM), commercial nutrient media (F/2 media A and B, CNM), and CNM and bicarbonate (CNMC) at two intermittent air flow rates (2 L/L.min and 3 L/L. min) for one minute every five minutes. All experiments

were conducted in batch reactors at $30 (\pm 1) ^\circ\text{C}$ and continuous low illumination of $50 (\pm 2) \mu\text{mol.m}^{-2}.\text{s}^{-1}$. A modified Gompertz kinetic model was applied to estimate the maximum concentration of algae and growth rate that could be attained under the studied conditions. Model parameters were estimated using the *nlinfit* function in Matlab software. Results showed that a maximum cell productivity of $21.91 \text{ mg [dry biomass]/L. day}$ could be determined after 30 days using the ZM at the flow rate of 3 L/L.min . There was no significant effect of air flow rates on the cell productivity when CNM and CNMC were used but there were significant differences when ZM was used. The maximum concentrations calculated after 30 days of cultivation were 0.92 and $0.83 \text{ g [dry biomass] L}^{-1}$ and the highest growth rates were 0.028 and 0.014 day^{-1} using the ZM under high and low air flow rates, respectively.

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Farmers' Willingness to Grow Energy Crops for Cellulosic Biofuel Production. H. Gedikoglu*, Department Agriculture and Environmental Sciences, Lincoln University of Missouri, Jefferson City, MO 65101.

The Energy Independence and Security Act of 2007 set a renewable fuel standard of 36 billion gallons of biofuel production by 2022, of which 21 billion gallons are to come from cellulosic sources, such as switchgrass and miscanthus. The objective of this study is to measure the impact of innovativeness and environmental stewardship on farmers' willingness to grow switchgrass and miscanthus. The results of the current study show that innovative farmers are not more willing to grow switchgrass or miscanthus than late adopters and laggards. Farmers' environmental stewardship is found to have a negative impact on willingness to grow switchgrass and miscanthus.

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Biomass and Sweet Sorghums Maintain High Yields Under Low-Inputs. H. P. Singh*, and B. P. Singh, Agricultural Research Station, College of Agriculture, Family Sciences and Technology, Fort Valley State University, Fort Valley, GA 31030.

The objective of this research was to study the optimum amount and mode of nitrogen inputs to maintain sustainable production of biofuel feedstocks from two sorghum (*Sorghum bicolor* L. Moench) types (biomass and sweet) on marginal land. Varieties ES5200 and EJ7281 were used for planting biomass sorghum and sweet sorghum respectively, and the plots were provided with input combinations of two nitrogen fertilization rates (0 kg ha^{-1} and 90 kg ha^{-1}) and three winter cover crop treatments, viz., annual rye, hairy vetch, and annual rye plus hairy vetch. The preliminary results have shown no significant difference in dry matter yield of both biomass and sweet sorghums in response to nitrogen rates or cover crops. The dry matter yield ranged from $15.6 - 18.21$ and $13.4 - 18.48 \text{ Mg ha}^{-1}$ for forage sorghum and sweet sorghum, respectively. Cover crops added significant amounts of dry matter to the soil in comparison to control plots. Annual rye provided significantly higher dry matter (1.132 Mg ha^{-1}) to the soil than hairy vetch and annual rye plus vetch. The juice yield of sweet sorghum ranged from 4892 to 9754 L ha^{-1} , while sugar yield ranged from 0.8 to 1.8 Mg ha^{-1} . Annual rye plus hairy vetch showed significantly higher juice and sugar yield in comparison to control while other treatments were similar to control. The results suggest that both biomass and sweet sorghums can be produced for bioenergy with minimal external inputs.

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Characterization of Dissolved Organic Nitrogen Using X-Ray Photon Spectroscopy and Nuclear Magnetic Resonance. B. Hua*, J. Yang, Department of Agriculture and Environmental Sciences, Lincoln University of Missouri, Jefferson City, MO 65102.

Dissolved organic nitrogen (DON) in surface waters has increased globally by a factor of two above natural levels, primarily resulting from agriculture-related activities. However, information on the occurrence, chemical structure and transport of DON is extremely limited due to lack of adequate methods for DON characterization. Understandings of the DON sources and characteristics in surface waters are critical for preventing many environmental problems associated with high levels of DON. As a part of our effort to develop a rapid and cost-effective DON tracking technology, X-ray photon spectroscopy (XPS) and nuclear magnetic resonance (NMR) were applied to elucidate the chemical properties of dissolved organic nitrogen in water from a variety of ecosystems. Six water samples were collected from Hinckson Creek, landfill, and constructed wetland at Columbia, MO. Solid organic matter was isolated from the collected samples and analyzed for chemical structure and composition. XPS results indicated that the nitrogen oxidation state was closely related to redox potentials of the sources. NMR results reveal that the

major functional groups of DON were also source-dependent. Data will improve our capability to effectively manage the important natural and engineering processes influenced by DON, such as primary production of biomass in aquatic systems, lake eutrophication, DBP formation, and membrane fouling in drinking water treatment.

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Improving the Understanding of Floodplain Biogeochemical Processes in a Central U.S. Urbanizing Watershed. A. Ikem*, Lincoln University, Department of Agriculture and Environmental Sciences, Jefferson City, MO 65101; and J. A. Hubbart, University of Missouri, Department of Forestry and Department of Soils, Columbia, Missouri, 65211.

Floodplain management practices are in need of advancement, particularly in regions where coupled urban and climate impacts will likely increase flooding. Bottomland hardwood forest (BHF) conversion to agriculture in the 19th and 20th centuries drastically altered the hydrology of streams, floodplains, and remnant BHF of the central US. Anthropogenic nitrogen (N), phosphorus (P) and carbon (C) loads in surface water systems are of growing concern due to possible groundwater and receiving water body contamination. Instrumentation was installed in lower reaches of the Hinkson Creek Watershed (230km²) in the spring of 2010 in a case study comparing remnant BHF and agricultural (Ag) floodplain sites. Instrumentation includes two 80 m² grids of eighteen equally spaced piezometers. Monthly water samples were collected and analyzed immediately using pH/electrical conductivity (EC)/total dissolved solids (TDS) meter, total carbon (TC)/total nitrogen (TN) analyzer, spectrophotometer for anions and the inductively coupled plasma – optical emission spectrometry for elemental species starting in June 2011. Preliminary analyses (June – November 2011) indicate 21, 35, and 22 % greater TC, total inorganic carbon (TIC), and TN, respectively, in the BHF, and 8 % less total organic carbon (TOC) in the BHF relative to the Ag site. From June to December 2011 there was 41 % greater TDS in the BHF, and 28 % less orthophosphate in the BHF, relative to the Ag site. Ongoing research and subsequent results hold important implications for future floodplain management practices in the Midwest. Research will yield recommendations to best manage vegetation and the hydrologic regime of urban floodplains and the services provided considering growing urbanization and future climate scenarios.

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i-Tree Ecosystem Analysis City of Mandeville, Urban Forest Effects and Values, Louisiana.

T. N. Legiandeny*, and K. K. Abdollahi, Urban Forestry Program, Southern University Agricultural Research and Extension Center, Baton Rouge, LA 70813.

An analysis of the benefits of trees in the city of Mandeville, LA, revealed that this area has about 151,347 trees with tree and shrub canopies that cover 54% percent of the city. The most common tree species are loblolly pine, bald cypress, water oak and live oak. Trees in the City of Mandeville currently store about 8,609 tons of carbon per year with an associated estimated value of \$1.5 million per year. In addition, these trees remove about 428,117 of carbon dioxide per year. Mandeville's trees are estimated to reduce annual residential energy costs by \$81,753. The structural value of the trees is estimated at \$766 million. Information on the structure and functions of the urban forest can be used to inform urban forest management programs and to integrate urban forests within plans to improve environmental quality in the city of Mandeville.

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The Effect of Quality of Parks on Neighboring Property Values. A. B. Lorenzo*, K. A. Milla, and M. H. Thomas, Division of Agricultural Sciences, College of Agriculture and Food Sciences, Florida A&M University, Tallahassee, FL 32307.

Using hedonic pricing technique, this study measures the effect of proximity to parks and park quality on house values in Tallahassee, FL. When all other structural and neighborhood attributes were equal, the expectation was that homes in close proximity to quality parks will be more expensive than homes at a distance. In order to account for the quality of the park, cleanliness, landscaping, available spaces, amenities, and safety were incorporated, which assumes that the higher parks rate on these criteria, the greater the value of neighboring homes. The results highlight the potential impacts and provide insight to local governments when considering development of neighborhood parks. The coefficient on distance to parks was negative and statistically insignificant, meaning that close proximity to parks did not significantly increase home values. Among the park quality variables, cleanliness, landscaping, and

amenities had negative coefficients but not statistically significant, suggesting that houses close to parks rated clean, with better landscaping, and providing amenities and safety had higher prices than houses farther away.

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Effect of Moisture Content on Thermal Properties of Selected Biomass Grinds. A. K. Mahapatra*, and E. M. Isang, Agricultural Research Station, Fort Valley State University, Fort Valley, GA 31030.

Biomass feedstocks show a wide range of physical, chemical, thermal, and agricultural/process engineering properties. Knowledge of these properties of biomass feedstocks is essential for efficient design of densification equipment, handling and processing systems, and the selection of operating parameters. Biomass end-users may require feedstock supply in various forms. At present, for example, biomass feedstock in pellet, briquette or bale form is mostly used. The potential pathways of feedstock bio-refinery such as hydrolysis, fermentation, gasification, pyrolysis, and chemical synthesis, all require feedstock materials in particulate form. The objective of this study was to generate information on the thermal properties of two biomass grinds, namely, energy cane (*Saccharum* spp.), and Napier grass (*Pennisetum purpureum*). Specific thermal properties evaluated in this study included thermal conductivity, thermal diffusivity, specific heat capacity, and calorific values. The effect of moisture content on thermal properties of energy cane was investigated at five different moisture contents (3%, 9%, 15%, 20%, and 35% wet basis) using a KD2 Pro Thermal Properties Analyzer. Thermal conductivity and thermal diffusivity of energy cane increased with an increase in moisture content while specific heat capacity decreased with the increase in moisture content. The mean calorific values of energy cane and Napier grass did not differ significantly ($p>0.05$).

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Effects of Tillage and Cover Cropping on Soil Water Properties. M. L. McGraw*, C. W. Raczkowski, and G. B. Reddy, Department of Natural Resources and Environmental Design, North Carolina Agricultural and Technical State University, Greensboro, NC 27411.

Southeastern U.S. Piedmont and coastal plain soils have undergone extreme degradation and losses in soil organic matter (SOM) caused by soil erosion and/or intensive, conventional tillage for crop production. This study was conducted to evaluate the effects of tillage and winter cover cropping on soil water properties, and to identify a best management system highly effective at improving soil water retention. The experiment was conducted at the North Carolina A&T State University Farm in Greensboro, NC and at the Center for Environmental Farming Systems in Goldsboro, NC. The design was a split plot with tillage levels (disk tillage and no tillage) assigned to main plots and cover crop levels (winter cover crop and no winter cover crop) assigned to subplots. A crimson clover-abruzzo rye bi-culture was planted each fall and mechanically killed each spring prior to tillage and planting of the summer cucurbit crop (pumpkins or butternut squash). Cover cropping increased infiltration and field capacity at the Coastal Plain location. Infiltration was higher in disk tillage and soil water content was higher in no tillage. In the Piedmont location, cover cropping increased field capacity and soil water content. Infiltration was higher in disk tillage than in no tillage.

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Predicting Soil Erosion on a Cultivated Field in Northern Florida: Using GIS and the USLE.

D. Nemours*, Center For Water Quality, Florida A & M University, Tallahassee, FL 32307.

Soil loss from cultivated lands remains a major issue in agriculture. Soil erosion is affected by vegetation, crop cover, climate, rainfall and topography. Soil erosion maps can be useful in predicting areas with significant soil loss in order to apply proper soil remediation in the affected areas. The purpose of this project is to quantify soil erosion with USLE in a GIS environment and to compare the results with a field-based experimental mesh-bag Method. Mesh bags were deployed along a 200 m slope in several plots measuring 25-200 m². Each plot contained an average of 30 mesh bags. The collected soil from each mesh bag was processed and quantified. The Universal Soil Loss Equation (USLE) USLE uses factors such as rainfall, topography, crop cover and crop management to determine annual rate of erosion. The USLE model predicts a soil loss in the amount of 0.65 t/ha, while the Mesh Bag experiment averages 5 to 37 t/ha. The Mesh bag method experiment takes into account the redistribution of the soil while the USLE results represent soil that has left the plot area. This study will help to draw some conclusions about the

effectiveness of the USLE in predicting soil erosion in small plots and allow for comparison of the model with field experiments.

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Species Composition and Net CO₂ Exchange Rate at Harvard Forest, Harvard University.

N. V. Nkongolo*, Department of Agriculture and Environmental Sciences, Lincoln University, Jefferson City, MO 65102; and A. M. Ellison, Harvard Forest, Harvard University, Petersham, MA 01366.

Net soil CO₂ exchange rate (NCER), photosynthetic active radiation (PAR), soil temperature (T) and moisture (H₂O) were monitored in two adjacent portions of Harvard Forest: one dominated by pine trees (*Pinus* sp.) and the other with mixed species. Measurements were conducted in summer 2011 (June through August) using an Automated Carbon dioxide Exchange (ACE) Analyzer (ADC Bioscientific, 2011). The ACE station was coupled to a photosynthetic active radiation (PAR) sensor for measuring PAR, three thermistors for measuring temperature and three soil moisture probes. The station also consisted of a 1 L stainless steel soil collar that was inserted into the soil prior to measurements, and used to accurately define the soil area being analyzed. The chamber was left at one location a day for 12 to 24 hours. Results showed that NCER ranged from 0.36 to 2.75 $\mu\text{molm}^{-2}\text{sec}^{-1}$, PAR from -3.00 to 385 $\mu\text{molm}^{-2}\text{sec}^{-1}$, T from 14.20 to 21.2°C and H₂O from 0.08 to 0.31 $\text{cm}^3 \text{cm}^{-3}$. Species composition affected T and H₂O, but not NCER, which was significantly correlated with PAR ($p = 0.001$, $r = 0.62$), T ($p = 0.0001$, $r = 0.75$) and H₂O ($p = 0.0001$, $r = 0.94$). Correlations between NCER and H₂O were sporadic, but stronger and very significant following rainfall events. However, T correlated with NCER at all sampling dates, independently of atmospheric conditions, suggesting that T is the most important controlling factors for CO₂ flux in this forest.

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Educating Future Textile and Apparel Industry Professionals on Sustainable Textile Disposal and Recycling Practices.

J. Oh*, Department of Human Ecology, Delaware State University, Dover, DE 19901.

“Fast fashion” trends have encouraged an increasing short consumer life cycle for textile products, which in turn increases the amount of textile related waste generated annually. Textile recycling is a way to alleviate the waste management challenge and capitalize on the opportunity that discarded textiles represent. According to the Council for Textile Recycling, textile recycling prevents 2.5 billion pounds of post-consumer textile product waste from going into the solid waste stream annually. Textile recycling companies and textile materials recovery facilities recycle 93% of the waste they process without producing any new hazardous waste or harmful by-products. To support the impact of this environmental process, consumers must be encouraged to recycle all disposed garments. The study extends that research study to five major universities across the US. The sample consisted of students ($n = 498$) who are preparing for careers in the apparel and textile related industries. At the start of the study, the students were surveyed to measure their awareness and sustainability attitudes and behaviors. The students then participated in an in depth educational program and competition. Upon completion of the program, the students were re-evaluated to gauge the extent to which the program impacted their attitudes and behaviors. These results support the findings of the previous study, as well as provide evidence of generalizability by extending the program beyond a cultural region of the United States. Additionally, this study begins to uncover the link between awareness of the benefits of sustainability and a shift in attitudes and subsequent behavior.

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Aquatic Insect Assemblages of Ephemeral Ponds in the Apalachicola National Forest.

A. K. Rasmussen*, B. A. Richard, J. L. Richardson, M. L. Pescador, and K. A. Milla, Center for Water and Air Quality, Florida A&M University, Tallahassee, FL 32307.

As part of a multidisciplinary study of the hydrology, vegetation, soils, and aquatic fauna of ephemeral ponds in the Apalachicola National Forest (ANF), we investigated aquatic insect assemblages of four ephemeral ponds in the Munson Sandhills region near Tallahassee, Florida. Recently, the use of ORVs (Off Road Vehicles) in the ANF has been restricted, due in part because of damage caused by these vehicles to ephemeral ponds which are known to be critical breeding habitat for imperiled amphibians, in particular the striped newt. Aquatic insects were surveyed by collecting dip net samples from the four ponds seasonally for two years. Specimens were identified to the lowest possible taxonomic level.

Abundance data were used to characterize the aquatic insect diversity of the ponds and examine temporal changes in community structure. Results indicate that the orders Coleoptera (aquatic beetles), Odonata (dragonflies and damselflies), and Heteroptera (aquatic bugs) are the dominant groups of aquatic insects. All of the ponds contained diverse assemblages of aquatic insects, and none of the ponds appeared to be currently impacted by ORV use. The results of this research will be the useful in the development of effective bioassessment tools tailored specifically for these unique ecosystems

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Endophytic Bacterial and Fungal Communities in Black Cohosh, *Actaea racemosa*. S. Ren*, L. Rutto, S. Weeda, M. Brandt, G. Ndip, J. Odom, T. Ferrell, and D. Covington, Virginia State University, Petersburg, VA 23806.

Black cohosh is a traditional medicinal plant species that is widespread in the Appalachian native forests. Endophytic micro-organisms residing inside of black cohosh could be a potential source of natural products for its medicinal function. In this study, endophytic bacteria and fungi were isolated from different tissues of black cohosh and the diversity of bacterial and fungal endophytes associated with black cohosh was molecularly investigated. A total of 24 bacterial isolates and 22 fungal isolates were recovered from different tissues of black cohosh. Of these bacterial isolates, 8 were isolated from leaves, 8 from stems and 8 from roots. No bacterial endophytes were isolated from flowers. Of the fungal endophytic isolates, majority was from roots (9) and stems (6). Four (4) isolates were also recovered from flower tissues. PCR-Restriction Digestion analysis grouped all 24 bacterial isolates into 5 distinct groups, and 22 fungal isolates into 5 groups. Sequencing of the representatives from each group identified four different bacterial endophytic species (*Bacillus* sp., *Serratia* sp., *Enterobacteriaceae* sp., and *Pseudomonas* sp.) and 4 different fungal species (*Alternaria*, *Cadophora* sp., *Phomopsis* sp., and *Volutella ciliate*). The results indicate that various bacteria and fungi were grown inside of black cohosh, and may provide mutual benefit to the survival of black cohosh under its native growing habitats in the Appalachian forests. It may also produce health benefit compounds in black cohosh that are essential for medicinal functions.

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Assessing Soil Bacterial Community Composition and Structure Across Wetland, Transition, and Upland Ecosystem Types in Macon County, Alabama. R. Shange*, R. Ankumah, and R. Smith, Department of Agricultural and Environmental Sciences, Tuskegee University, Tuskegee, AL 36088; and E. Haugabrooks, Food Science and Human Nutrition, Iowa State University, Ames, IA 50011.

Wetlands provide essential functions to the ecosphere that range from water filtration to flood control. These wetlands have also been reported to contain diverse assemblages of various organisms that greatly distinguish them from other ecosystems. Current methods of evaluating the quality of wetlands include assessing vegetation, soil type, and period of inundation. Identifying more sensitive indicators of ecological change that allow for the distinction of the unique ecosystems has become an important area in soil ecology. The objective of the current study was to determine whether soil bacterial community composition and structure (along with other abiotic factors) changed with respect to three ecosystem types (wetland, transition zone, and upland) along a single transect in Macon County, AL. Nine soil samples from each ecosystem type were extracted for DNA, quantified, amplified and sequenced. The resulting sequences were assessed for phylogenetic and compositional differences. As in previous soil studies, Proteobacteria were the most abundant phyla throughout the soils in the study. Specific taxonomic groups showed preferences for different ecosystem types. Double dendrograms and PCoA plots were generated, showing distinction amongst the ecosystem types through clustering by class abundance and Unifrac scores at 3% dissimilarity, respectively. Selected soil properties (SOM and phosphatase enzyme activity) also differed significantly across ecosystem types, while showing predominance in the wetland area. This study suggests that with further study the structure and composition of soil bacterial communities may eventually be an important indicator of ecological impact in wetland ecosystems.

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Anomalous Levels of Heavy Metal Concentrations in Miller County Streams, Missouri. S. Tesfaye*, M. Tarka, and A. Ikem, Cooperative Research Programs, Lincoln University, Jefferson City, MO 65101.

Abandoned mines result in barren landscapes with disturbed vegetation, acid mine drainage, anomalously high concentrations of potentially toxic elements that affect the water quality and the

ecosystem. The Central Mining District (CMD), Missouri is characterized by small but numerous, scattered abandoned barite, lead, and zinc mines. Seventy water samples were collected from Miller County streams (of CMD) and analyzed for heavy metal contaminants (cadmium, lead, and zinc) using Inductively coupled plasma-optical emission spectrometer. The results were evaluated using the current Environmental Protection Agency's national recommended water quality criteria. The Criteria Maximum Concentration (CMC) is an estimate of the highest concentration of a material in surface water to which an aquatic community can be exposed briefly without resulting in an unacceptable effect. The Criterion Continuous Concentration (CCC) is an estimate of the highest concentration of a material in surface water to which an aquatic community can be exposed indefinitely without resulting in an unacceptable effect. The chemical analysis indicate that a number of samples exceed the criteria set by the EPA for cadmium, lead, and zinc. Of the 70 samples analyzed 7 samples exceeded the CCC limit (0.25 µg/l) set for cadmium, of which 6 exceeded the CMC limit (2.0 µg/l). Similarly, 18 samples exceeded the CCC limit (2.5 µg/l) for lead; however, none exceeded the CMC limit (65 µg/l). Three samples exceeded both the CMC and CCC limits (120 µg/l) set for zinc. The implications of these anomalous concentrations will be investigated.

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Pyrolysis of Municipal Solid Waste into Bio-Oil. L. Wang*, E. Ansah, H. Wang, A. Shahbazi, and G. B. Reddy, Biological Engineering Program, Department of Natural Resources and Environmental Design, North Carolina Agricultural and Technical State University, Greensboro, NC 27411.

Municipal solid waste (MSW) is a potential feedstock for producing transportation fuels because it is readily available using an existing collection/transportation infrastructure, and fees are provided by the suppliers or government agencies to treat MSW. MSW can be thermally pyrolyzed into bio-oil in the absence of oxygen or air at a temperature of 500°C or above. As bio-oil can be easily stored and transported, compared to bulky MSW, landfill gas and electricity, pyrolysis offers significant logistical and economic advantages over landfilling and other thermal conversion processes such as combustion and gasification. Crude bio-oils produced from the pyrolysis of MSW can be further refined to transportation fuels in existing petroleum refinery facilities. The objective of this research is to determine the pyrolysis characteristics and kinetics of MSW, and analyze the technical and economic feasibility of pyrolyzing MSW into liquid transportation fuels. A combined thermogravimetric analyzer (TGA) and differential scanning calorimeter (DSC) instrument, which can serve as a micro-scale pyrolysis reactor, was used to simultaneously determine the degradation kinetics and reaction heat of MSW during pyrolysis. Experimental data was regressed to quantify the reaction kinetics and reaction heat during MSW pyrolysis as functions of the chemical composition of the MSW and pyrolysis temperature. An ASPEN Plus-based mathematical model will be further developed to analyze the technical and economic feasibility of pyrolysing of MSW into liquid transportation fuels in fixed bed and fluidized bed reactors at different scales.

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Acknowledgements

The Association of 1890 Research Directors, Inc. is grateful to all individuals who served on the various committees and served as presenters, judges and moderators for the oral and poster presentations, as well as those who assisted with registration. The members of the steering committee, the presentations committee, and the technology committee (many of whom served in both 2011 and 2013) have been invaluable contributors and it is because of their dedication and exceptional competence that the biennial research symposium continuously enjoys success.

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