FORUM

Biofuels: No Single Answer, Many Possibilities

Biofuels research has been part of the Agricultural Research Service's core mission for more than 40 years.

ARS has long been a leader in biofuels research, with such successes as helping to perfect the cold tolerance of biodiesel, finding that briefly exposing corn grain to anhydrous ammonia can reduce costs of fuel ethanol production, and validating the economic and environmental benefits of switchgrass as a nonfood crop for biofuels.

The goal today is to help industry accelerate progress towards establishing commercial biofuel supply chains nationwide, beyond ethanol from corn grain towards solutions that will help commercial airlines, the U.S. Navy, and others meet their renewable-fuel-use goals in a sustainable way. Meeting these goals requires that ARS help develop new dedicated bioenergy crops, improve production and harvest systems, and enhance industrial biomass conversion processes so that costs can be lowered throughout the supply chain, making the cost of biofuels competitive with that of petroleum-based fuels.

But the commercial growth and long-term viability of renewable fuels in this country are impeded by a number of technical and economic barriers. ARS has unique strengths and capabilities to address many of them.

Ensuring that dependable, abundant, and affordable feedstocks are available is critical for developing a strong renewable-fuels industry in the United States. Farmers need to know that the biofuel crops they produce will have a profitable market, while biorefiners need assurance that if they build a plant, the biomass they need will be readily available and priced so the fuels they produce can compete with petroleum-based fuels. Everybody in the biofuels supply chain needs to be able to make a profit.

To support the development of complete supply chains, ARS research programs are encouraging collaborations among scientists across a wide variety of disciplines, commercial partners who will put the research results to use, and users who will purchase the biofuels.

For example, ARS scientists and a commercial sugar company in Hawaii are working together to determine the most economical options for expanding renewable energy production on Maui. With support from the U.S. Navy, the researchers are helping to determine the best options for producing energy cane to make fuels for the Navy and electricity for the island.

Working with University of Hawaii researchers, the team is determining how to fit energy crop production into plantation-management plans. The research is building tools that can not only be used in Hawaii but elsewhere in the Pacific Basin, and also on the mainland. Given the diversity of growing and production environments across the country, ARS recognizes there won't be just one answer to all of the questions about how to sustainably achieve biofuel success.

So ARS is focusing on finding region-based answers, knowing that no one region will be able to produce all of the feedstocks needed to meet our national biofuel and other renewable-energy goals. Developing bioenergy crops that work for different growing regions will also provide opportunities for many rural communities to participate and help make production of biofuels a nationwide endeavor.

Reinforcing this localized approach was the establishment of five USDA Regional Biomass Research Centers, announced by U.S. Department of Agriculture Secretary Tom Vilsack in 2010. The purpose of the centers is to provide a coordinated research focus designed to develop relatively short-term deliverables to help accelerate the establishment of a commercial biomass feedstocks industry.

Together, the Regional Biomass Research Centers embody a nationwide network of USDA scientists and facilities managed by ARS and USDA Forest Service Research and Development. The centers are helping to lead a national research effort to develop sustainable biomass production systems, superior performing feedstocks, and value-added coproducts to help industry establish commercial biofuel supply chains.

ARS is also developing partnerships with other federal agencies, universities, states, and private industry. The centers are targeting partnerships to include 1890 land-grant, Tribal Nations, and Hispanic-serving institutions. For example, ARS researchers are working with the Colville Confederated Tribes to design a way to fit winter oilseed production into wheat crop rotations on tribal and neighboring lands in the Pacific Northwest. The seed oil will be extracted locally and used to make biodiesel for the tribe's school buses and logging trucks.

ARS has also formed a partnership with the U.S. Federal Aviation Administration to help air-transportation interests and other decisionmakers develop the best plans for producing biofuels to benefit commercial aviation. This work will ultimately help the aviation industry stabilize fuel costs and reduce greenhouse gas emissions.

In this issue of *Agricultural Research* magazine, you can read more about the USDA Regional Biomass Research Centers and how ARS research is making the future of bioenergy grow.

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