

Powering America and the U.S. Economy

Agricultural Research Service Bioenergy Program

Bioenergy research has been and continues to be an active, high priority for the Agricultural Research Service (ARS). Concerns over the security and reliability of our energy supply, compounded by the environmental effects of fossil energy use, the economic cost of importing petroleum, and a struggling rural economy have spurred interest in developing alternative, renewable energy.

ARS formed its Bioenergy and Energy Alternatives National Program (<http://www.ars.usda.gov/biofuels>) in 1998 to develop alternative energy sources, to reduce the Nation's dependence on foreign oil, and to improve the environment. The program also helps increase the use of agricultural materials as feedstocks for biofuels and products, creates jobs, and stimulates economic activity in the United States. This national program not only supports ARS priorities but also ensures that problems of high national priority are being addressed.

ARS works with a range of industry stakeholders, university, state, and federal partners to conduct biofuels research.

Feedstock Development

Advanced technology creating the next generation of feedstocks.



Using a portable photosynthesis analyzer to measure the effects of elevated ozone on growth and development of soybean plants.



Interest in switchgrass ethanol has intensified recently as researchers gain confidence in its potential as a bioenergy crop because of its wide adaptability and high yields on marginal lands.



Various fractionation methods are being studied on by-products of the rubber-making process from southwestern desert shrub guayule in order to evaluate its use as a bioproduct and a biofuel feedstock.



Using a portable photosynthesis analyzer to measure the effects of elevated ozone on growth and development of soybean plants.



Comparing the biomass of a single alfalfa plant selected for use in electric energy production (left) with several smaller alfalfa plants bred for use as livestock feed.



Harvesting switchgrass seed as part of a breeding program to develop new cultivars with improved biomass conversion to bioenergy, broad adaptation, and high biomass yields.

Sustainable Feedstock Production

Ensuring dependable feedstock supplies now and in the future.



Data gathered in growth chambers is used to develop an accurate model of soybean growth.



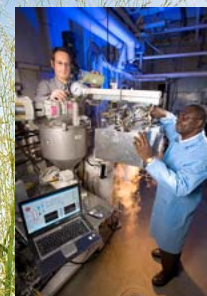
Winter cover crops and living mulches such as kura clover, which is interseeded with corn, represent possible ways to harvest biomass without jeopardizing soil health or productivity.



Bales of corn stover collected from a REAP experiment near York, Nebraska. Stover is often left in place to protect soil, but it also has potential as a feedstock for cellulosic ethanol production.

Conversion

Creating the next generation of biofuels and value-added coproducts.



A fluidized-bed thermochemical reactor designed and built by ARS engineers for converting crop residues into renewable bio-oils and hydrogen fuels.



Trap grease sample being prepared for conversion to biodiesel. In the foreground are samples of distilled (left) and crude (center) biodiesel from trap grease.



Developing methods for conversion of lipid bearing materials into valuable, environmentally sensitive commercial products.



Examining alfalfa stem sections before and after digestion by rumen bacteria. Genetic modification of nondigestible xylem tissue would make stems better cattle feed and enhance their conversion to ethanol.