

## **Sustainable Solutions To Solve Today's and Future Agricultural Production Challenges**

American farms generate more than \$200 billion in goods and services on 442 million acres of agricultural land. Profitable farms are the basis of economically vibrant rural communities, and consumers benefit from an abundant harvest that provides a variety of affordable foods.

But in many parts of the country, rural communities are suffering from flagging farm profits that have resulted from stagnant commodity prices, higher costs of fuel and other materials needed to grow crops, and competing products from overseas markets where production costs can be lower. At the same time, producers are challenged to continually advance conservation goals that enhance the natural-resource base our nation depends on not only for food, feed, fiber, and renewable energy, but also for abundant and high-quality supplies of fresh water, clean air, and healthy ecosystems.

With so many issues to manage at one time, it is no wonder that a farmer attending a recent ARS national program customer workshop asked: "Can anyone tell me what is sustainable?"

Participants at many of the USDA-ARS customer workshops have expressed their need for holistic solutions to problems they face on their farms. Not only do they want the best that research can provide of high-yielding and disease-resistant crop varieties, fertilizer-management plans, irrigation-scheduling techniques, weed-control methods, and harvest-monitoring software, but they also want to know how these innovations can be best incorporated into their operations and whether doing so will increase their ability to compete in the market.

It was from these needs that ARS National Program No. 216, Agricultural System Competitiveness and Sustainability, emerged. Its 21 projects across the country bring together the expertise needed to understand how different kinds of farms function and how changing or introducing new technology will affect productivity, profitability, energy efficiency, and natural-resource stewardship.

Many ARS projects, particularly those within the Natural Resources and Sustainable Agricultural Systems national programs, work together to achieve these goals. Whether the ARS teams and cooperators from universities and industry are in the Pacific Northwest, Great Plains, Midwest, Southeast, or New England, they use their collective scientific talent to find the best combinations of practices to suit different kinds of farming systems.

An invaluable resource of many ARS research units has been the ability to conduct long-term field studies at locations within all U.S. regions where there is production agriculture—both conventional and organic. A good deal of what can be learned about the long-term effects of direct seeding, minimal tillage,

residue management, and other conservation practices is made possible by the ARS commitment to this kind of research.

The article "No Shortcuts in Checking Soil Health" (page 4) highlights some benefits of long-term research that has been conducted in Maryland, Oregon, and Washington. To many, "conservation management" means protection of soil resources, but another benefit is that less fuel is needed to prepare the fields for planting. This saves both money and time for farmers.

Economic analysis can help find not only the production practices that will give the greatest returns, but also the strategies or systems with the least risk of economic loss. The feature "Show Me the Money: Why Economics Is Essential for Sustainable Agriculture" (page 8) highlights the greater impact of combining production economic studies with traditional biophysical agricultural research.

The United States has embarked on an ambitious program to replace a significant portion of transportation fuels with biobased sources from agriculture. Producers, government agencies, energy companies, and policymakers need to know how best to produce energy crops in different regions of the country and what the likely effects of energy production would be not only on farm economic return, but also on natural-resource quality. "Helping Corn Face Tomorrow's Challenges" (page 14) is a timely report about some of the research ARS is doing to help direct a sustainable future for agriculture-based energy production.

Conservation benefits don't necessarily have to come from riparian buffer strips, cover crops, or no-till seed planters. Development of new corn varieties that effectively use nutrients found in soil organic matter will help organic farmers be more profitable and will enable conventional growers to use less purchased nitrogen fertilizer. An added benefit may also be less nitrogen leaving the field and getting into waterways.

A future for American agriculture that is profitable and provides good stewardship of our natural resources is not just a dream. ARS systems research projects are helping producers around the country choose the best technologies and strategies to achieve the right balance for their farms. Perhaps that is the best answer to the question of what is sustainable.

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