



## ASSOCIATION OF 1890 RESEARCH DIRECTORS

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### Message from the Chair

Dr. Chandra Reddy

DR. CHANDRA REDDY

Dear Friends and Colleagues, I express my sincere appreciation to Drs. Christopher Watkins and Matt Wilson, 2022 Joint ESS-CES-NEDA Meeting co-chairs, and the planning committee for an outstanding fall conference. The meeting theme, "Building Trust," was timely and the four joint sessions were engaging and delivered by recognized experts.

The first joint session, "Building Trust," led by David Horsager, CEO, Trust Edge Leadership Institute, was incredible and challenged the directors and administrators to consider adopting new practices and strategies to build institutional and organizational culture. Building trust, contended Horsager, is essential and is needed to re-ignite culture in a peri- and post-pandemic.

The 1890 participants benefited tremendously from this fast-paced, highly interactive session on "building trust." Horsager, a gifted presenter, focused on how the 1890 and other administrators can identify and then tackle viable challenges and how to apply specific tools to projects associated with these perplexing challenges.

As ARD continues to move forward to implement its strategic agenda, bold Transformations 2025, the eight pillars identified by Horsager, that drive results (clarity, compassion, character, competency, commitment, connection, contribution and consistency) will be very helpful as we form teams and partner strategically to solve these challenges.

The other joint sessions (From Reckoning to Healing and Reconciliation; Generational Diversity and Interactions in the Workplace; and The Land-grant Institution Of the Future) were also interactive and allowed participants to engage in conversations about the importance of remembering and recognizing the painful past as the key to healing, reconciling and building a future based on respect and dignity for everyone; managing a generational workforce with many different perspectives, experiences, values and goals; and new ways of working – principles, practices, agreements, norms, and expectations – as a means to realize the purpose and ambition of the land-grant university system while continuing to build trust and connection throughout the network.

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## CR passes; Funding in place until December

On Friday, September 30, 2022, President Biden has signed an interim funding bill to tide federal agencies over until mid-December.

The House passed the measure Friday by a vote of 230-201, with 10 Republicans joining all Democrats in voting to keep the government open. The Senate approved it on Thursday.

Government spending power would have ended and required a shutdown on Saturday morning.

The Continuing Resolution (CR) maintains current levels of spending and extends funding through Dec. 16, giving both chambers extra time to hammer out details for a broader budget deal.

"This is common sense, bipartisan legislation," Senate Majority Leader Chuck Schumer, D-N.Y., said on the floor Thursday before the upper chamber passed the bill 72-25. "I'm glad we came to a timely conclusion and didn't go right up to the brink and risk a shutdown. Millions and millions of people can breathe easy knowing that we have done this in a timely way and the money to continue the government will be there."

### Today's WORD

#### continuing resolution

/ kuh n-tin-yoo-ing rez-uh-loo-shun /

noun

: short-term legislation passed by Congress to keep the government open.





Congress approved the Evans-Allen Act of 1977 to provide capacity funding for food and agricultural research at the 1890 land-grant universities and Tuskegee University (the 1890 Institutions) similar to that provided to the 1862 universities under the Hatch Act of 1887. Research conducted under the Evans-Allen Program has led to hundreds of scientific breakthroughs of benefit to both the unique stakeholders of the 1890 institutions and the nation as a whole. The Evans-Allen Program has been extremely important in allowing the 1890 institutions to attract top-notch scientists to their campuses, conduct high-quality and innovative research and become more fully integrated within the land-grant system.

Below is an example of impacts from the 1890 research program submitted by scientists at Delaware State University.

## Delaware State explores blueberry climate viability

Blueberries are native to North America and are considered super foods. They have a high concentration of phenolic compounds and anthocyanins, which are reported to protect against carcinogenicity, cardiovascular and neurodegenerative changes related to the aging process. Renowned for their flavor, versatility, and health benefits, blueberry usage has been expanded from fresh consumption to a variety of products including health supplements, powders and additives in foods and beverages.

rapid rate, heat stress is expected to become an even more critical threat to blueberry cultivation than it is today as the mean temperature and the severity of heat events will rise due to climate change.



Intense heat waves are more frequent in the U.S., as seen in [recent news articles](#). Under such conditions, the performance and adaptability of the northern highbush blueberry will face serious challenges.

### Program design (What has been done?):

The adaptability of blueberry plants to high-temperature stress conditions varies among genotypes. Southern blueberry species, such as *Vaccinium darrowii*, are native to Florida and other sub-tropical regions and are adapted to warmer climates. Such species may carry new genes/alleles that allow the plant to survive and grow in relatively warmer conditions. However, these plants may not perform better in northern regions and their fruits are not up to the market quality, hence they can't be grown directly in cooler regions. However, we can identify high-temperature tolerance genes/alleles and the development of molecular markers associated with high-temperature stress tolerance traits will facilitate the selection and breeding of new heat-tolerant blueberry cultivars, which can be readily grown in temperate regions.

We are trying to solve the problem in multifaceted ways by:

- Exploring the available gene pools; we have collected blueberry germplasm representing all regions of the country and screened these genotypes for high-temperature tolerance.
- Exploring the newly created gene pools: Around 320 pseudo F<sub>2</sub> mapping population developed from an inter-specific cross between northern species *V. corymbosum* and southern species *V. darrowii* to develop *Quantitative Trait Loci (QTL) maps*.
- Developing genome-wide association (GWAS) maps with cutting-edge sequencing technologies and screening the plants under high-temperature stress for a few years.
- Studying global gene expressions of divergent genotypes when challenged with high temperatures and cross-comparing the findings from the above studies to pinpoint genes that can enhance the high-temperature stress in blueberries.
- Trans-

Due to increased demand, the blueberry market and trade across the globe

[have seen dramatic growth in the last 10 years.](#)

According to National Agricultural Statistics Services, approximately 669 million pounds of blueberries were harvested in the U.S., [with a value of \\$765 million](#) in 2020.

### Issue Statement (What is the problem?):

Blueberries have stringent growth conditions and are highly sensitive to temperature fluctuations. A decrease in plant survival and fruit quality has been observed in some blueberry cultivars when average daytime temperatures exceeded 30°C. Since the global mean temperature continues to increase at a



PI Dr. Melmaie explaining different blueberry genotypes .

See Blueberries on Page 5

# In situ activation of lignin peroxidase-enriched bioengineered biomass dramatically improves biomass digestibility

## Issue Statement (What is the problem?):

The Energy Independence and Security Act of 2007 (EISA) requires an aggressive scale-up of cellulosic biofuels as part of the Renewable Fuel Standard (RFS) program, with a production target of 39.7 billion l yr<sup>-1</sup> (10.5 billion gal yr<sup>-1</sup>) by 2020.

However, cellulosic biofuel production is currently less than 10% of the 2016 goal set by EISA. This production gap is primarily due to the cost of conversion technologies currently being commercialized.

Two specific barriers are the prohibitive costs of cell wall degrading enzymes and of biomass pretreatment, both required by existing technologies and feedstocks. Indeed, despite tremendous efforts to develop commercially viable methods, pretreatment to remove the resistance of plant cell walls for efficient enzymatic conversion of cellulose and hemicellulose to fermentable sugars remains the most expensive unit operation in the conversion of lignocellulosic feedstocks to biofuels, accounting for nearly \$0.30/gallon of ethanol produced.

## Program design (What has been done?):

Our project goal was to overcome the resistance of plant cell walls to enzymatic conversion, primarily owing to lignin using recombinant DNA technology and crop gene engineering.

A team of scientists from academic and research institutions namely Pennsylvania State University, the University of Kentucky and Pacific Northwest National Laboratory, led by Delaware State University, has heterologously expressed *R. jostii* RHA1 mesophilic ligninase (DypB) in *N. benthamiana*. The team further demonstrated that activation of the recombinant enzyme *in situ* in bioengineered biomass follow by subsequent biomass saccharification using a cocktail of cellulase and glucosidase enzymes releases remarkably dramatic amount of fermentable sugars, a phenomenon that might be explained by reduced lignin recalcitrance likely due to lignin depolymerization *in planta*.

## Outcomes (What are the results?):

*In situ* DypB activation and subsequent saccharification of bioengineered biomass-enriched DypB released nearly 200% more fermentable sugars than non- bioengineered lines controls. Results from the

compositional analysis could not explain these findings by variation in initial structural and non-structural car-

bohydrates and lignin content. Pyrolysis-GC-MS analysis showed more reduction in the level of lignin-associated pyrolysates in the bioengineered lines than the control primarily when the recombinant ligninase is activated in the bioengineered biomass prior to pyrolysis, consistent with increased lignin degradation and improved saccharification.

Based on the <sup>1</sup>H-<sup>13</sup>C CP/MAS NMR data collected from bioengineered biomass where recombinant ligninase has been self-activated, the appearance of the 128.5 and the 130.2-ppm for non-etherified C-1 and etherified C5, demonstrated certainty an *in situ* breakage of lignin structure by recombinant ligninase in bioengineered biomass. To our knowledge, this is the first attempt to successfully express and activate a lignin-degrading enzyme *in planta* that leads to dramatic improvement of lignocellulosic biomass saccharification.

## Impact (What is the lasting effect, real or potential?):

Here we report a novel method of ligninolysis, whereby a bacterial lignin-degrading enzyme can be accumulated in its active form in biomass, activated *in planta* and used for dramatic improvement of biomass saccharification efficiency with several lines of analytical and biochemical evidence suggesting the mechanism is by depolymerizing intact lignin *in situ*. To our knowledge, this is the first report showing a dramatic increase in saccharification efficiency by producing and activating a lignin-degrading enzyme *in planta* without any pretreatment, revealing the potential of the DypB and other lignin degrading enzymes in breaking recalcitrance once heterologously expressed in biomass, hence facilitating the conversion of lignocellulosic biomass to biofuels and bio-based chemicals.

Transferability of this technology to commercial lignocellulosic bioenergy crops (switch grass, *Miscanthus*, *Pennisetum purpureum*, *Populus* etc.) will facilitate the conversion of their lignocellulosic biomass into biofuels and high values bio-based chemicals. This work is now published in a prestigious Nature Journal (see citation below).

## Publication:

Ayalew Ligaba-Osena, **Bertrand Hankoua\***, Kay DiMarco, Robert Pace, Mark Crocker, Jesse McAtee, Nivedita Nagachar, Ming Tien, Tom L. Richard (2017) Reducing biomass recalcitrance by expressing a *Rhodococcus jostii* lignin peroxidase in bioengineered tobacco. **Scientific Reports-Nature 7**, Article number: 17104; doi: 10.1038/s41598-017-16909-x (\*corresponding author)

For more information, contact [Dr. Bertrand B. Hankoua](mailto:Dr.Bertrand.B.Hankoua) at or 302.857.7935. This project is supported by the Evans-Allen program of the USDA's National Institute of Food and Agriculture (NIFA).





A UNIVERSITY OF ARKANSAS AT PINE BLUFF (UAPB) initiative supported by NIFA recently gave students from UAPB, North Carolina A&T State University and Tennessee State University the chance to travel to the western African country of Ghana. The [study abroad program](#) allowed students from the three historically Black universities to learn about agricultural topics and familiarize themselves with the history, culture and people of Ghana. The trip featured a range of cultural excursions, one of which was to the Bonwire Kente Village, where the participants learned about the production of handwoven, traditional kente cloth. From left: Dr. Benjamin Annor, Annette Fields, Lyric Armstrong, Jeremiah Pouncy, Jai Lewis, Dr. Nina Lyon Bennett, Dr. Emmanuel Asiamah and Allison Malone, courtesy of UAPB.

## Reddy ... from page 1

Overall, the desired joint meeting outcomes were achieved with commendation; the bar was set high for the 2023 ESS Meeting in Grand Rapids, Michigan (Sept. 24-27).

On behalf of the Mississippi Small Farm and Agribusiness Center at Alcorn State University, Dr. Elizabeth Myles received the Section's Diversity, Equity & Inclusion Award at the Experiment Station Section Diversity Luncheon. The goal of the Mississippi Small Farm and Agribusiness Center (MSFAC) is to recruit, train and equip new and beginning farmers and ranchers with the tools to succeed in agribusiness. Dr. Myles and her staff have worked tirelessly, effectively and efficiently with underserved, small, and limited-resource farmers. Congratulations to Dr. Myles and her staff.

Relative to the ARD business meeting, NEXTGEN grant opportunity, the integrated multistate climate change proposal and the 2013 Farm Bill were three important agenda items that needed our immediate attention.

As discussed, the NextGEN Program, "From Learning to Leading: Cultivating the Next Generation of Diverse Food and Agriculture Professionals," is a \$250 million generational grant opportunity for minority-serving institutions to support and prepare students for the expansive array of diverse careers in the food, agriculture, natural resources and human sciences across research, education and Extension, with an emphasis on federal government sector employment.

We will develop competitive proposals of the highest quality, partner strategically and align our proposals with two strategic goals in the USDA Strategic Goals FY 2022-2026: "Strategic Goal 5: Expand Opportunities for Economic Development and Improve Quality of Life in Rural and Tribal Communities;" and "Strategic Goal 6: Attract, Inspire, and Retain an Engaged and Motivated Workforce that's Proud to Represent USDA." Also, this is a great opportunity to help sustain the 1890 Centers of Excellence. Brent Elrod, NIFA's acting director of programs and the acting director of operations, and Venu (Kal) Kalavacharla, NIFA's director, Institute of Youth, Family & Community (IYFC), participated in our meeting and gave us a number of excellent points relative to developing our proposals.

An integrated, multidisciplinary multistate proposal is

being developed by the 1890 universities that focuses on understanding and analyzing climate change impacts and/or its consequences on persons in low-income, underserved or marginalized communities and communities of color towards climate-smart practices to generate stable income and environmental benefits from climate-smart solutions. This proposal is being designed to leverage the expertise and strengths built on professional working relationships and a shared agenda for improving the quality of life of these populations in the 19 southern and border states.

Four goals are being proposed: soil health, water security; environmental justice and equity and policy. Pending NIFA approval, this multistate proposal will fill a crucial void in climate research.

As submitted to the Committee of Legislation and Policy, the 1890 priorities for the 2023 Farm Bill are:

- Reauthorization of the Evans-Allen (Research and Education Programs) with the percentage share of Hatch funds be increased from 30% to 40%. In addition, ARD is proposing to add graduate student tuition as an allowable use of Evans-Allen funds.
- Reauthorization of 1890 Extension Program with the percentage share of Smith Lever funds be increased from 20% to 40%.
- Reauthorization of the 1890 Capacity Building Grants Program.
- Reauthorization of the 1890 Facilities Improvement Program.
- Reauthorization of the Centers of Excellence.
- Reauthorization of the Scholarships for Students at 1890 Institutions.

Additional priorities for the 1890 universities may be submitted later.

Finally, on behalf of ARD, we would like to congratulate Dr. Jeff Jacobsen, executive director of the North Central Regional Association (NCRA) of the State Agricultural Experiment Station Directors, on his retirement. The ARD family is grateful for his role in improving the programs and initiatives in the NCRA and in the national land grant system. All the best Jeff!

## Blueberries ... from page 2

ferring those identified high-temperature tolerant alleles to commercially accepted elite lines.

### Some of the Outcomes (What are the results?):

- Blueberry germplasm was established and pre-breeding material is being developed for future trait improvement programs.
- Determined the inheritance pattern of some of the traits associated with high-temperature stress tolerance.
- Around 2.2 million Single Nucleotide Polymorphisms (SNP) were identified spanning the entire blueberry genome, out of those, 1,323 SNPs are significantly associated with high-temperature stress-tolerance



Some of the F<sub>2</sub> population blueberries after stressing them to 40°C for three days.

traits.

- Conducted gene expression profiling for further validation of candidate genes responsible for high-temperature stress tolerance in blueberries.

### Selected Impacts (What is the lasting effect, real or potential?):

We are among the very few research groups to focus on improving blueberry genotypes for high-temperature stress tolerance in the U.S. It is a timely initiative, as we are observing the intense effects of climate change on the globe.

The genetic information and knowledge obtained from these projects can be applied to improve other perennial fruit crops like grapes, blackberries, raspberries, etc.

Ten graduate students, nine undergraduates and two post-doctoral scientists were trained in genome molecular breeding skills.

For further information, contact [Dr. Kalpalatha \(Latha\) Melmaiee](#) also visit our [laboratory website](#). The Blueberry research is supported by USDA-NIFA-CBG and USDA-NIFA-AFRI grants.



YOUR VOICE. YOUR FUTURE. YOUR OPPORTUNITY.



#AgCensus



## Ag. Census is in the mail

America's farmers and ranchers will soon have the opportunity to be represented in the nation's only comprehensive and impartial agriculture data for every state, county and territory.

The USDA will mail the [2022 Census of Agriculture](#) to millions of agriculture producers across the 50 states and Puerto Rico this fall. Collected in service to American agriculture since 1840 and now conducted every five years by USDA's National Agricultural Statistics Service (NASS), the Census of Agriculture tells the story and shows the value of U.S. agriculture. It highlights land use and ownership, producer characteristics, production practices, income and expenditures, among other topics.

Changes to the 2022 questionnaire include new questions about the use of precision agriculture, hemp production, hair sheep, and updates to internet access questions.

## Open Opportunities

We welcome audacious research proposals in response to our open funding opportunities.

All application and required documents must be submitted through our [Grants Management System](#).

[Login to the Grants Management System](#)



[Click for funding opportunities](#)

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### 1890 Land Grant Universities

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## JOB OPPORTUNITIES

JOB

[WEST VIRGINIA STATE UNIVERSITY ASSOCIATE DEAN FOR EXTENSION ASSOCIATED DEAN/ASSOCIATE DIRECTOR FOR WV SU AGRICULTURAL AND ENVIRONMENT RESEARCH STATION](#)  
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For additional information or questions, contact: [Dr. Scott Willard](#), Director - Mississippi Agricultural and Forestry Experiment Station, Dean - College of Agriculture and Life Sciences, or (662) 325-0233.

[EXECUTIVE VICE PRESIDENT AND CEO](#), COUNCIL FOR AGRICULTURAL SCIENCE AND TECHNOLOGY (CAST) Ames, Iowa

## NEW APPOINTMENTS

**DR. SAKTHI KUMARAN**, interim associate director of Research, Central State University, effective Oct. 1, 2022.

## CALENDAR

[FALCON 2022 Conference](#) - Registration for the First Americans Land-Grant Consortium (FALCON) is open for its 18th Annual Conference, scheduled for Oct. 21-24, 2022. This in-person conference will be held at the Hotel Albuquerque in Old Town, Albuquerque, New Mexico. The conference will include sessions on 1994 land-grant teaching, Extension programs and research that benefit Native American students, communities, governments and lands. There will be a strong student focus and tribal college students are especially invited to participate and present their work. The conference will also include a USDA NIFA update, training workshops, information-sharing and networking opportunities.

[APLU ANNUAL MEETING](#), Nov. 6 – 8; Denver, CO, Hyatt Regency Denver at Colorado Convention Center.



[80TH PROFESSIONAL AGRICULTURAL WORKERS CONFERENCE](#) | Tuskegee University | Nov. 13-15

**SAVE THE DATE** | Joint AEA-ARD Meeting | Jan. 17-20, 2023

