



This research has successfully exposed the community, as well as college and high school students in Huntsville and surrounding areas of Alabama, to the passion and possibilities that come from studying and researching renewable fuels. Partnerships with renowned manufacturing and government contract companies, as well as a mobile “Biodiesel Classroom on Wheels” have provided a solid platform for sustainable fuels and other products to come.

Partnership in Biodiesel Sustainability

Who cares and why?

In today’s society, there is much talk about green or sustainable living, which is basically the choice to consider the impact that our actions have on the environment. The choices one can implement toward adopting this mindset can range from simply turning the lights off when you leave a room and won’t be returning; changing air filters regularly as you heat and cool your home; being mindful of the use of pesticides for lawn

care; cutting down on the amount of plastics used, to even collecting rain water for reuse. There are many ways people consider to conserve our resources, as well as resources that if depleted would not be replaceable. In these conservation efforts, one of the top areas of concern is energy, since as a nation; there is an ongoing reliance on oil and the need to find an alternative, the focus on biofuels is becoming more prevalent.

What has the project done so far?

For more than thirteen years on the campus of Alabama A&M University, in the Department of Biological and Environmental Sciences (formerly Plant and Soil Sciences) there has been much research done in the way of biodiesel production. For the past four years, there has been a successful partnership between Toyota Motor Manufacturing, Willbrook Solutions, Inc. and the scientists of Alabama A&M University in the area of biodiesel research and production. In this collaboration, there has been more than 2000 gallons of used cooking oil from the Toyota plant’s cafeteria that has been converted into biodiesel fuel and used to run the in-house semi-fleets of Toyota Motor Manufacturing in Huntsville, Alabama. These semi’s are used to transport engines around the facility. As a part of Toyota’s efforts to become more green and environmentally friendly, with the leadership of Alabama A&M University professors and students from the Department of Biological and Environmental Sciences within the College of Agricultural, Life and Natural Sciences (CALNS), gallons of used cooking oil harvested from Toyota’s cafeteria have been delivered from the engine plant in Huntsville to a laboratory at Alabama A&M University as part of a biodiesel donation program.

Through the use of the *Springboard* about the size of a stand-up arcade and Materials (ASTM)-quality fuel is waste oil from Toyota’s plant, which cafeteria produces in a month, makes

The oil that was once considered something that is beneficial to Toyota A&M University’s Bulldog Transit future, i.e., small tractor engines and



Above is the waste vegetable oil being received from Toyota on a regular basis. The waste oil is used to produce biodiesel using the equipment (below) for experimental purposes and training. Each 55 gal barrel of waste oil, if purchased on the open-market would cost approximately \$90.00.



This is the system currently being used to covert waste vegetable oils to biodiesel at the AAMU CALNS greenhouse.

Biodiesel BioPro™ 190 unit, which is game, American Society for Testing produced. One 55-gallon drum of is the amount of waste cooking oil the approximately 30 gallons of biodiesel.

waste has now been transformed into currently and to the buses of Alabama System and other equipment in the irrigation pumps, etc. According to

the plant drivers, the “trucks run great and they produce less exhaust emissions.” It is a fact that biodiesel can burn cleaner, because it does not contain petroleum, and can be obtained not only from used cooking oil, but from plant oils, animal fats and algae. These sources tend not to produce the smog, ozone or acid rain, as does petroleum.

Additionally, the AAMU CALNS biodiesel. They are working toward technology through the development simple and cost effective enough to relief efforts, or in developing new. In the early 1900s George promoted peanut oil and ethanol equipment. G.W. Carver provided demonstration of his diesel engine at continuing the work started by different crop. Our effort now is to create a food vs fuel scenario. The biodiesel would eliminate the food-v- can be created to sustain the process



The department is also working with plants including *Jatropha curcas* (above) to obtain valuable information about potential feedstock for biodiesel and other value-added benefits from the plant.

scientists hope to do more than make the expansion of the uses of this of a conversion process that would be used by rural communities, in disaster counties. The concept of biodiesel is not Washington Carver, while at Tuskegee from corn as sources of fuel for farming peanut oil to Dr. Rudolf Diesel for the the 1900 Chicago World’s fair. We are George Washington Carver, only with a make the process sustainable and not to use of waste vegetable oil (WVO) for fuel situation, as long an infrastructure as has been shown.

Impact Statement

The primary focus of our biodiesel program has been educational, research and outreach. We use the program to engage students with hands-on opportunity to understand the process of producing biodiesel from waste vegetable oil. We emphasize the fact that biodiesel is a clean burning fuel and it reduces carbon emission and is better for the environment. However, the research component is the area where the program is more active. Our partnership with private companies continues to focus on modifying the production process so it can be continuous, rather than the batch system being used for small scale production. We produce about 1,000 gallons of biodiesel/year and it is used in small tractors and other diesel operating units such as generators for electricity for our equipment. We provide some fuels intermittently to Toyota on a trial basis for their shunt-trucks at their local manufacturing plant. Our plan is to begin producing biodiesel on a regular basis to supply sufficient fuels to our buses on campus, once our new facility is completed.

The program continues to serve the community by making presentations and educating farmers and other groups who are interested in producing their own biodiesel. We collaborate with Bevill State Community College, in Jasper, Alabama by sharing resources for their biodiesel program.

What research is needed?

A significant problem with renewable fuels is that the same crops we depend on for food are also the ones being used to produce fuel. Therefore, an important social and ethical issue has been raised, which is: should we be using food crops to make fuel? The consequences are higher food prices, shifting land use from food-crops to fuel-feedstock and potential shortage of foods. Instead of using food crops, we are focusing on non-edible oil crops such as Jatropha, Castor and waste vegetable oil. There is a closed-loop model which is an example of how a food crop can be used for biodiesel, if the infrastructure can be created among the industries and users. Contact Dr. Cebert for more information.

Want to know more?

Dr. Ernest Cebert

ernst.cebert@aamu.edu

ecebert@gmail.com (alternate email)

(256) 372-4243

Additional link: <http://www.umes.edu/ard/Default.aspx?id=46285>

University and Year: Alabama A&M University, 2014

This project was supported by: The initial funding was from the State of Alabama Department of Agriculture, followed by another grant from ADECA (Alabama’s Economic Development Office). Since then, biodiesel has been included as a component of our canola project through USDA REEIS (Research, Education & Economics Information System) .