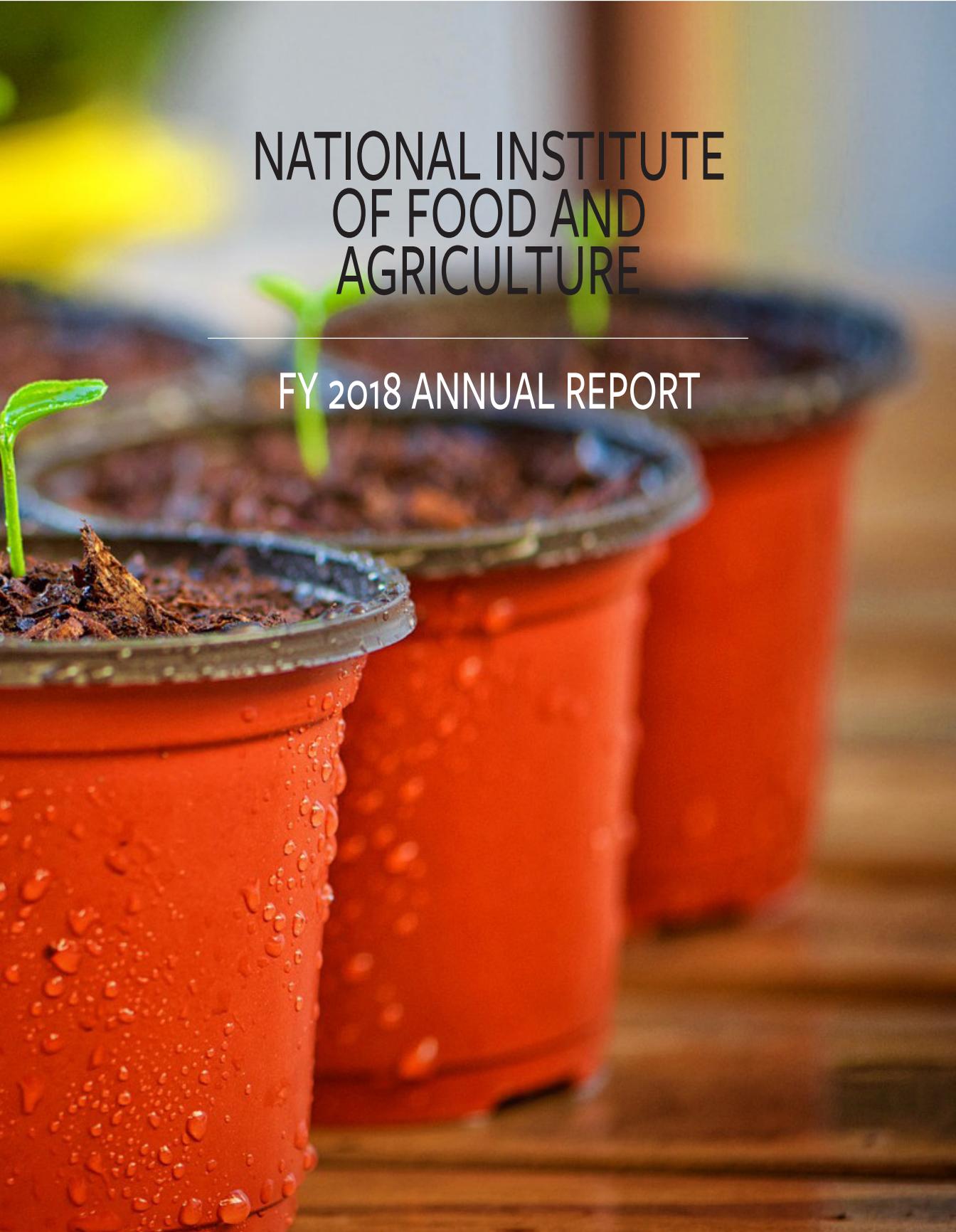




United States Department of Agriculture

NATIONAL INSTITUTE OF FOOD AND AGRICULTURE

FY 2018 ANNUAL REPORT



IMPACTS

With NIFA funding, researchers across our nation make significant strides toward solving society's challenges in the areas of climate, bioenergy, education, the environment, family & consumer sciences, food safety, nutrition, sustainable agriculture, and youth development.

The following pages contain a small fraction of the thousands of NIFA-supported research, education, and extension projects.

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OUR VISION

Catalyze transformative discoveries,
education, and engagement to address
agricultural challenges.



A MESSAGE FROM THE DIRECTOR

As the recently sworn-in director of the National Institute of Food and Agriculture (NIFA), I am pleased to present NIFA's 2018 Annual Report. Through an integrated approach, NIFA ensures that groundbreaking discoveries in agriculture-related sciences and technologies reach our nation's farmers, ranchers, foresters, producers, and consumers.

Agriculture Secretary Sonny Perdue's vision is for USDA to be the most efficient, most effective, and most customer-focused department in the federal government. We will achieve this, in part, through USDA's Strategic Plan for fiscal years 2018-2022.

NIFA's leadership and investments will contribute to USDA's seven strategic goals to ensure agricultural and rural prosperity.

This NIFA 2018 Annual Report includes powerful examples of the many NIFA-funded research, extension, and education solutions that address societal challenges. NIFA invests Congressionally-appropriated funds to solve these challenges through collaboration with our broad range of grantees and partners, including academic and science organizations; small business and industry; agencies from all levels of government; and non-governmental, public, and private organizations. NIFA's academic partners include land-grant and non-land-grant universities, Hispanic-serving institutions, minority-serving institutions, Alaska Native-serving and Native Hawaiian-serving institutions, and institutions in insular areas. NIFA's continued strong collaboration with our grantees and partners helps American agriculture become more efficient and competitive, sustains natural resources and the environment, enhances the safety of our nation's food supply, and improves nutrition.

One of our greatest challenges is educating the future labor force, skilled workers, and scientists to support sustainable growth in agricultural production. NIFA's educational programs nurture the next generation of farmers, ranchers, producers, scientists, and other professionals needed in agriculture, food, the environment, and natural resources.

I am honored to lead NIFA, our committed and talented professionals, and our role in supporting America's 21st century research, extension, and education. I look forward to the transformative and remarkable discoveries that our grantees will make, with NIFA support, in the coming year to solve our most pressing societal challenges.



J. SCOTT ANGLE



PHOTO OF DR. ANGLE BY TYLER JONES, IFAS, UNIVERSITY OF FLORIDA

AFRI

The Agriculture and Food Research Initiative (AFRI), America's flagship agricultural competitive grants program, supports scientists, researchers, and extension professionals as they seek solutions to our most pressing societal challenges in agriculture, health, food safety and security, bioenergy, natural resources, and more.



PHOTO © GETTY IMAGES / KONSTANTIN KOLOSOV

AFRI advances fundamental new science and translational research and development projects that build on those discoveries. AFRI also supports education and extension programs that deliver science-based knowledge to people, allowing them to make informed practical decisions.

These AFRI-supported efforts enable our nation to respond to significant challenges, both here and abroad. Challenges include water quality, adapting to and mitigating the effects of changing climate, restoring soil health, improving food safety and quality, preventing childhood obesity, promoting the bioeconomy, and advancing America's competitiveness internationally.

Ultimately, our expectation is that the discoveries, along with the extension and education outcomes, promote farm profitability.

Stakeholder input, through requests for applications and public meetings, is critically important for AFRI's continual improvement. More information is available on the AFRI Stakeholder Feedback page of the NIFA website.

In FY 2018, Congress appropriated \$400 million for the AFRI program. During FY 2018, NIFA received approximately 2,707 proposals for AFRI grants and, after a peer-review process, made 686 awards. The funded projects focused on the six agricultural priorities of the 2014 Farm Bill:

- Agricultural economics and rural communities;
- Agricultural systems and technology;
- Animal health and production and animal products;
- Bioenergy, natural resources, and the environment;
- Food safety, nutrition, and health; and
- Plant health and production and plant products.

**AFRI FY18
FUNDING:
\$400
MILLION**

**PROJECTS:
686**

IMPACTS

Cooperation is the Key to Fighting Weeds

Weeds cause tremendous economic damage to agriculture - corn and soybean producers in North America lose more than \$40 billion per year in an uphill battle against herbicide resistance. However, a new report from scientists at the [University of Illinois](#) and [USDA's Agricultural Research Service](#) adds a new weapon to the fight: Conversation. Researchers say that cooperating with neighboring farmers to make decisions about how to manage herbicide-resistant weeds delays the spread of herbicide resistance. Simulations show that mixing herbicides delays resistance and the delay gets longer with increasing levels of farmer cooperation.

New Technology Pays Off, One Acre at a Time

[Clemson University](#) researchers are using new nutrient-management technology to save up to \$54 per acre on cotton production. With 180,000 acres of cotton production in South Carolina alone, there is potential for a lot of added revenue for growers. The technology involves a systems operator who flies a drone with an infrared camera over the field to map nutrient deficiencies in plants. An irrigation system then uses a variable-rate nitrogen applicator to apply only the amount of fertilizer needed to specific locations around the field. Farmers save on fuel and fertilizer costs and the environment benefits from reduced nutrient runoff from their fields.

Putting the Sting into Integrated Pest Management

[Auburn University](#) entomologists have discovered a wasp that may help soybean producers and other farmers in the Southeast rid their fields of a major pest, produce more crops, and see higher profits. Though only about the size of a pinhead, the newly detected wasp, *Ooencyrtus nezarae*, can do plenty of damage to the kudzu bug, a quarter-inch-long invasive pest to soybeans and other legume crops. Left unchecked, kudzu bugs can reduce crop yield by up to 60 percent.

Using CRISPR to Improve Wheat Yields

Scientists at [Kansas State University](#) are using Clustered Regularly Interspaced Short Palindromic Repeats (CRISPR) technology to improve the wheat genes that control several yield component traits, such as seed size and the number of seeds per plant. They have identified 19 yield component genes and are continuing research to develop transgenic lines for both spring and winter wheat. Their work will fix known defects and improve gene properties. As a result, wheat breeders in Kansas and other states will harvest greater yields for consumers and improve local economies.

Zinc Plays Vital Role in Animal Fertility

Infertility costs the livestock industry billions of dollars each year. Researchers at the [University of Missouri](#) have found that zinc plays a key role in promoting fertility in males. In addition to improving in vitro fertilization and artificial insemination in livestock, the research provides a quick and accurate evaluation of livestock fertility. If this research adds just one more pig to every litter, it would increase the income of U.S. pork farmers by \$130 million per year.

Copper May Be the Key to Feeding the World

Copper deficiency compromises crop fertility and reduces grain/seed yield, but exactly why is not known. Two [Cornell University](#) researchers are using cutting-edge equipment to map and identify regions of the chromosome associated with improving copper movement to wheat reproductive organs and grain yield. Tests show that increasing copper uptake can lead to a 7-fold increase in yield for wheat and other cereal crops, including rice, barley, and oats.

Turning a Cyber Eye toward Animal Production

Precision field crop agriculture has been a successful proving ground for drones and drone-based technologies. Now, scientists at [Virginia Tech](#) are using cyber-physical systems research to explore the relationship between individual animal and herd behaviors on dairy farm efficiency. Researchers will develop enhanced animal mobility sensors, in-dwelling rumen sensors, automated feed delivery, a cow weight sensor, and in-line milk analysis equipment with the goal of improving sustainability, efficiency, and profitability.

Influence of Nitrogen on Wheat Grain Yield and Protein Yield

Rising atmospheric CO₂ levels inhibit the conversion of nitrate into amino acids in wheat and compromise protein yields. Researchers at [University of California – Davis](#) are working to determine the influence of CO₂ concentration on wheat carbon fixation, grain and protein yield, and the genetic bases of these responses. Success in this research will improve the productivity and nutritional quality of wheat.



PHOTO: USDA/ARS PHOTO BY JACK DYKINGA

Science Emphasis Areas



Stakeholder input is a key driver in determining NIFA’s research, education, and extension priorities. This process ensures that user-inspired science beginning in the lab reaches the people who need it: Professionals in ag-related fields, educators, and consumers.

NIFA developed, delivered, and evaluated the agency’s science objectives through nine Science Emphasis Areas (SEAs):

- Agroclimate Science
- Bioeconomy-Bioenergy-Bioproducts
- Education and Multicultural Alliances
- Environmental Systems
- Family & Consumer Sciences
- Food Safety
- Human Nutrition
- Sustainable Agricultural Production Systems
- Youth Development

The nine SEAs are administered by NIFA’s four programmatic institutes:

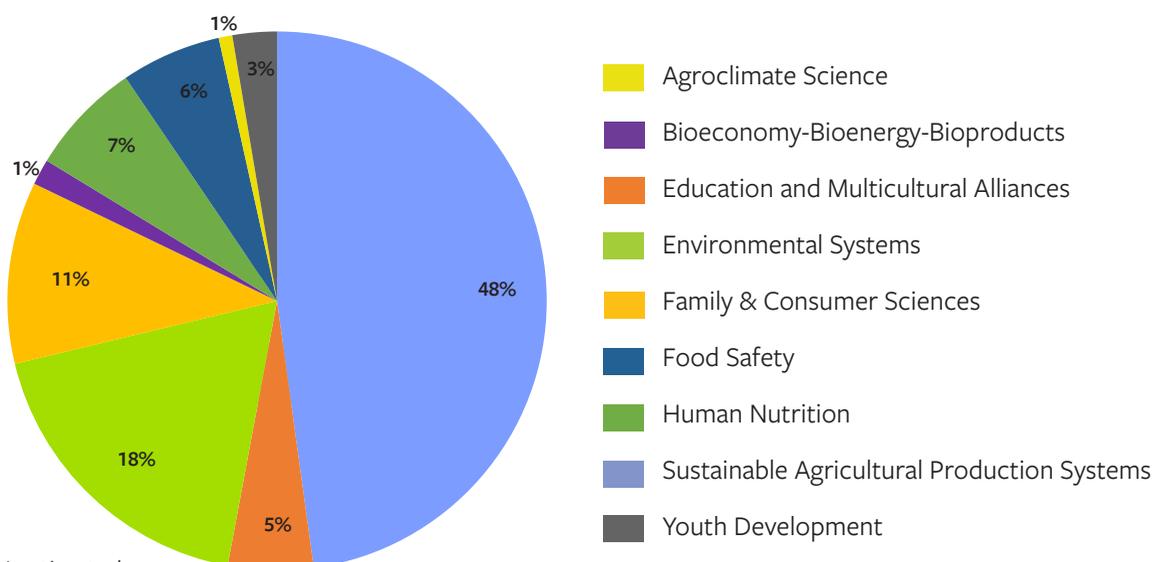
- Institute of Food Production and Sustainability (IFPS)
- Institute of Bioenergy, Climate, and Environment (IBCE)
- Institute of Food Safety and Nutrition (IFSN)
- Institute of Youth, Family, and Community (IYFC)

Advancing U.S. agriculture through global engagement is a theme that cuts across all of NIFA’s SEAs. NIFA’s Center for International Programs works with the four institutes to develop partnerships and collaborations that apply the best science to problems we face, increase our global competitiveness, and maintain U.S. leadership internationally.

SCIENCE EMPHASIS AREAS	INSTITUTE
Agroclimate Science	IFPS, IBCE
Bioeconomy-Bioenergy-Bioproduts	IFPS, IBCE
Education and Multicultural Alliances	IYFC
Environmental Systems	IBCE
Family & Consumer Sciences	IYFC
Food Safety	IFSN, IYFC
Human Nutrition	IFSN, IYFC
Sustainable Agricultural Production Systems	IFPS, IBCE, IFSN, IYFC
Youth Development	IYFC

SCIENCE EMPHASIS AREAS	TOTAL COMPETITIVE PROJECT FUNDING BY PORTFOLIO*	COMPETITIVE PROJECTS ACTIVE IN 2018*
Agroclimate Science	\$5,927,439	31
Bioeconomy-Bioenergy-Bioproduts	11,213,855	30
Education and Multicultural Alliances	37,059,729	157
Environmental Systems	132,745,425	335
Family & Consumer Sciences	79,149,537	272
Food Safety	43,532,361	161
Human Nutrition	49,342,177	131
Sustainable Agricultural Production Systems	346,700,406	787
Youth Development	19,278,103	93
Total	\$724,949,032	

COMPETITIVE FUNDING BY SCIENCE EMPHASIS AREA*



* estimated

Agroclimate Science
**Ensuring Sustainable,
Adaptive Agroecosystems**

NIFA supports sustainable agriculture and forestry-based strategies that will attain thriving food and fiber systems and communities that are resilient to climate variability and environmental change.



IMPACTS

Intensive Agriculture Influences Regional Summer Climate

New research suggests that how we use land may play a significant role in altering the world's climate systems. Scientists at the [Massachusetts Institute of Technology](#) and [Dartmouth College](#) discovered that intensive agriculture might influence regional climate. The study showed a strong correlation between increased agriculture in the Midwest with a decrease in average daytime temperatures in the summer and an increase in local rainfall. This finding could help to refine global climate models by incorporating such regional effects.

Oregon Forests may Improve Environmental Outlook

Oregon's forests are among the most carbon-dense in the world and may store more. Researchers at [Oregon State University](#) used climate models to project that, by 2100, four land use strategies will increase forest carbon update by 56 percent and decrease emissions. Co-benefits include increased biodiversity of forest species and increased water availability. Using half of harvest residues for bioenergy production would not reduce emissions. These approaches may apply in other temperate regions to evaluate climate mitigation options.



PHOTO: DOUGLAS FIR AMERIFLUX SITE / OREGON STATE UNIVERSITY

Active Management Sustains the Health of Working Forests

Drought, density, bark beetle epidemics, and wildfires cause working forests throughout Washington State to lose vigor. [Washington State University Extension](#) presented a sequence of classroom-based and "out-in-the-woods" educational experiences to 1,500 landowners who implemented forest health and wildfire hazard mitigation practices across 125,000 acres of forestland. These wildfire protection practices have saved an estimated \$26 million in firefighting costs and more, when considering savings related to watershed protection, infrastructure damages, and human health.

Increasing Ecosystem Services and Climate Change Resilience in the Northeast

[University of Vermont Extension](#) is working to understand how different practices on Northeastern dairy farms can help build resilience to weather extremes. By comparing conventional and alternative management practices on the dominant agricultural land uses in Vermont (e.g. corn silage and hay), researchers will be able to better help farmers understand how a shift in cropping management may affect water quality, field and watershed hydrology, and adaptability to climate change.



PHOTO: UNIVERSITY OF VERMONT / JOSHUA FAULKNER

Milking the Best from Dairy Farm Management

A large multi-institution project led by the [University of Wisconsin–Madison](#) examined greenhouse gases and the dairy industry. Reductions in methane, carbon dioxide, and nitrous oxide emissions can substantially reduce the environmental footprint of animal production systems. Researchers found that producers could reduce methane emissions by 5-30 percent and increase milk production through better nutrition management and improved genetics.

Improving Forest Carbon and Biomass Models on Tribal Lands

Tribal communities of North America – which are often remote, economically disadvantaged, and highly dependent on natural resources – are especially interested in smart, sustainable forestry. Researchers at [Salish Kootenai College](#) in Montana are investigating how forest management in Nez Perce and Flathead Reservation lands can influence the removal of greenhouse gas from the atmosphere and reduce trends toward global warming. The project also provides quality educational opportunities to Native communities, enhances the research capacity at Salish Kootenai College, and creates research partnerships that address locally relevant research questions..

Bioeconomy-Bioenergy-
Bioproducts

Strengthening Bio-Based Systems to Support Our Nation's Energy Independence

NIFA supports the expansion of a robust bioeconomy that enhances communities, job growth, and agricultural systems and contributes to U.S. competitiveness.



IMPACTS

Southwest is Perfect Place to Grow Bioeconomy Feedstocks

Researchers at [New Mexico State University](#) have joined the [Sustainable Bioeconomy for Arid Regions project led by the University of Arizona](#). The team is developing sustainable bioeconomy feedstocks for arid regions, guayule and guar, plants that grow well in the region. Farmers seeking alternative crops to maintain or improve farm profits may grow these crops for use in high-value products such as rubber, resin, and polysaccharide. Demand for guar gum in the United States is up to \$1 billion annually, and most of the guar gum is imported.

Finding a Starting Place for the Poplar Bioeconomy

Advanced Hardwood Biofuels Northwest (AHB) is a collaborative poplar tree-based bioenergy project led by [University of Washington](#), with support from [University of California](#) and [Washington State University Extension](#). AHB found that the Lewis County, Washington, region could be ideal for a poplar bioproducts industry. AHB plans to grow poplar for biomass production, a process that will create economic opportunities, reduce net greenhouse gas emissions, decrease foreign oil dependence, and improve water quality and wildlife habitat.

Growers Sow the Seeds of New Biofuel Crop

[Auburn University's Alabama Cooperative Extension System](#) is helping farmers incorporate carinata into their crop rotations as a biofuel feedstock while leveraging its meal value for livestock feed and providing an alternative rotation crop solution for winter wheat. Carinata is more drought and cold tolerant than canola. In addition, growers can use carinata's high glucosinolic acid content, a natural deterrent for nematodes and other pathogens and insects, to help break pest cycles. Auburn's scientists are members of the [University of Florida](#)-led Southeast Partnership for Advanced Renewables from Carinata research team.

Eye-in-the-Sky Surveys Beetle-Infested Trees

Georgia, the nation's leader in forestry, wood fuel, and pellet export, suffers greatly from insect damage caused by Southern Pine Beetles (SPB). Infestation effectively girdles a tree, causing its death. Researchers at [Fort Valley State University](#) monitor Loblolly pines with aerial drones to evaluate heat spikes and vegetation loss associated with SPB and conduct fuel analyses and pelletization quality from infected locations. Predictive models will serve to inform foresters if salvaging damaged pine trees is economical. Controlling SPB damage could save the state's forestry industry up to \$7 million per year.

Incentivizing Feedstock Supply for the Bioeconomy

Researchers at [Auburn University](#) and [University of Illinois at Urbana-Champaign](#) are combining economic and ecological modeling to identify the economic barriers to biomass production and to explore the ecosystem service implications of biomass production. Their work will help decision makers understand the issues that face the cellulosic biofuel and bioproduct industry, biomass markets, and the economic and policy challenges that farmers face as viable suppliers.

New Pilot System Turns Scum into Biodiesel

Scum, a dark, muddy substance produced during wastewater treatment, presents a significant waste disposal challenge but also a potential energy source. Researchers at the Center for Biorefining at the [University of Minnesota](#) developed a pilot system at the St. Paul Wastewater Treatment Plant. Scientists found that they could convert 68 percent of the dried and filtered scum to biodiesel. This is equivalent to approximately 140,000 gallons of biodiesel and \$500,000-\$600,000 in profit per year using all the scum from the plant.

Developing Policies for Renewable Fuels

Researchers at [University of California-Davis](#) are analyzing federal and state energy programs and policies to better understand how subsidies affect ethanol investment, production, and entry and exit decisions. The team will use theoretical and empirical models to design an efficient and cost-effective renewable input mandate policy in order to encourage innovations in renewable fuels, reductions in greenhouse gas emissions, and U.S. energy independence.

Genomics-Assisted Breeding Improves Bioenergy Crops

Shrub willow is emerging as a superior bioenergy crop that thrives on marginal land, but shrub willow leaf rust threatens yield. [Cornell University](#) researchers are identifying gene networks that are activated during infection of the pervasive fungus and mapping genes that confer resistance. Project success would ensure that shrub willow continues its robust growth in the bioenergy industry.



LARRY SMART AND WILLOW: CORNELL UNIVERSITY/ROBYN WISHNA

Education and Multicultural
Alliances

Educating our Nation's Workforce

NIFA supports education and workforce development programs that empower the Ag science, technology, engineering, and mathematics workforce with the knowledge and skills needed by the global agricultural industry to address challenges and capitalize on future opportunities.



IMPACTS

Bioinformatics and New Standards for the 21st Century

Bioinformatics is a computer-based approach to biological research, including disease understanding, drug-development, and low-cost production of healthy agricultural items. To keep pace with scientific and technological advances and the need for students to receive training on bioinformatics, **Fort Valley State University** implemented a new curriculum that integrates hands-on experiential learning with state-of-the-art technology and prepared faculty. To date, more than 200 students have received introductory and advanced bioinformatics training.

Teaching Teachers in Agricultural Science Education

The **National Association of Agricultural Educators** (NAAE in Lexington, Kentucky) is taking steps to address the industry-recognized lack of agriculture professionals. To help meet that need, the NAAE-managed Curriculum for Agricultural Science Education increased access to hands-on, rigorous courses in agricultural education. In 2018, 22 teachers from around the country earned scholarships and lab resources. Ultimately, 1,320 students will explore agriculture issues that focus on biotechnology, food science, and safety.

Ho'ohiapo: Renewing Ancestral Education in Agroecology

University of Hawaii created the Ho'ohiapo Network to lift up indigenous approaches to education and youth development in a peer-to-peer fashion. Ho'ohiapo's goal is to increase the number of Native Hawaiian youth who enroll in higher education, specifically an applied science degree program in sustainable community food systems. If successful, the program will result in a more ancestral approach to food sustainability in the islands.

Opportunities in Agriculture

Austin Community College created its Opportunities in Agriculture program to increase the number of underrepresented students who earn associate of science degrees in agriculture and in sustainable agriculture. The project supports 48 students directly through enrollment in the new courses, 40 through scholarships and stipends, and an additional 50 students during its "Agricultural Career Day" to promote a career in agricultural science.

NIFA-supported Agriculture in the Classroom's K-12 curriculum website had over 336,000 visitors (an increase of 26 percent over 2017), 30 percent of whom accessed 405 standards-based lesson plans and 785 companion resources.

At the post-secondary level, AFRI supported about 940 undergraduates, 995 graduates, and 617 postdoctoral students.

The AFRI-funded Professional Development Opportunities for Secondary School Teachers Program awarded \$3.1 million to train 950 educators, which will impact up to 70,000 K-14 students over the next three years.

NIFA-funded programs supported 104,149 students through recruitment/retention, curriculum development, and faculty development.

Over the past 15 years, NIFA has provided each state an average of \$910,000 per year in support of education and workforce development programs. The states, on average, have leveraged those NIFA funds to \$7.7 million per year, for an average return-on-investment of \$8.46 per dollar.

Environmental Systems
**Safeguarding our
Environment**

NIFA supports programs that conserve natural resources and improve ecosystem services while promoting resilience and sustainability of agroecosystems.



IMPACTS

Can Urban Forests Take the Heat?

A study from [North Carolina State University](#) shows that urban trees can survive increased heat and insect pests fairly well – unless they are thirsty. Insufficient water not only harms urban trees, but allows other problems to have an outsized effect on them. This information is important because keeping trees healthy is vital for them to perform their valuable ecosystem services, such as removing pollutants from the air and storing carbon.

Managing Pollution and Ensuring Safe Drinking Water

[University of California-Davis](#) evaluated regulatory instruments and policy options to better understand how to manage agricultural nitrate pollution in groundwater systems. The California Water Resources Control Board synthesized the recommendations into a report to the state legislature to outline potential funding mechanisms for the provision of safe drinking water in affected communities. This work clearly shows how research is translated into policy to secure water supplies and protect water quality.

Reduced Herbicide Preserves Biodiversity and Maintains Profitability

[Oregon State University](#) and the [National Council for Air and Stream Improvement](#) conducted large-scale experiments to test the effects of herbicides on plant, animal, and insect life in forest plantations. Studies showed that herbicides negatively affected biodiversity in the first five years, but impacts lessened considerably in later years. Although there were tradeoffs between wood production and biodiversity, there were no such tradeoffs with profitability once economic discount rates were taken into consideration. This indicates that optimal management strategies will not compromise biodiversity, but will maintain profitability.

Map Points to Sources of Coral Reef Collapse

About half of Hawaii's once-thriving coral reefs have died and more are struggling to recover from rising water temperatures. Researchers at the [University of Hawaii](#) (UH) at [Manoa](#) developed the first comprehensive map to document the impact of human activities and natural events on Hawaii's reefs. UH was part of a multi-institution collaboration that included [Stanford University](#), [Stockholm Resilience Center](#), and the [National Oceanic and Atmospheric Administration](#). The interactive map provides a foundation for further research and informs policies to protect coral reefs.

Enhancing Local Agricultural Water Supplies with Wastewater

Water scarcity, deteriorating soil and groundwater quality, and growing climate uncertainty pose a serious threat to irrigated agricultural sustainability. Scientists from [University of California-Riverside](#) and [Israel](#) collaborated on how agricultural drainage waters (ADW) and treated wastewater (TWW) can improve sustainable water use in agriculture. Their work shows how to treat and produce TWW at low cost. The work also illustrates how wastewater treatment plants can deliver more cost-effective TWW and ADW to agricultural operators. This work is helping society address its water scarcity problems.

Measuring the Benefits and Costs of Natural Resources on Public and Private Lands

New tools and techniques developed by scientists from land-grant universities have led to reliable estimations of the economic value of nature area recreation across the United States. Examples include [University of Florida](#), where researchers calculated that residents derive annual benefits of about \$212 per household from recreation on the St. Johns River, and natural springs generate \$57 million per year in recreation benefits. At [Penn State University](#), researchers collaborated with colleagues at [Cornell University](#), to study recreational angling in the Great Lakes and Upper Mississippi and Ohio River basins, and with New York's [Cary Institute of Ecosystem Studies](#), to project the potential impacts of invasive insects on Northeastern forests.

Wildfire Impacts on Molecular Nitrogen and Water Quality

Forest fires are devastating in not only the obvious ways, but also on the molecular transformation of nitrogen. Altering the chemistry and quantity of dissolved nitrogen and dissolved organic matter causes adverse effects on both aquatic ecosystems and human health. Elevated pollutant loads are highest in the first year following wildfire. Researchers at the [University of California-Davis](#) are using their findings to help downstream water managers address reservoir eutrophication potential. Understanding wildfire impacts on water quality is important to guiding watershed management and post-fire remediation actions.



Family & Consumer Sciences
**Strengthening Families,
Farms, Communities, and
the Economy**

NIFA supports programs to help ensure the well-being of the agricultural workforce, their families, and the communities they serve.



IMPACTS

Training Caregivers in Oklahoma

There are millions of family caregivers, and more than 80 percent of them feel they don't have the information or training they need. Family & Consumer Sciences educators from **Oklahoma State University Cooperative Extension** have developed a comprehensive health education curriculum that includes lessons in proper nutrition, aging and finances, and prevention of elder abuse and exploitation. With proper training, the caregivers may lower hospital readmission rates.

Identifying Challenges for Elderly Renters

The number of elderly renters in the United States may reach 12 million by 2030 as retirees remain in their homes, a trend that yields substantial savings but also presents challenges. **North Carolina A&T State University** researchers studied the obstacles that face low-income elderly renters and found that these seniors often struggle with unaffordable housing, unsupportive home environments, and a lack of formal and informal resources. This information helps local, state, and federal agencies develop practical strategies to support aging-in-place renters.



PHOTO OF SHELBY CHAMBERS: N.C. A&T STATE UNIVERSITY

Investing in Public Education Leads to Greater Upward Mobility

A report from economists at **Penn State University** studied the characteristics of rural-urban mobility. Their report suggests that investing in education may help boost economic opportunities for the next generation, lower teen pregnancy rates, and provide a way to ease income inequality. Results of this study will help inform citizens and policy makers in matters of public education.



PHOTO: © GETTY IMAGES / SEB_RA

NC Cooperative Extension Creates \$300 Million Economic Impact

At **North Carolina State University**, Cooperative Extension educators taught classes that empowered people to make better-informed decisions in communities across the state. Extension professionals and volunteers provided 13,000 educational programs to 1.9 million residents, improved the health and well-being of 115,000 North Carolinians through food and nutrition programs, prepared more than 263,000 youth through 4-H programs, and provided \$300 million of economic impact to the state.

Ramping Up for Home Harvesting

North Carolina State University Extension continued its Backyard Ramp Patch Project, giving out more than 15,000 ramp bulbs to the community to establish their own resources and lessen the impact of overharvesting native stocks. Ramps are a variety of wild onion similar to scallions. Extension agents also worked with the National Park Service to establish a new rule for members of the Eastern Band of Cherokee Indians to harvest native greens in the Great Smoky Mountains National Park.

Food Safety

Improving the Food Quality and Safety of Our Food Supply

NIFA supports food safety programs that improve the safety and quality of the U.S. food supply for a healthy population and improved quality of life.



IMPACTS

“Dewing” Right for Food Storage

\$10,000 a year. That’s the amount of money artisanal cheese and meat producers can save by using “DewRight,” an invention from an agricultural engineer with **University of Vermont Extension**. DewRight measures temperature and humidity in high-humidity environments, like those required by food storage and processing facilities. The accuracy of existing sensors can be off by as much as 6 percent, while DewRight improves that accuracy by 67 percent. This reduces spoilage and increases yield and quality.



PHOTO: CHRIS CALLAHAN (LEFT)/UNIVERSITY OF VERMONT EXT

Studying Enteric Diseases to Enhance Prevention, Control, and Food Safety

Researchers at **South Dakota State University** are developing a new generation of test methods and vaccine candidates for *Salmonella*, *E.Coli*, Porcine Epidemic Diarrhea virus, and other emerging enteric pathogens in animals and food products. Researchers have developed a “humanized pig” model to study the function of human gut microbiota and dietary effects. Piglets, implanted with pathogen-free human gut microbiota, ate Western or Mediterranean diets and then were tested for immunological, microbiological, and metabolic parameters. This research will help in the development of biologics to improve the enteric health of humans and animals.

New Technology Enhances Inactivation of *E. coli*

Demand for goat meat is increasing in the United States due to its nutritional values and the growing foreign-born population. Goat meat, like other foods, is susceptible to foodborne pathogens. **Fort Valley State University** researchers developed a non-thermal processing method to inactivate *E. coli* on goat meat and promote meat hygiene practices to benefit smaller producers. This approach combines ultraviolet light with lemongrass oil and improves the microbial quality of goat meat.

Safer Shopping Practices Identified

Researchers at **Tennessee State University** report that meat juice contaminates over 60 percent of the surfaces of meat packages, which then transfers to shoppers’ hands and grocery carts. Meat juices contain a high prevalence of human pathogens such as *Campylobacter* and *Salmonella*. This study reports that using secondary plastic bags to handle poultry packages at the store essentially eliminates the risk of cross-contamination during shopping. Researchers also warn that re-packing at home exposes home kitchens to contamination.

Detecting and Separating Chemical and Biological Contaminants

Early and rapid detection of contaminants is an important step in ensuring food safety, and a researcher at the **University of Missouri** has developed a system that will detect, separate, and extract foodborne contaminants from fresh produce. The surface-enhanced Raman spectroscopy platform uses hybrid nanocellulose films and separation devices to help maintain the safety and sustainability of agriculture and food systems in a cost-effective and environmentally friendly manner.

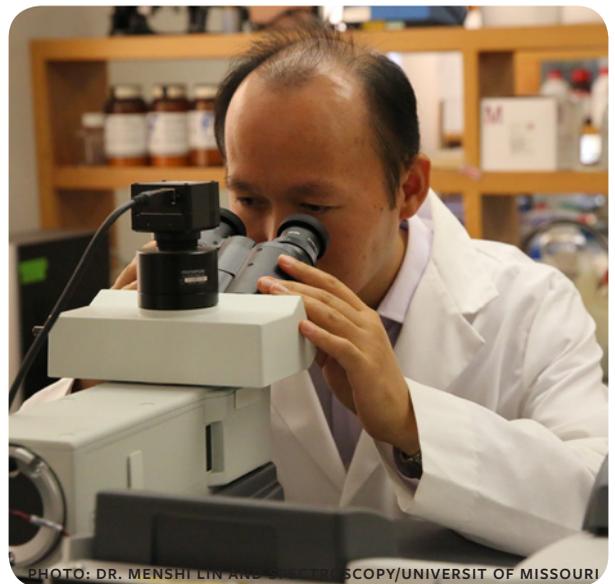


PHOTO: DR. MENSHI LIN AND SURFACE ENHANCED RAMAN SPECTROSCOPY/UNIVERSITY OF MISSOURI

Turning the ‘Fungal Highway’ into the Yellow Brick Road

“Fungal highways” on cheese rinds can spread bacteria that quickly ruins quality or causes foodborne illnesses — however, cheesemakers may be able to manipulate these same highways to help cheese mature faster and taste better. Researchers from **Tufts University** discovered they could manipulate the “speed limits” on the highways to alter the microbial ripening processes, possibly improving both food safety and profits for cheesemakers.

Human Nutrition

Improving Health through Nutrition

NIFA supports programs that improve quality, diversity, and access of nutritious foods in the U.S. food supply, resulting in improved quality of life.



IMPACTS

Broccoli May be Good for the Gut

Researchers at [Pennsylvania State University](#) found that eating broccoli and other cruciferous vegetables may combat gastrointestinal diseases, which afflict more than 60 million Americans each year. Researchers fed mice broccoli with their regular diet to discover how organic chemical compounds in the vegetable may help prevent diseases, such as various cancers and Crohn's disease, caused by inflammation in the lining of the gut.



PHOTO: USDA PHOTO BY LANCE CHEUNG

Enhancing Tasty Treats

A researcher from the [University of Alabama](#) has discovered a process that will enhance the flavor of food and, potentially, mask bad flavors and odors. The process involves supramolecular structures that wrap starch around flavor components. These structures improve the stability of flavors and how they are disbursed, ultimately controlling the release of flavor.

Illinois Study May have Long-Term Benefits for Women's Health

[University of Illinois](#) researchers have discovered that long-term therapy with estrogen and bazedoxifene alters the microbial composition and activity in the gut, affecting how mice metabolize estrogen. The findings suggest that changing the chemistry in the gut could improve the efficacy and long-term safety of estrogen supplements for postmenopausal women and breast cancer patients.

New Methods to Process Food and Retain Health Benefits

[University of California - Davis](#) studied how contemporary agronomic and post-harvest processing techniques effect food quality and chemical safety. Results include new strategies and processing innovations for retaining and optimizing the beneficial compounds in finished food products as well as decreasing the formulation of toxic or undesirable compounds in processed foods.

Prenatal Choline Intake Improves Brains in Piglets... and Humans?

Choline intake during pregnancy can influence infant metabolism and brain development, according to researchers from the [University of Illinois](#). The role of choline in neurodevelopment in pigs has relevance to humans because the two have the same nutrient requirements, similar metabolic function, and very similar brain development. Research shows that pigs from choline-deficient mothers were born with brains about 10 percent smaller than those whose mothers had choline-rich prenatal diets.

So, Rocky was Right to Drink Raw Eggs?

[University of Illinois](#) researchers have confirmed that people who consume 18 grams of protein from whole eggs or egg whites after resistance exercise see a significant improvement in how their muscles build protein. Further, the study showed that yolks contain protein, key nutrients, and other food components that are not present in egg whites.

Helping West Virginia's Communities Succeed

West Virginia farmers are unable to raise crops on over one million acres of land due to improper soils and flood-prone locations. Scientists and extension agents at [West Virginia State University](#) established a training center that features an aquaponics system of three 1,200-gallon tanks filled with tilapia inside a high tunnel as an alternative agriculture source to provide fresh food to citizens.



PHOTO: AQUAPONICS / WEST VIRGINIA STATE UNIVERSITY

Agroecology, Stewardship, and Community Engagement

Bismarck, North Dakota's, [United Tribes Technical College](#) has increased community outreach by converting its children's gardening project to a community garden program that includes orchard crops and Haskap berry plants. Specially designed raised beds enable mobility-impaired gardeners to work in the garden without having to bend. Traditional knowledge, Western science, and the rejuvenation of indigenous practices make this project helpful and successful. Annual produce harvest rates have improved by hundreds of pounds.

Sustainable Agricultural Production
Systems

Safeguarding Our Food Supply through Sustainable Agricultural Systems

NIFA supports programs that improve our nation's ability to achieve food security through increased production efficiencies and profitability while enhancing environmental stewardship and quality of life.



IMPACTS

‘Buck’-Naked is the New Way to View Barley

Researchers at [Oregon State University](#) (OSU) are giving the world’s oldest crop – barley – a new look. “Buck,” as in buck-naked, is a type of barley that sheds its hard outer hull during the harvest, which allows it to hold onto its whole grain status. The OSU team has bred naked barley from the Northwest with a Virginia variety to enhance disease resistance and other favorable traits. The combined traits enable Buck to flourish with less fertilizer and water than wheat and produce a higher yield. This leads to greater profitability so producers may get bigger bang for the buck.

New Vaccine Could be Huge Catch for Catfish Industry

Columnaris is a fatal disease that attacks fish through the mucous membrane covering their skin and gills. At [Auburn University](#), researchers have produced a vaccine that can immunize catfish against the disease in a laboratory and are now testing it in the field. If successful, catfish farmers would have their most effective weapon against the disease. In 2017, commercial catfish farmers lost about 2.5 million pounds of fish to columnaris.

Cutting the Canopy to Cut Down on Pests

A researcher at the [University of Hawaii](#) showed that pruning the canopy in macadamia orchards reduces populations of a key pest, felted coccid, by half. Pruning also increases beneficial predatory beetles by 60-70 percent and parasitoids by 50-60 percent. Pruning did not affect yields, but nut quality was higher. Plant diversity in the pruned plots suggests that an increase in habitat for these beneficial insects plays an important role in the results.

Using Genetics to Reduce Insect Bites

U.S. Southern states produce 40 percent of the nation’s beef cows, but heat and humidity in the region cost the industry an estimated \$369 million each year. As part of a Multistate Research Project, scientists at [University of the Virgin Islands](#) and [Oklahoma State University](#) are breeding cattle with resilience to insect bites, which raise an animals’ internal temperature. Producers will be able to reduce chemicals to control parasites, enhance production, and improve profits.

Sweet News for Cocoa Producers

Black pod rot is a disease that destroys 20-30 percent of cocoa beans every year. In West Africa, it’s not uncommon for severe outbreaks to kill all cacao fruit on a single farm. Now, researchers from [Penn State University](#) are using gene editing technology to breed cacao trees with enhanced resistance to diseases and

climate change. Success in this endeavor will secure the raw material for the multi-billion dollar chocolate industry and improve the quality of life for smallholder cacao tree growers.

Teaming Up to Stop a Worldwide Disease

A tripartite collaborative research project of the [University of Missouri](#), with partners from [Teagasc in the Republic of Ireland](#) and the [Agri-Food and Biosciences Institute in Northern Ireland](#), are working to reduce the prevalence of Bovine Respiratory Disease (BRD) worldwide. BRD is the world’s most common and costly disease involving cattle. The team is using genetic testing to identify regions of the cattle genome that regulate the normal immune response to disease-causing pathogens. If successful, this research could reduce BRD and save the beef industry much of the \$800 million it currently loses to the disease.

New Grapevine Cultivars may Revolutionize Wine Making

The wine industry needs new grape cultivars that are attractive to evolving consumer preferences and resistant to disease. VitusGen2, a multi-institutional research project led by the [New York Experiment Station](#) in Geneva, New York, is using high-resolution genetic maps to speed up the historically slow process of grape breeding. These new-generation, high-quality grapes adapt to a range of climates, appeal to consumers, and require less pesticide. The process reduces the plant breeding timeline by two or three years, reducing the time it takes producers to see improved yields and profits.



PHOTO OF BRUCE REISCH AND GRAPEVINES: CORNELL UNIVERSITY

Youth Development

Strengthening Youth, Creating Sustainable Change

NIFA supports programs in positive youth development science that prepare youth of the nation with the 21st century skills needed to be successful, healthy, and productive members of society.





PHOTO OF MAKENZIE HINSON © CRAIG LADD

‘Making a Difference’ One Food Pantry at a Time
Mackenzie Hinson, a 13-year-old 4-H’er, took the leap from food pantry volunteer to director of her own non-profit, the Make a Difference (MAD) Food Pantry in **Mount Olive, North Carolina**. After Hurricane Matthew effectively cut off Mount Olive from the outside world, the town’s mayor called upon “Kenzie” to help. She and her pantry fed over 400 people the first day. To date, the MAD pantry has provided over a million meals.

Curating the Farmers of Tomorrow
Ensuring the long-term sustainability of U.S. agriculture requires introducing agricultural education to young people. **West Virginia State University** 4-H is establishing school gardens and leading activities in preschool settings, teaching sustainability, environmental awareness, and appreciation for outdoor spaces to youths under the age of five. The program is available at several schools in three counties, reaching more than 600 youths.

Oklahoma 4-H’ers Help with Wildfire Relief
In April 2018, wildfires scorched nearly 350,000 acres in northwest Oklahoma, claiming 1,600 head of cattle and compromising 2,100 miles of fencing. Damages exceeded \$26 million. **Oklahoma State University Cooperative Extension** provided agricultural related relief to affected areas and families by offering hands-on assistance and offering science-based information to guide recovery efforts. Between April 13 and 31, Extension crisis communication via Facebook and

Twitter generated a reach of 1,860,142. Meanwhile, **Oklahoma 4-H** youth development members raised \$55,000 for affected families and packed 1,225 sack lunches for hundreds of firefighters battling the blaze.

STEM Education Develops College and Workforce Readiness

Youth across Connecticut are being introduced to science, technology, engineering, and math (STEM) through educational and engaging 4-H programs. 4-H youth across the state completed 12,961 STEM projects last year, helping them develop college and workforce readiness preparedness. The program’s highlight was 4-H Adventures in STEM, the annual statewide conference at **University of Connecticut - Storrs**.

Youth as Zoonotic Disease Detectives... What a Novella Idea!

Every year, people get sick from zoonotic diseases, afflictions spread between animals and people. A three-way partnership between **4-H National Headquarters** at NIFA, USDA’s **Animal Plant Health Inspection Service**, and the **Centers for Disease Control and Prevention** are teaching youth to recognize and respond to zoonotic diseases, especially at local and state fairs. **Georgia 4-H** created a special “Be a Zoonotic Disease Detective” edition of its *Friends* magazine. Along with graphic novella *The Junior Disease Detectives*, youth are not only introduced to zoonosis but also careers related to epidemiology.

SPECIAL RECOGNITION



Immunity, Serendipity, and a Golden Goose

In 2018, researcher Dr. Bruce Glick was posthumously recognized for his work and its impacts leading to improvements in immunology and cancer treatment. Glick received the Golden Goose Award, which recognizes Federally-funded scientific research that “seems odd or obscure,” but that is fundamental to advancing science.

His work focused on fundamental and applied research on the bursa of Fabricius, a gland located in the posterior of a goose. This work generated 225 scientific papers, review articles, and book chapters. Glick focused on understanding how the immune system works and how defender cells protect against certain diseases. His work provided critical insight on human immunodeficiency disease, and is the foundation for understanding vertebrate and human immune system functioning.

Glick’s work helped improve cancer treatments, through knowledge of using B cells or T cells to develop targeted disease treatments for specific diseases. His work opened the door to further discovery in this area. Glick’s research was made possible through research support from the National Institute of Food and Agriculture, the National Institutes of Health, and the National Science Foundation.



PHOTO: © GETTY IMAGES / DRAGONIMAGES

THE NUMBERS

NATIONAL INSTITUTE OF FOOD AND AGRICULTURE (\$000)

PROGRAMS

FY 2018 CONSOLIDATED APPROPRIATIONS

DISCRETIONARY FUNDING

RESEARCH AND EDUCATION ACTIVITIES

Agriculture and Food Research Initiative \$400,000

CAPACITY PROGRAMS:

Hatch Act 243,701

McIntire-Stennis Cooperative Forestry 33,961

Evans-Allen Program 54,185

Animal Health and Disease, Section 1433 4,000

SPECIAL RESEARCH GRANTS:

Minor Crop Pest Management, IR-4 11,913

Global Change, UV-B Monitoring 1,405

Potato Research 2,500

Aquaculture Research 1,350

OTHER RESEARCH:

Aquaculture Centers 5,000

Sustainable Agriculture Research and Education Program 35,000

Supplemental and Alternative Crops 825

1994 Research Grants 3,801

Federal Administration (Direct Appropriation) 19,692

Farm Business Management and Benchmarking Program 2,000

Sun Grant Program 3,000

Capacity Building for Non-Land-Grant Colleges of Agriculture 5,000

Alfalfa and Forage Research 2,250

HIGHER EDUCATION:

Institution Challenge, Multicultural Scholars, and Graduate Fellowship Grants 9,000

1890 Institution Capacity Building Grants 19,336

Hispanic-Serving Institutions Education Grants Program 9,219

Tribal Colleges Education Equity Grants Program 3,439

Interest (Estimated) Earned on Tribal Colleges Endowment Fund 4,559

Secondary Education/2-Year Post Secondary 900

Alaska Native-Serving and Native Hawaiian-Serving Institutions 3,194

Veterinary Medical Services Act (Loan Repayment Program) 8,000

Veterinary Services Grant Program 2,500

Grants for Insular Areas 2,000

SUBTOTAL a/ 891,730

General Provision: Relocation and Building Alteration/Repair Expenses b/ 6,000

SUBTOTAL a/ 897,730

INTEGRATED ACTIVITIES

Methyl Bromide Transition Program 2,000

Organic Transition Program 5,000

Crop Protection/Pest Management 20,000

Regional Rural Development Centers 2,000

Food and Agriculture Defense Initiative 8,000

SUBTOTAL 37,000

NATIONAL INSTITUTE OF FOOD AND AGRICULTURE (\$000)

PROGRAMS

FY 2018 CONSOLIDATED APPROPRIATIONS

EXTENSION ACTIVITIES

CAPACITY PROGRAMS:

Smith-Lever Formula 3(b)&(c)	\$300,000
1890 Institutions	45,620

SMITH-LEVER 3(d) PROGRAMS:

Expanded Food and Nutrition Education Program	67,934
Farm Safety and Youth Farm Safety Education and Certification	4,610
New Technologies for Agricultural Extension	1,550
Children, Youth, and Families at Risk	8,395
Federally-Recognized Tribes Extension Program	3,039

OTHER EXTENSION PROGRAMS:

Extension Services at 1994 Institutions	6,446
Renewable Resources Extension Act	4,060
Rural Health and Safety	3,000
1890 Facilities (Section 1447)	19,730
Food Animal Residue Avoidance Database Program (FARAD)	2,500
Women and Minorities in Science, Technology, Engineering and Mathematics (STEM) Fields	400
Food Safety Outreach Program	7,000
Food and Ag Service Learning	1,000
Federal Administration c/	8,342

SUBTOTAL

483,626

General Provision: Enhancing Agricultural Opportunities for Military Veterans in Agriculture d/	5,000
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TOTAL, DISCRETIONARY FUNDING a/

1,423,356

FARM BILL MANDATORY AND ENDOWMENT FUNDING

Tribal Colleges Endowment Fund	11,880
Organic Agriculture Research and Extension Initiative	18,680
Beginning Farmers and Ranchers Program	18,680
Specialty Crop Research Initiative	51,370
Emergency Citrus Research and Extension Program	23,350
Food Insecurity Nutrition Incentive Program	23,350
Biodiesel Fuel Education Program e/	934
Agriculture Risk Management Education Program e/	4,670
Community Food Projects Competitive Grants Program e/	9,000

TOTAL, FARM BILL MANDATORY AND ENDOWMENT FUNDING f/

161,914

TOTAL, DISCRETIONARY, FARM BILL MANDATORY, AND ENDOWMENT FUNDING a/ f/

1,585,270

NOTES:

- a/ Estimated interest on Tribal College Endowment Fund was included in the total.
- b/ In FY 2018 Consolidated Appropriations Section 753.
- c/ \$552,000 was provided for Agriculture in the Classroom.
- d/ In FY 2018 Consolidated Appropriations Section 777.
- e/ Mandatory program delegated to another USDA agency but administered by NIFA.
- f/ Farm Bill funding amounts were based on H.R. 2642, the Agricultural Act of 2014 and include impact of sequestration of mandatory funds in FY 2018 Consolidated Appropriations.

STATES AWARD STATISTICS FOR FISCAL YEAR 2018 NON-FORMULA AWARDS*

PERFORMING ORGANIZATION	NUMBER OF AWARDS	TOTAL FUNDING
1862 Land-Grant University (LGU)	957	\$530,637,395
1890 LGU (including Tuskegee University)	119	52,305,995
1994 LGU	96	13,363,720
Certified Non-LGU	41	14,895,370
Non-Land-Grant Public University or College	32	17,855,878
Other	40	17,252,869
Private, For-Profit	120	29,771,879
Private, Non-Profit	136	65,775,918
Private University or College	49	25,931,169
State, Local, or Tribal Government	10	1,640,078
USDA Agency	19	13,461,491
Individual	5	619,907
Other Federal Agency/Department	2	1,591,031
Total	1,626	\$785,102,700



PHOTO: © GETTY IMAGES / OLIVIER LE MOAL

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Dr. Muquarrab Qureshi

DEPUTY DIRECTOR, OFFICE OF GRANTS AND FINANCIAL MANAGEMENT

Cynthia Montgomery

*Dr. Meryl Broussard passed during the development of this publication.

INSTITUTES AND ENTITIES HIGHLIGHTED IN NIFA'S 2018 ANNUAL REPORT BY STATE/TERRITORY

AL - Alabama

Auburn University: P. 5, P. 11, and P. 23
Auburn University Alabama Cooperative Extension System: P. 11
University of Alabama: P. 21

AZ - Arizona

University of Arizona: P. 11

CA - California

Stanford University: P. 15
University of California: P. 11
University of California-Davis: P. 5, P. 11, P. 15, and P. 21
University of California-Riverside: P. 15

CT - Connecticut

University of Connecticut-Storrs: P. 25

FL - Florida

University of Florida: P. 11 and P. 15

GA - Georgia

Fort Valley State University: P. 11, P. 13, and P. 19
Georgia 4-H: P. 25

HI - Hawaii

University of Hawaii: P. 13 and P. 23
University of Hawaii-Manoa: P. 15

IL - Illinois

University of Illinois: P. 5 and P. 21
University of Illinois at Urbana-Champaign: P. 11

KS - Kansas

Kansas State University: P. 5

KY - Kentucky

National Association of Agricultural Educator: P. 13

MA - Massachusetts

Massachusetts Institute of Technology: P. 9
Tufts University: P. 19

MN - Minnesota

University of Minnesota: P. 11

MO - Missouri

University of Missouri: P. 5, P. 19, and P. 23

MT - Montana

Salish Kootenai College: P. 9

NC - North Carolina

MAD Food Pantry: P. 25
National Council for Air and Stream Improvement: P. 15
North Carolina A&T State University: P. 17
North Carolina State University: P. 15 and P. 17
North Carolina State University Extension: P. 17

ND - North Dakota

United Tribes Technical College: P. 21

NH - New Hampshire

Dartmouth College: P. 9

NM - New Mexico

New Mexico State University: P. 11

NY - New York

Cary Institute of Ecosystem Studies: P. 15
Cornell University: P. 5, P. 11, and P. 15
New York Experiment Station: P. 23

OK - Oklahoma

Oklahoma 4-H: P. 25
Oklahoma State University: P. 23
Oklahoma State University Cooperative Extension: P. 17 and P. 25

OR - Oregon

Oregon State University: P. 9, P. 15, and P. 23

PA - Pennsylvania

Penn State University: P. 15, P. 17, P. 21, and P. 23

SC - South Carolina

Clemson University: P. 5

SD - South Dakota

South Dakota State University: P. 19

TN - Tennessee

Tennessee State University: P. 19

TX - Texas

Austin Community College: P. 13

VA - Virginia

Virginia Tech: P. 5

VI - Virgin Islands

University of the Virgin Islands: P. 23

VT - Vermont

University of Vermont Extension: P. 9 and P. 19

WA - Washington

University of Washington: P. 11
Washington State University Extension: P. 9 and P. 11

WI - Wisconsin

University of Wisconsin-Madison: P. 9

WV - West Virginia

West Virginia State University: P. 21 and P. 25

FOREIGN

Agri-Food and Biosciences Institute in Northern Ireland: P. 23
Israel: P. 15
Stockholm Resilience Centre: P. 15
Teagasc in the Republic of Ireland: P. 23

FEDERAL

4-H National Headquarters: P. 25
Agricultural Research Service: P. 5
Animal Plant Health Inspection Service: P. 25
Centers for Disease Control and Prevention: P. 25
National Oceanic and Atmospheric Administration: P. 15

IN MEMORIAM



DR. MERYL C. BROUSSARD MAY 25, 1950 – MAY 18, 2019

It is with great sadness that we acknowledge the passing of Dr. Meryl Broussard, Associate Director of Programs for USDA's National Institute of Food Agriculture (NIFA). Dr. Broussard was responsible for leading NIFA's \$1.7 billion science portfolio. Throughout his 33+ years of Federal service, he demonstrated a sustained commitment to excellence and integrity.

Dr. Broussard began his career as USDA's first national program leader for aquaculture, where he provided effective leadership in developing and implementing new university-based aquaculture research and extension outreach programs. He went on to serve as Director of the Animal Systems Division within the Cooperative State Research, Education, and Extension Service and, later, as the Deputy Administrator for Plant and Animal Systems.

Dr. Broussard led the planning, development, and establishment of NIFA as mandated in the 2008 Farm Bill. He helped build NIFA's strong foundation from the ground up. He became NIFA's first Deputy Director for Agriculture and Natural Resources. In 2014, he became the Associate Director for Programs, leading and elevating Federal science efforts that ultimately benefit American farmers and consumers.

His strong commitment to diversity and equal employment opportunities enhanced program delivery and fostered a workplace environment that ensured dignity and respect to co-workers, customers, partners, and stakeholders.

Dr. Broussard will be remembered as a key figure in developing NIFA's modern organization, influencing the long-term growth in resources, raising the profile of agricultural science within the Federal science enterprise, and most importantly for making a difference in people's lives.

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NIFA invests in and advances agricultural research, education, and extension and seeks to make transformative discoveries that solve societal challenges.

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June 2019