



Improving Crops Key to Food Security

Research at land-grant institutions keeps the U.S. food production on the cutting edge when it comes to quality, nutrition, disease resistance and other factors that help keep our food system safe and contribute to national security.

Successful examples include:

- In **North Dakota**, nitrogen fertilizers are the single largest expense for food crops such as wheat, corn, canola, barley, sugar beets and potatoes. Improving nitrogen use efficiency not only makes crops more profitable, but also reduces excessive fertilizer use which can run off into water supplies and contribute to greenhouse gases. Studies there found that variability of region, soil type and environmental conditions impact nitrogen uptake each year. To make more accurate nitrogen recommendations, researchers developed web-based nitrogen calculators for more efficient nitrogen use without decreasing crop yields.
- At an 1890s institution in **North Carolina**, researchers are finding environmentally friendly ways to better control insect infestations in stored grains. They used essential oils found in cinnamon, cloves and thyme to be the most effective in controlling the maize weevil in stored organic corn. These oils also helped reduce mold without any change in shelf-life for the corn.
- Also working with organic corn, researchers in **Pennsylvania** used a common soil fungus to boost the corn's defense genes to reduce the threat of pests such as the black cutworm. The beneficial fungus also helped produce taller plants with increased biomass.
- In an attempt to breed more productive crops that are resilient to climate variability, **Pennsylvania** researchers developed a new use of the laser oblation tomography (LAT) system to visualize crop roots and show in three dimensions how soil organisms, such as fungi and insects, interact with different crop species. Using the laser technology speeds up the analysis of root systems and makes them easier to study.

Continued

www.landgrantimpacts.org

ABOUT LANDGRANTIMPACTS.ORG | The Land-grant University System is a uniquely American institution and has operated successfully for more than a century. The website documents the collective and individual impacts of the national system of joint teaching, research, and extension institutions.

Prepared by the National Impacts Database writing team, and supported by the Association of Public and Land-grant Universities' Board on Agriculture Assembly. Some projects funded by USDA/NIFA.



Food Security

- In **Illinois**, growing winter wheat can be good for the environment, but unprofitable for farmers using current wheat varieties. Scientists there are developing a wheat breeding strategy that focuses on improving the profitability of wheat which will also contribute to more sustainable farming practices.
- New soybean varieties are also being developed in **Illinois** to increase yields of this in-demand crop. The program is creating high yielding, non-GMO varieties with improved oil quality and enhanced disease and pest resistance. The altered fat content in soybeans will also increase market demand for soybean oil.
- Enhancing the oil and protein content of corn is also the work of scientists in **Illinois** who are researching a variety of starch, protein and oil concentrations in corn kernels. The goal is to discover genes that will enhance nutritional content of corn and other cereal grains. One variety was already used successfully in beer production.