








SUSTAINABILITY, COMPETITIVENESS & PROFITABILITY OF FOOD & AGRICULTURE

Rising energy costs, frequent extremes in weather, and social changes affect agricultural productivity, food security, and economic viability. Even in the absence of these factors, a business-as-usual approach to agriculture will continue to degrade soil, water, air, and other natural resources. Now more than ever, we must enhance the sustainability, competitiveness, and profitability of our food and agricultural systems. With continued support, the Land-grant University system is poised to address this challenge area. Doing so will require investment in interdisciplinary systems-level research and development of comprehensive datasets and holistic analytical tools.

RESEARCH PRIORITIES

-  Reduce the carbon footprint of agriculture
-  Improve soil health
-  Improve the energy efficiency of agricultural systems
-  Find new ways to conserve water
-  Enhance crop and livestock productivity
-  Develop non-chemical pest and weed control
-  Improve producer profitability

CAPACITY & RESOURCES

-  Institutions in all 50 states and many U.S. territories with research sites representing diverse ecosystems, communities, and food production systems
-  State-of-the-art laboratories, greenhouses, computational centers, and tools
-  Skilled scientists, educators, students, and staff
-  Impartial, peer-reviewed science, technology, and recommendations
-  Far-reaching Extension networks to work with and inform communities across the U.S.
-  Strong relationships with government agencies, farm and commodity groups, and the private sector



SUCCESS STORIES

Research-based approaches can make agricultural systems more resilient to change, protect natural resources and ecosystem services, and keep agriculture and the economy at the frontier of global competitiveness. Over the years, Land-grant Universities have shown how investments in research can have major impacts:

75% reduction in insecticide applications by onion growers using pest management programs developed by **Cornell University** researchers. These growers saved an average **\$300 per acre.**

Growers using a new wireless soil moisture sensor system have seen less disease, better plant quality, and large water savings. One user reduced irrigation by 50%, saving **43 million gallons of water.**

For average-sized greenhouses, new management guidelines have led to 30% reductions in energy use and savings of **\$20,000 per year.**

10% reduction in labor and water pumping costs for **Idaho** farmers using tools and strategies developed by Land-grant Universities, which also helped mitigate **Texas'** record-breaking 2011 drought.

Farmers using nitrogen management methods and tools designed by **Colorado State University** reported increased net returns of **\$17 to \$54 per acre.**

95% of **Georgia's** swine producers and transporters have received training through **University of Georgia** research and Extension programs that ensure pig welfare and food safety. Certification gives producers access to more markets and allows them to sell products at a premium.

Kentucky State University's Small Farm Program trainings on running livestock enterprises helped **32,538 small farms** increase net farm income by an average of **\$4,500 per year.**

In **Georgia**, Extension specialists are conducting trials and hosting farm tours to help cotton growers choose varieties that will produce the highest yields on their farms and earn **\$245 more per acre.**

University of New Hampshire quadrupled the length of the strawberry growing season using low tunnels, which will increase production by **80%.**

The U.S. fishing and aquaculture industries have adopted effective marketing practices recommended by Land-grant University researchers. These practices have enhanced producer competitiveness and profits and have made desirable products more readily available to consumers. In particular, data on consumer preferences has been used to market farm-raised and wild-caught seafood products.



Extension specialists share information with beekeepers, farmers, home gardeners, regulatory agencies, and others. Beekeepers following research-based recommendations saved **10,500 honey bee colonies**, worth over **\$5,750,000** each year. Research and Extension programs helped **Tennessee** beekeepers reduce colony losses to mites by 15%. Nutrition recommendations for commercial honey bees could reduce colony losses by 15%. After research showed they can rely on native bees and feral honey bees instead of managed honey bee colonies, **New York** and **Connecticut** pumpkin and squash growers are saving money.



Land-grant University researchers are making advances that protect livestock health. For example, **Virginia Tech** researchers developed a quick, easy-to-use tool to detect bacteria that cause bovine respiratory disease. A new vaccine could save beef producers **\$10-15 million** each year by preventing epizootic bovine abortion, a disease that causes loss of pregnancy or unhealthy calves.

The Grand Challenges are part of the *Science Roadmap for Food and Agriculture* developed by the Experiment Station Committee on Organization and Policy (ESCOP) to guide food and agricultural research. A unit of the Association of Public and Land-grant Universities, ESCOP governs the research activities of Land-grant Universities and Agricultural Experiment Stations. Borne out of the Hatch Act of 1887 and the Evans-Allen Act of 1977, these premier institutions are supported by USDA NIFA and by collaborations across federal, regional, state, nonprofits, and private institutions. For more information:

- escop.info
- aplu.org

To learn about the research needs, resources, and success stories for other Grand Challenge areas, see the rest of this series: escop.info/roadmap



Experiment Station
Committee on Organization
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