



United States  
Department of  
Agriculture

National Institute  
of Food  
and Agriculture

# TODAY'S SCIENCE, TOMORROW'S SOLUTIONS



*Transformative Research, Education, and Extension  
for America's Food and Agricultural Future*





# CONTENTS

2	OUR VISION
3	MESSAGE FROM THE DIRECTOR
4	2014-2018 NIFA STRATEGIC GOALS
5	THE AGRICULTURE AND FOOD RESEARCH INITIATIVE
8	OUR SCIENCE EMPHASIS AREAS: ENSURING USER-INSPIRED RESEARCH, EDUCATION, AND EXTENSION FOR AMERICA
10	IMPACTS
	<i>12 AGROCLIMATE SCIENCE</i>
	<i>14 BIOECONOMY   BIOENERGY   BIOPRODUCTS</i>
	<i>16 EDUCATION AND MULTICULTURAL ALLIANCES</i>
	<i>18 ENVIRONMENTAL SYSTEMS</i>
	<i>20 FAMILY &amp; CONSUMER SCIENCES</i>
	<i>22 FOOD SAFETY</i>
	<i>24 HUMAN NUTRITION</i>
	<i>26 SUSTAINABLE AGRICULTURAL PRODUCTION SYSTEMS</i>
	<i>28 YOUTH DEVELOPMENT</i>
30	OUR PARTNERS
37	THE NUMBERS
41	OUR LEADERSHIP AND ORGANIZATION
44	USEFUL LINKS

# OUR VISION

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



## A MESSAGE FROM THE DIRECTOR, NATIONAL INSTITUTE OF FOOD AND AGRICULTURE



“Our programs help nurture the next generation of scientists and other professionals in food, agriculture, natural resources, and human sciences to secure America’s global preeminence.”

I am pleased to present the 2016 National Institute of Food and Agriculture (NIFA) Annual Report.

This report highlights examples of how NIFA funding is delivering user-inspired discoveries into classrooms and into the hands of farmers, producers, counties, community organizations, people across our nation, and in other countries where the need is greatest.

With direction and support from Congress, and strong collaboration with academic, governmental and non-governmental institutions, science organizations, small business, industry, other federal agencies, and public and private organizations, we are making significant progress toward solving our nation’s most pressing concerns in the areas of food safety and security, nutrition and public health, natural resource stewardship, the bioeconomy, job growth, and economic health. With NIFA’s support, land-grant and non-land-grant universities, Hispanic-serving institutions, Alaska Native and Native Hawaiian-serving institutions, and institutions in insular areas are developing transformative strategies to solve complex societal problems, such as protecting the health of our pollinators, mitigating antimicrobial resistance, and combating the effects of extreme weather events.

NIFA’s resources empower our partners to transform agricultural production systems in environmentally responsible ways, mitigate the impacts of extreme weather and climate change, advance the bio-based industry, and ensure that food produced is sustainable, nutritious, safe, and accessible for consumers here and abroad. Finally, our programs help nurture the next generation of scientists and other professionals in food, agriculture, natural resources, and human sciences to secure America’s global preeminence.

I am grateful for the privilege to work with the talented and committed professionals at NIFA, our preeminent land-grant and non-land-grant university partners, and diverse stakeholders representing federal, private, and public organizations. I look forward to the remarkable discoveries and achievements the coming year will bring for our nation.

SONNY RAMASWAMY



## 2014-2018 NIFA STRATEGIC PLAN GOALS

The work NIFA undertakes is anchored under four strategic goals:

### **GOAL 1—SCIENCE:**

Catalyze exemplary and relevant research, education, and extension programs.

### **GOAL 2—PEOPLE:**

Transform NIFA into a model agency with a highly motivated workforce.

### **GOAL 3—PROCESS:**

Institutionalize streamlined and effective technologies, policies, and processes.

### **GOAL 4—COMMUNICATION:**

Advance America's global preeminence in food and agricultural sciences.



# AFRI

The Agriculture and Food Research Initiative (AFRI), America's flagship agricultural competitive grants program, supports the nation's best and brightest scientists as they find solutions to our most pressing societal and global challenges.

AFRI-supported research and extension efforts play a critical role in enabling our nation to respond to the significant problems and challenges that face the United States and other countries. These problems include ensuring an abundant supply of safe water for agricultural uses, advancing innovation, adapting to and mitigating the effects of climate change, restoring soil health, improving food safety and quality, preventing childhood obesity, promoting the bioeconomy, and elevating America's competitiveness internationally.

AFRI is NIFA's flagship competitive grants program for funding research, education, and extension projects that address key agricultural, food, and natural resource problems of national, regional, and multi-state importance. AFRI supports foundational and translational research across all key areas of agriculture, including farm efficiency and profitability, renewable energy, forestry, aquaculture, rural communities and entrepreneurship, human nutrition, food safety, biotechnology, and plant and animal breeding.

**AFRI FY16  
FUNDING:  
\$350 MILLION**

**PROJECTS:  
557  
ESTIMATED**

In FY 2016, Congress appropriated \$350 million to the AFRI program, an increase of \$25 million from 2015. AFRI projects focused on the six agricultural priorities of the Agricultural Act of 2014:

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

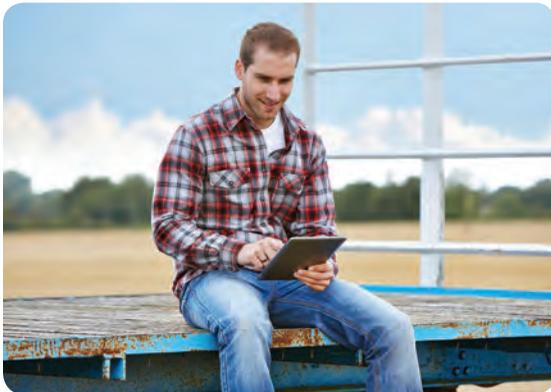
AFRI-funded science is vital to meet the food, fiber, and fuel needs of a global population that is projected to surpass 9.7 billion by 2050. The following exemplify successful impacts resulting from NIFA's investment in AFRI programs.

## Agricultural Economics and Rural Communities

### SUPPORTING OUR NATION'S VETS

Two million U.S. military veterans are younger than 35, with nearly 45 percent of them coming from rural America. Most have expressed interest in returning to their communities, and census data indicates that the Southern region welcomes the largest concentration of veterans. With multi-year support from a \$500,000 AFRI grant, the **University of Arkansas** led a team of experts from **University of Missouri**, **Appalachian State University**, **University of Arkansas at Pine Bluff**, and the **Farmer Veteran Coalition** in developing targeted mentoring programs for beginning farmers and ranchers that emphasize business practices, such as a “veteran-grown” label program, to create marketing opportunities. In 2016, 30 participants went to veteran-owned Across the Creek Farm and learned production operations, including business planning and financial decisions that impact the farm. The grant pays for vets’ attendance at workshops, boot camps, and free online courses.

## Agricultural Systems and Technology



### SAVING PRECIOUS WATER RESOURCES

NIFA is investing in research that enhances food production, processing, and distribution that benefits consumers and rural communities. Water conservation is a critical, global issue for human

use and agricultural production—approximately 80 percent of the consumptive use of water is in agricultural food production. A team of **Cornell University** researchers improved the efficiency of irrigation by measuring how much water stress can be tolerated without adversely affecting crop yield or quality. They did this by developing a water sensor that is inserted into plants to continuously measure water levels within the plant. These low-cost chips efficiently provide real-time, sensitive water measurements that inform growers on irrigation management. With the sensor, farmers are able to adjust their irrigation schedules to various weather anomalies that affect water transpiration in plants. As a result, farmers may be able to reduce their water-use footprint and increase profits by saving money on their water bills.

## Animal Health and Production and Animal Products

### GENETICS HUMANELY DEHORN DAIRY CATTLE

Advances in the field of genomics help breeders produce desirable varieties of crops and livestock, as well as overcome challenges that had previously been undertaken via conventional breeding. For example, most cattle in the dairy industry are mechanically or chemically dehorned, or polled, early in life to protect against injury to other cattle and their handlers. To eliminate this traumatic process, a team of NIFA-funded researchers at **Recombinetics, Inc., in St. Paul, Minnesota**, successfully used a \$435,000 AFRI grant to develop a gene editing process that introduces the hornless gene into the cells of horned bulls. While the majority of hornless cattle generated via conventional breeding produce low-quality milk, gene editing offers a simple and rapid solution to generate hornless cattle that produce milk of higher quality.



## Bioenergy, Natural Resources, and Environment

### POWERING FLIGHT, FROM WOOD TO WING

On Nov. 14, 2016, Alaska Airlines flew the first commercial flight from Seattle, Washington, to Washington, District of Columbia, powered, in part, by a new renewable fuel made of wood waste. This flight was the culmination of a five-year, \$39.6 million AFRI research and education project, the Northwest Advanced Renewables Alliance (NARA), led by **Washington State University**. Launched in 2011, NARA advanced research into biofuels and biochemicals, fostered the Northwest regional biofuel industry, and helped educate tomorrow's workforce on renewable energy. The harvested residues used to make fuel for this flight came from forests owned by the Muckleshoot Indian Tribe in Washington and the Confederated Salish Kootenai Tribes in Montana. The resulting biofuel, created by industrial partner Gevo, is chemically indistinguishable from jet fuel derived from fossil fuel. NARA is one of seven NIFA-funded regional bioenergy Coordinated Agricultural Project (CAP) grants that are attempting to help industries break our nation's dependence on fossil fuels and reduce their carbon footprint.

## Food Safety, Nutrition, and Health

### DELIVERING A HARD BLOW AGAINST NOROVIRUS

Norovirus, often known as stomach flu, is so good at infecting humans that it's been called the perfect

human pathogen, so virulent that a person can become sick within a few hours of consuming as few as 20 virus particles. In the United States alone, there are about 21 million cases each year that result in more than 800 deaths. The NoroCORE team, led by **North Carolina State University**, is a multi-disciplinary collaborative of 30 researchers who are leaders in the fields of basic, food, and environmental virology from 25 universities. Their goal was to reduce the burden of foodborne illness associated with viruses. NIFA supports the project with a \$25 million CAP grant. In 2016, NoroCORE team members at the **Baylor College of Medicine** announced that they had successfully cultured the human norovirus in intestinal cells. This goal had eluded scientists for over 48 years. This discovery can lead to advances in the development of vaccines, therapeutics, and other measures to control the virus in humans and also affect management of norovirus transmission.

## Plant Health and Production and Plant Products

### SEPARATING DEVASTATING WHEAT BLAST PATHOGEN FROM LOOK-ALIKES

An epidemic of wheat blast, a crop disease caused by the fungus *Magnaporthe oryzae triticum* (MoT), struck Bangladesh in spring 2016. Wheat blast can result in 30-100 percent crop loss. To limit such food security calamities in the United States, researchers from **Kansas State University**, **University of Kentucky**, and **USDA's Agricultural Research Service** joined forces to create a sensitive new assay method to detect the fungus. With support from two AFRI grants totaling \$5.4 million, the researchers devised a method to home in on a specific region of the fungus' genome that distinguishes it from look-alike strains. In tests, it accurately distinguished all known strains of MoT from more than 280 specimens of *M. oryzae* collected around the world. The method yields results in less than 24 hours and is sensitive enough to detect even trace amounts.



# SCIENCE EMPHASIS AREAS

## ENSURING USER-INSPIRED RESEARCH, EDUCATION, AND EXTENSION FOR AMERICA

In 2016, NIFA developed, delivered, and evaluated the agency's science objectives through nine science emphasis areas administered through the agency's four programmatic institutes:

Institute of Food Production and Sustainability (IFPS)

Institute of Bioenergy, Climate, and Environment (IBCE)

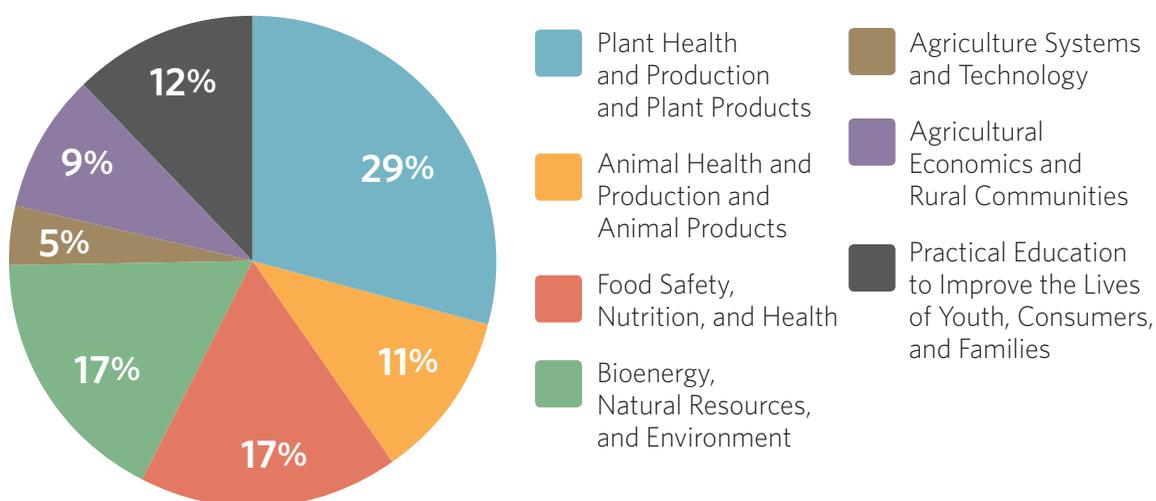
Institute of Food Safety and Nutrition (IFSN)

Institute of Youth, Family, and Community (IYFC)

SCIENCE EMPHASIS AREAS	INSTITUTE
Sustainable Ag Production Systems	IFPS, IBCE, IFSN, IYFC
Education and Multicultural Systems	IYFC
Environmental Systems	IBCE
Family & Consumer Sciences	IYFC
Bioeconomy, Bioenergy, Bioproducts	IFPS, IBCE
Human Nutrition	IFSN, IYFC
Food Safety	IFSN
Agroclimate Science (Climate Change)	IFPS, IBCE
Youth Development	IYFC

SCIENCE EMPHASIS AREAS	TOTAL COMPETITIVE PROJECTS FUNDING BY PORTFOLIO*	COMPETITIVE PROJECTS ACTIVE IN 2016*
Sustainable Ag Production Systems	\$279,096,337	690
Education and Multicultural Systems	27,737,779	116
Environmental Systems	85,257,120	271
Family & Consumer Sciences	63,886,456	256
Bioeconomy, Bioenergy, Bioproducts	10,553,123	34
Human Nutrition	44,657,001	127
Food Safety	43,861,706	129
Agroclimate Science (Climate Change)	3,875,822	25
Youth Development	13,805,812	86

## COMPETITIVE FUNDING BY FARM BILL PRIORITY AREA\*



\* estimated



# IMPACTS

NIFA funding enabled our grantees to make significant strides toward solving societal challenges in the areas of climate, bioenergy, education, the environment, family and consumer sciences, food safety, nutrition, sustainable agriculture, and youth development.



# Ensuring Sustainable, Adaptive Agro-Ecosystems

IMPACTS

## MAP IDENTIFIES, TARGETS PROBLEM LOCATIONS

Harmful algal blooms (HAB) can harm the health of the environment, plants, and animals by depleting oxygen from water and blocking the sunlight that other marine organisms need to live. Some HAB also release toxins that can be dangerous to animals and humans. NIFA's support of the **National Atmospheric Deposition Program (NAPD)** helps track how airborne nitrogen is deposited in the United States and how it affects the environment. NAPD maps indicate how nitrogen deposition in the United States can enter the Mississippi River, travel south, and threaten aquatic life in the Gulf of Mexico. A 5,300-square-mile hypoxic "dead zone" in the Gulf is an example of the danger caused by too much nitrogen. The map gives policymakers, scientists, and others a clear view of nitrogen hot spots so they can develop and implement plans of action to reduce hypoxia and the size of the hypoxic zone.



## BUILDING A CADRE OF 'CLIMATE MASTERS'

NIFA announced July 2016 the availability of an \$8.4 million grant to study and develop new approaches for the agriculture sector to adapt to and mitigate the effects of climate change. One seminal hallmark of the program will be the development of **Climate Masters**, a cadre of community-based volunteers who will develop the requisite knowledge to help their communities better adapt to and become resilient to climate variability.

## PUTTING THE 'WOW' INTO WEATHER VARIABILITY RESEARCH

Research-based tools are readily available to document current and projected climate variability impacts, but students sometimes have difficulty interpreting the data or understanding its urgency. The "G-WOW" Changing Climate, Changing Culture initiative from **University of Wisconsin Extension, Fond du Lac Tribal and Community College**, the Great Lakes Indian Fish and Wildlife Commission, National Park Service, and U.S. Forest Service changed the way educators talk about climate variability by creating a model that integrates culturally-relevant evidence of climate variability with climate science. The project is building educational partnerships with tribes and native people. More than 1,100 people have participated in G-WOW, including 196 students participating in follow-up G-WOW Coastal Climate Camp field experiences.

## UNDER THE AGROCLIMATE SCIENCE EMPHASIS AREA, NIFA SUPPORTS

the development of sustainable agriculture and forestry-based strategies to mitigate the effects of climate variability and change. These strategies include the development of selective breeding of crops and livestock, agronomic and animal husbandry practices, help producers reduce atmospheric greenhouse gas (GHG) emissions, and maximize carbon sequestration. The programs seek to:

- Identify new production practices that increase soil carbon while reducing GHG emissions;
- Reduce energy, nitrogen, carbon, and water footprints in agricultural production systems;
- Translate genomics research and resulting technologies to the agricultural and forestry production sector to adapt to climate variability;
- Develop and implement new nitrogen fertilizer recommendations that optimize yields while reducing GHG emissions; and
- Improve agricultural and forest sector inputs to climate change models.



### REDUCING GREENHOUSE GAS — ONE COW AT A TIME

A five-year, NIFA-funded Dairy CAP is putting the U.S. dairy industry on target to reduce its GHG emissions by 25 percent by 2020. The **University of Wisconsin** is leading a team of 50 researchers who are examining all facets of dairy production to meet the goal by considering feed efficiency and feed production, manure processing and energy use, economic aspects of manure handling, nutrient use, water use, and soil quality. The researchers are developing computer models to identify where farm emissions are the greatest. By integrating process models with climate models,

scientists will be able to recommend new management practices to reduce GHG.

---

### ENHANCING CLIMATE RESILIENCY AND AGRICULTURE ON AMERICAN INDIAN LAND

Reduced snowpack and rainfall, combined with urban and industrial expansion, is increasing demand for a dwindling supply of water for American Indian communities in the Great Basin Desert and arid lands of the American Southwest. **University of Nevada, Reno (UNR)**, with support from a \$1.5 million AFRI grant, is leading a team of researchers and extension professionals who are working with tribal communities Nevada, Utah, Arizona, and New Mexico to develop and implement reservation-wide plans, policies, and practices to support sustainable agriculture and water management. The team created a 5-year work plan and characterized tribal agricultural production, traditional agricultural practices, and data related to land base and tribal water rights, income, employment, and demographics.

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

## IMPACTS

### ONE PERSON'S WASTE IS ANOTHER'S FUEL OIL

Developing, implementing, and supporting sustainable energy sources is one of USDA's top priorities. NIFA-funded researchers from USDA's **Agricultural Research Service (ARS)** at the Eastern Regional Research Center in **Wyndmoor, Pennsylvania**, developed a way to produce a renewable fuel called bio-oil from agricultural and food waste. A key part of this bio-oil production project is a new high-output mobile processing unit that was funded by NIFA. The mobile reactor travels from farm to farm, converting biomass into energy-dense bio-oil right on the farm, eliminating the need to ship agricultural waste to refinery plants at high cost.

both natural and synthetic rubber with guayule in various components, and testing each build for maximum durability. The project, which NIFA funded with a \$6.8 million grant, will replace petroleum-based materials in tires, produce renewable fuels from biomass, and create green jobs in agriculture and manufacturing. Project partners included **Cornell University, Clemson University**, and **ARS**.

### OILSEEDS TO POWER PLANES

**South Dakota State University** collaborated with Agrisoma Biosciences, Inc., and the SD Oilseeds Council to develop an oilseed crop, Carinata, to be used for production of bio-based jet fuel and diesel for the U.S. Navy. Carinata, which has the potential to be used as a 100 percent petroleum substitute in biodiesel, bio-jet fuel, oil additives, and specialty lubricants, can reduce dependence on petroleum-based products. The NIFA-funded project specifically gives farmers in semi-arid and arid areas the potential to transform the economy of their regions.

### IT'S WHERE THE... GUAYULE... MEETS THE ROAD

Tire manufacturing in America will reach a milestone in mid-2017 when **Cooper Tire & Rubber Company**, in Findlay, Ohio, will produce a tire made with guayule-based polymers rather than natural and synthetic rubber. Guayule is a shrub that grows in the American Southwest and contains an alternative to the natural rubber used to process tires. The tire, which is 100 percent guayule-based, will undergo extensive technical trials following its production. The company will continue studies regarding the commercial distribution of the tires. Cooper has completed a number of pilots that include the replacement of

### BEETLE-KILLED TREES PRODUCING BIOFUEL

Infestations of pine and spruce bark beetles has led to widespread tree death in coniferous forests across the Rocky Mountains over the past decade, with about 42 million acres of U.S. forests impacted since 1996. The resulting beetle-killed wood represents a vast bioenergy resource that requires no cultivation, circumvents food-versus-fuel

## THE BIOECONOMY-BIOENERGY-BIOPRODUCTS SCIENCE EMPHASIS AREA

supports the expansion of regional production systems for biofuels and bio-based products. Non-carbon-based fuels, power sources, and chemicals are just a few of the products resulting from this portfolio's research, demonstration, extension, and education programs. These programs foster rural economic development, mitigate the impacts of climate variability, improve wildlife and pollinator habitat, reduce GHGs, and improve water quality and food and energy security. NIFA collaborates with and leverages the resources of other federal agencies, such as U.S. Department of Energy's (DOE's) Biomass Research Development Initiative (BRDI), and private sector investments to achieve the objectives of this portfolio.



concerns, and may have a highly-favorable carbon balance compared to other forestry feedstocks.

**Cool Planet Energy Systems'** proprietary technology and advances in modular thermochemical conversion enable them to produce gasoline and jet fuel from wood chips, and other organic waste and could significantly reduce the potential for forest fires. Cool Planet's work falls under the Bioenergy Alliance Network of the Rockies (BANR) at **Colorado State University**, which brings together scientists, educators, and extension specialists from universities and government agencies across the region to research the use of insect-killed trees for the production of biofuels and biochar.

### SWITCHGRASS EQUAL TO, IF NOT BETTER THAN, CORDWOOD?

Switchgrass is an environmentally-friendly plant that provides cover for wildlife, forage production, and erosion control, and can absorb pesticide residue from the soil. Baled switchgrass can be a cost-effective alternative to cordwood or propane for heat production on farms or supplement coal in municipal power plants to reduce GHG.

NIFA-funded research at **University of Missouri's** Bradford Research Farm shows that baled switchgrass has about the same British thermal unit output and burn duration as cordwood, per equal weight but with significantly less ash residue and carbon emissions. Switchgrass has an advantage over other alternative crops because it is a perennial that also returns nutrients back into the soil and can produce 25 tons of crop per 100 acres.



# Educating Our Nation's Next Generation of Scientists

## IMPACTS

### NEW MEXICO STUDENTS JOIN THE 'CORPS' TO FIGHT EFFECTS OF CLIMATE VARIABILITY

Climate variability presents real threats to U.S. agricultural production, forest resources, and rural economies. These threats have significant implications, not just for farmers, ranchers, and forest landowners, but for all Americans. One NIFA-funded project at the **University of New Mexico-Taos** (UNM-Taos) is cultivating the next generation of climate variability researchers. With the help of a \$1 million Hispanic-Serving Institution Education grant, UNM-Taos created the Northern New Mexico Climate Change Corps (CCC) to educate students to respond to climate-related challenges. UNM-Taos collaborated with New Mexico Highlands University (NMHU) to help students start their education in Taos and transfer to NMHU to complete a bachelor's degree in forestry, geology, or biology. To date, 20 students have enrolled in CCC. The program also offers paid summer internships as research assistants to scientists in federal agencies or to graduate students at NMHU doing thesis research related to climate change.

Capacity Building program helped FVSU create a bioinformatics curriculum where students learn to transform biological research into informational science. In the program, science, technology, engineering, and mathematics (STEM) majors join with computer science majors to become competent bioinformatics programmers and gain hands-on experiences in writing algorithms and coding for biological problems. Bioinformaticians use computers to store, organize, and analyze the vast amounts of data generated by scientific research.



### TEXAS A&M STEPS UP STEM

In 2013, Hispanics made up 16 percent of the U.S. population, but earned only 9 percent of all certificates and degrees awarded in STEM fields, according to Excelencia in Education. **Texas A&M University-Kingsville**, with the support of a \$3.3 million NIFA Hispanic-Serving Institution Education grant, is leading a multi-institution

---

### STUDENTS LEARN 'DIGITAL BIOLOGY' TO MAXIMIZE USE OF BIG DATA

At Georgia's **Fort Valley State University** (FVSU), new leaders in agricultural and life sciences are coming face-to-face with technology that will help them solve the toughest agricultural challenges of the future. A \$150,000 grant from NIFA's 1890

## WORK UNDER THE EDUCATION AND MULTICULTURAL ALLIANCES

science emphasis area supports education programs that serve students from pre-kindergarten through the postdoctoral level and beyond. With the global population projected to increase beyond 9.7 billion in the coming years, one of the nation's greatest challenges is to educate new scientists and train skilled workers. NIFA's education programs support student recruitment and retention, teacher training, provide financial support, and advance the development of a diverse food and agricultural workforce.

NIFA-supported Agriculture in the Classroom (AITC) programs were implemented by state-operated programs to improve agricultural literacy, awareness, knowledge, and appreciation, among pre-K through 12th grade teachers and their students. In 2016, AITC's curriculum website had

nearly 142,000 visitors accessing the online curriculum matrix of more than 295 lesson plans and 537 companion resources. At the post-secondary level, AFRI educational programs supported 1,055 undergraduates, 652 graduates, and 270 postdoctoral researchers.

Other NIFA-funded education programs provided direct support to 3,710 students through learning and engagement programs, capacity building for minority-serving institutions, and workforce development.

program that encourages such students to pursue STEM degrees and careers as leaders in agriculture. Participants of the STEP UP to USDA Career Success program receive intensive hands-on training and internships at four USDA agencies: Natural Resources Conservation Service, Agricultural Marketing Service, ARS, and Animal and Plant Health Inspection Service. More than 330 students have participated in the program's courses since 2012, surpassing the project's goal of 50 students per year. With STEP UP, students discover the types of jobs where they may excel, and the field of agriculture receives an infusion of diverse, well-educated career professionals.

### AG ROBOTICS STUDENTS DESIGN THEIR WAY TO NEW CAREERS

Agricultural engineers with robotics knowledge are in high demand because advanced robotics and unmanned agricultural vehicles are becoming widely used in precision agriculture. **Prairie View A&M University** in Texas now offers agricultural robotics training to ensure that students are adequately prepared for this burgeoning job market. With support from a \$276,000 NIFA grant, Prairie View has created an agricultural robot capable of carrying multiple sensors, including one that can detect crop height, a multi-spectral camera, and hyperspectral radiometer for processing information from across the electromagnetic spectrum. Robots in agriculture include self-driving tractors and other machines that perform tasks such as precision weeding and spraying, pruning vines in the wine industry, and herding cattle. Prairie View students designed their system and use it in the classroom and in rice and fruit fields.



# Safeguarding Our Environment

IMPACTS

## NEW SENSOR HELPS FORESTERS DETECT CHANGES TO THEIR ASSETS

Northeast forests face a variety of threats, from climate variability and land-use change to invasive species. Researchers at the **University of New Hampshire** are studying how LiDAR (light detection and ranging) remote-sensing technology that uses lasers and radar—can help foresters and landowners gain more accurate and detailed information about their forests, saving both time and money over previously used technologies. The project also refines new techniques for identifying the forest understory (vegetation beneath the forest canopy), which is critical to water and nutrient availability, soil carbon storage, and regrowth of commercially-important trees.

“grab-sampling” has been the standard for testing water. **University of Nebraska** researchers are using a \$956,000 AFRI grant to develop an aerial water sampling system using an unmanned aerial vehicle (UAV). The UAV can quickly and safely deploy to hard-to-reach locations and respond to changing scenarios. The prototype aerial water sampler has flown more than 1,000 test flights in wide-ranging sampling and sensing missions over California, Kansas, and Nebraska, collecting samples rapidly and at low cost. The researchers have refined the technology with sensors that enable them to obtain sub-surface water samples to detect salinity and temperature.

---

## BIOSENSORS HELP MONITOR PESTICIDE USE

Underuse of pesticides can harm crops, while overuse can result in runoff into soil or waterways. A team of researchers at **Iowa State University's** Department of Mechanical Engineering helped farmers determine how much pesticide to use by creating a flexible, low-cost, disposable biosensor that can detect pesticides in soil. This biosensor is made of graphene, a strong and stable nanoparticle. The sensor provides instantaneous feedback, saving the time and money it would otherwise take to send a sample to a lab and await results. The biosensor is made by printing graphene ink onto paper. A laser then traces over the ink to improve its electrical conductivity by welding together flakes of the graphene ink, making a nanostructured surface that is three dimensional. By dipping the biosensor into a slurry



## USING DRONES TO COLLECT WATER SAMPLES

Monitoring and predicting water quality poses a significant challenge since sources of fresh water and contaminants come from vast areas of land and waterways. As a result, inconsistent, manual

## THE GOALS OF THE ENVIRONMENTAL SYSTEMS SCIENCE EMPHASIS AREA

are to proactively and comprehensively protect the critical air, water, and soil resources fundamental to life on earth and the ecosystems that they foster, from forest, range, grass, and grazing, to recreational lands. Collaborative research conducted in this portfolio involves scientists and engineers from a range of disciplines and organizations to solve the significant global challenges impacting these complex and interdependent systems. Projects bring together experts in land use, forests, rangeland, watershed management, wildlife habitat, agriculture land conservation, and small business innovation. These projects investigate ecosystems and the services they provide, such as:

- Supporting nutrient recycling, primary production, and soil formation necessary for the production of all other ecosystem services;
- Provisioning food, raw materials, water, genetic resources, energy, minerals, and medicinal resources;
- Experiences that humans obtain from ecosystems, including spiritual experiences, historical understanding, recreational experiences, science and education; and
- Carbon sequestration and climate regulation, waste decomposition, purification of water and air, and pest and disease control.

of soil and water, like a pH test strip, farmers can get results quickly and understand how much pesticide they need to maintain healthy crops, minimize environmental damage, mitigate pesticide resistance, and save money by not purchasing and using too much pesticide.

---

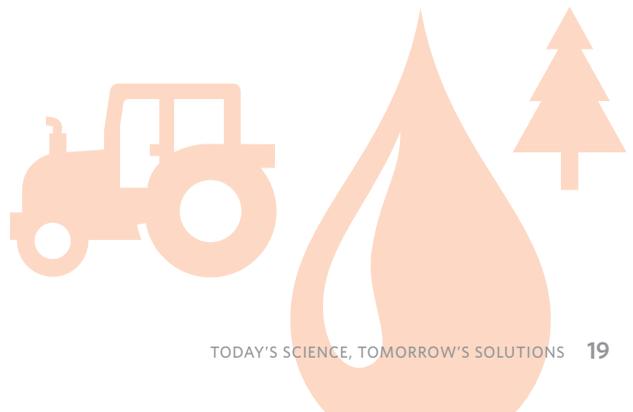
### WATER TREATMENT COULD PREVENT ALGAE BLOOMS, REDUCE CARCINOGENS

A recent rise of dissolved organic carbon (DOC) in surface water poses environmental and health concerns due to eutrophication—the excessive richness of nutrients in bodies of water causing dense growth of plant life—which could ultimately deplete oxygen from the water and lead to the death of fish and other marine life.

A team at Missouri's **Lincoln University**, supported by NIFA funds, developed cost-effective water treatment technologies for small water systems. Preliminary results show that their methods are fast and effective for DOC removal and reduction



of DBP forming potential. Pilot-scale studies will be conducted soon to validate lab results.



# Strengthening, Enabling Communities

## IMPACTS

### MENTORING VETS: FROM PARENTING TO FARMING

NIFA, the Department of Defense (DOD), and the Department of Veteran Affairs (VA) collaborate to support those who protect America—U.S. military veterans and their families. Research suggests that children of deployed parents experience more stress than their peers. NIFA, DOD, and VA collaborations have helped thousands of military families gain access to the high-quality educational programs in early childhood education, youth development, and related fields that land-grant university cooperative extension systems provide. In nearly every state, 4-H Military Partnerships offer programs for children from military families. Other key initiatives include the Clearinghouse for Military Family Readiness, led by **Penn State University**, which collects information on hundreds of programs from across the country and serves as a one-stop shop for professionals who work with vets and their families. The Virtual Lab School, led by **The Ohio State University**, is an online professional development and resource system that provides research-based courses in child care and youth development. NIFA also engages military veterans with the **Beginning Farmer and Rancher Development Program** (BFRDP), which funds organizations that train beginning farmers and ranchers through workshops, educational teams, training, and technical assistance. Nearly 10 percent of BFRDP funding went to projects that serve military veterans in 2016.

### AIDING IN TIMES OF NATURAL DISASTERS

In mid-August 2016, residents of southern Louisiana were deluged by storms that brought about two feet of rain, resulting in flood damage to more than 100,000 homes. Several federal agencies, including NIFA and its partner, **Healthy Homes Partnership (HHP)**, sprang into action to help. HHP links the resources of NIFA and state land-grant universities with U.S. Housing and Urban Development to form a public outreach education program to help residents prepare their homes in case of floods and other disasters. In southern Louisiana, HHP posted on Facebook and Twitter so people could access resources online. In one 24-hour period, the posts logged 509 clicks in which people went from the HHP Facebook page directly to the recovery guides. In all, flood recovery posts from **Louisiana State University Extension's** LaHouse, HHP's partner agency in Louisiana, reached about 30,000 residents.

### HELPING RURAL COMMUNITIES HELP THEMSELVES

Regional Rural Development Centers (RRDCs) play a unique role in USDA's service to rural America. With NIFA funding, RRDCs help rural communities across the country find innovative ways to capitalize on their local strengths. The four RRDCs are located at **Michigan State University, Mississippi State University, Penn State University, and Utah State University**. Through a guided process, more than 400 counties in 38 states have discovered new ways to work together

## NIFA'S FAMILY & CONSUMER SCIENCES (FCS) SCIENCE EMPHASIS AREA

addresses 21st century economic and health challenges. NIFA offers a range of research, education, and extension programs to help families and communities make healthy choices and better financial decisions, and reach their full potential.

According to the 2014 Census, 14.8 percent of all Americans lived in poverty. A recent Battelle study of the value of Family & Consumer Sciences Extension in the North Central Region showed that FCS results in

substantial economic returns to the nation. Among the many benefits of FCS, the study reported that every \$1 spent on NIFA's Expanded Food and Nutrition Education Program (EFNEP) results in savings on food expenditures

of \$2.48 through smarter shopping behavior, meal planning, and enhanced use of low-cost recipes and more home-cooked meals.

to grow their economies. Stronger Economies Together (SET) is a joint partnership between NIFA, USDA'S Rural Development, the RRDCs, and the Cooperative Extension System that brings together regions of three or more neighboring rural counties to identify their collective economic strengths, develop an action plan, and build on those assets to find a competitive edge for economic growth. To date, the 84 regions participating in SET have leveraged more than \$588 million in funding to support their plans.

**Caddo, Custer, Washita, and Beckham counties, Oklahoma,** contended with the economic devastation of a local military base closure. With the help of their RRDC, the community decided to take the empty airstrip and repackage it as a prime location for unmanned aerial vehicle research and development. By taking an underused resource and redirecting it to fit a niche need, the region opened the doors to a rapidly expanding new industrial market.

---

### KEEPING AG PRODUCERS, FAMILIES ON THE JOB

NIFA's AgrAbility program enhances quality of life for farmers, ranchers, and other agricultural workers with disabilities by providing funding for direct assistance, non-formal education, and

networking, and uses marketing to direct the public to initiatives, trainings, resources, and partnering opportunities. The **University of Maine's** AgrAbility program provides health and safety information for the state's high visibility professions, including commercial fishing and logging. Missouri AgrAbility, a partnership between the **University of Missouri** and **Lincoln University Cooperative Extension**, partnered with the **University of Missouri-Kansas City School of Pharmacy** to minimize health risks and avoid re-injury related to prescription medications for disabled farmers. More than 65 pharmacy students and four pharmacists provided health screenings and education to nearly 2,000 farmers and ranchers. In FY 2016, NIFA awarded \$4.2 million in grants through the AgrAbility Program to support 20 state and regional programs. Since initial funding in 1991, NIFA has awarded AgrAbility grants to more than 35 states resulting in on-farm assistance to keep more than 13,000 farmers working while educating thousands of professionals on how to accommodate those with disabilities in agriculture.

# Improving Food Quality and Safety of Our Food Supply

## IMPACTS

### EXAMINING THE VIRULENCE OF SALMONELLA

NIFA-funded researchers at the **University of Maryland Eastern Shore** (UMES) studied factors that affect antibiotic resistance and virulence of *Salmonella* during poultry processing. Their analysis showed that the chilling process can lead to *Salmonella* contamination and cross-contamination among poultry carcasses but has no effect on the prevalence of antibiotic-resistant genes. This knowledge will be used to develop tools to help poultry inspectors improve *Salmonella* detection, helping to improve food safety and prevent future food recalls.



### RESEARCHERS DROP 'NANOBOMBS' ON PATHOGENS

The Centers for Disease Control and Prevention (CDC) estimate that 48 million Americans get sick each year from eating food contaminated by pathogens. **Harvard University** researchers are using an AFRI grant to investigate a novel,

chemical-free, nanotechnology-based way to inactivate pathogens like *E. coli*, *Salmonella*, and *Listeria* on the surface of fruits and vegetables. Their method involves engineered water nanoparticles—aerosolized water that is passed through a strong electric field—in a process called electro-spraying. Despite their small size, about 4,000 times smaller than the width of human hair, the droplets contain a high electrical charge that kills pathogens on contact. After destroying the pathogen the water evaporates and leaves no chemical residue.

### BIOSENSORS SCREENING FOR BACTERIA

Keeping the food on America's tables safe to eat is a major priority at NIFA, and our partners are constantly working to find innovative ways to stay a step ahead of bacteria and other dangerous contaminants that can cause illness. A research team at the **Auburn University** Detection and Food Safety Center developed a new portable and easy-to-use screening tool to test fresh fruits and vegetables for the presence of bacteria that can cause foodborne illnesses. The team developed biosensors that are placed directly on the fresh fruits or vegetables. The eyelash-size biosensors are coated with antibodies and phages, which are viruses that target specific bacteria that vibrate when placed within an oscillating magnetic field. Frequency changes help inspectors determine the type and amount of bacteria on a given fruit or vegetable. In a matter of minutes, the sensors can detect as few as 500 *Salmonella* cells amid a sea

## NIFA'S FOOD SAFETY SCIENCE EMPHASIS AREA SUPPORTS OUR NATION'S

with a safe food supply. Approximately 48 million Americans contract foodborne illnesses each year from food contaminated with bacteria, viruses, parasites, or toxins. NIFA is committed to reducing the number of illnesses by protecting the food supply through research, education, and extension efforts that focus on all levels of the food chain, from farm to fork. This portfolio addresses a wide variety of food safety issues that include:

- Delivering food safety education, outreach, and training to a variety of audiences;
- Employing nanotechnology in production, processing, packaging, and safety of food;
- Increasing food safety and food quality through improved processing technologies;
- Improving safety across agricultural production systems, including organic agriculture;
- Identifying the interactions between food safety, nutrition, and human health;
- Understanding plant-pathogen interactions;
- Implementing a systems approach for developing effective mitigation strategies for antimicrobial resistance;
- Preventing, detecting, and controlling foodborne and waterborne pathogens; and
- Understanding the ecology of foodborne pathogens, including viruses.

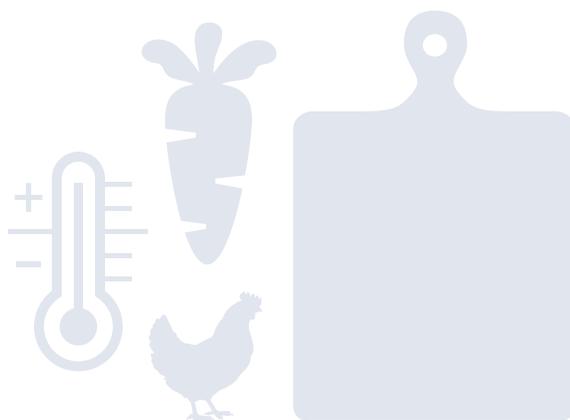


of a million bacterial cells. The biosensors are disposable and inexpensive, costing less than 1/1,000 of a cent.

### UV OVENS KILLS PATHOGENS WITHOUT COOKING FOOD

A variety of high-risk foods, such as fresh produce, poultry, meats, and seafood have been associated with foodborne outbreaks and NIFA has provided many grants to researchers looking for ways to reduce the risk. While cooking is generally a

surefire way to eliminate pathogenic bacteria from food, not all foods are cooked. A NIFA-funded researcher at the **University of Delaware** developed a technology to improve the safety of food without using heat. The research team developed a “UV oven” that exposes food to ultraviolet light, which kills pathogens. The oven looks like a microwave but generates no heat. Studies of spot-inoculated produce show that the UV oven can kill up to 99.99 percent of pathogenic bacteria.



# Cultivating a Healthy Nation through Nutrition Research and Education

IMPACTS

## HELPING TO END FOOD INSECURITY

NIFA's Food Insecurity Nutrition Incentive (FINI) program supports projects that increase the purchase of fruits and vegetables among participants of the Supplemental Nutrition Assistance Program (SNAP) by providing incentives at the point of purchase. In **Savannah, Georgia**, Farm Truck 912 offers a food education and outreach program and health screenings provided by Mercer University School of Medicine. A **Chester County, Pennsylvania**, Fresh2You Food Truck offers valuable financial incentives to customers shopping with SNAP benefits and enhances their knowledge of how to choose, prepare, and store produce.

## FOOD HUBS CONNECT LOCAL GROWERS TO COMMUNITY CONSUMERS

NIFA-funded Community Food Projects (CFPs) are addressing food distribution issues in food-insecure communities by creating new local food hubs, including the Molokai Food Hub (MFH) on the island of **Molokai, Hawaii**. An estimated 80-90 percent of the food in Molokai grocery stores is imported via barge, and families bear the transportation costs through high food prices. In **West Springfield, Massachusetts**, the New Lands Farm Marketing Initiative connects new American farmers and low-income consumers to local, fresh, culturally-appropriate foods. In the past three years, Lutheran Social Services has worked with 172 farmers, more than 100 being

from Bhutanese, Burundi, Kenyan, and Vietnamese communities. During that time, participating micro-farmers have reached an average of 10,171 consumers per year, 58 percent of whom were low-income.

## RESPONDING TO FLINT, MICHIGAN'S LEAD IN WATER CRISIS

**Michigan State University** (MSU) Extension, with partial funding by NIFA, provided an educational and nutritional response to the crisis of lead-contaminated water in Flint, Michigan. MSU specialists provided educational workshops, and wrote several educational articles and fact sheets on lead poisoning. MSU Extension facilitated the distribution of 12,000 gallons of milk to the Food Bank of Eastern Michigan. Milk can be used to mitigate the effects of lead absorption, as it is rich in iron, vitamin C, and calcium. MSU Extension worked with partner organizations to fund and distribute water filters and soil tests. Cooperative Extension educators have been an integral part of the Flint Downtown Farmers Market by providing health, nutrition, and cooking education. MSU Extension organized a 4-H special interest club that focuses on water filtration and helping people understand the need to drink filtered or bottled water. MSU coordinated with Edible Flint, an informal cooperative of food producers, to focus new programs on lead in soils and educating people who grow their own food.

## NIFA'S HUMAN NUTRITION SCIENCE EMPHASIS AREA SUPPORTS

**RESEARCH AND** education programs that lead to a healthy, nourished population. NIFA partners with the Cooperative Extension System to deliver community-based nutrition education programs that help individuals, families, and communities make informed choices about food and lifestyles that support their physiological health and economic and social well-being. The programs also provide policymakers with the knowledge to make appropriate policies for citizens. Programs within the Human Nutrition portfolio seek to:

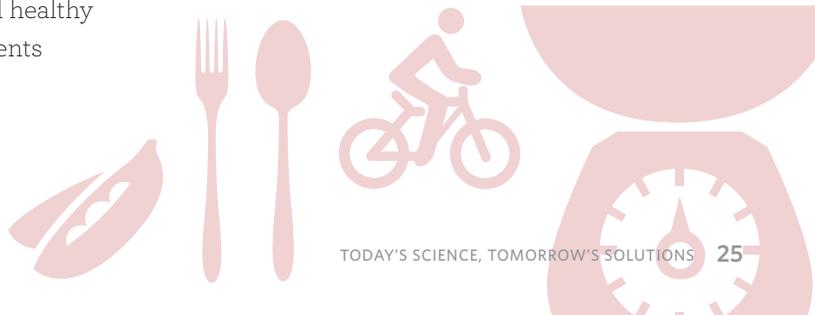
- Expand knowledge about how bioactive components of food affect gastrointestinal health;
  - Cultivate interventions that include dietary guidance in community food programs;
  - Increase knowledge about the behavioral, cultural, and psychosocial factors that influence obesity; and
  - Advance successful obesity prevention interventions.
- The United States is making strides in combating food insecurity. Food insecure households dropped from 14 percent in 2014 to 12 percent in 2015. NIFA funding and leadership support many food and nutrition assistance programs that provide low-income households access to food, a healthy diet, and nutrition education. Three such programs are the Food Insecurity Nutrition Incentive (FINI), Community Food Projects (CFP), and the Expanded Food and Nutrition Education Program (EFNEP).

### REDUCING CHILDHOOD OBESITY

According to USDA's Food and Nutrition Service, 30 percent of Hispanic households with children are food insecure, meaning they have limited or uncertain access to healthy food. In addition, the CDC estimates 22 percent of Hispanic children to be obese. NIFA has joined the fight against food insecurity and obesity by funding the **University of Illinois'** program "Abriendo Caminos" (Clearing the Path) with a \$926,500 AFRI grant. The workshop-based curriculum teaches the importance of family activities. Examples of these activities include meal preparation, choosing healthy alternatives, exercising, and other physical activity. These combined efforts help strengthen the link between strong family units and healthy eating, both of which are major components of fighting childhood obesity.

### COMBATING TRIBAL DIABETES

According to the Department of Health and Human Services' Indian Health Service, American Indians are 2.2 times more likely to have diabetes compared to non-Hispanic whites. The **United Tribes Technical College** (UTTC), in Bismarck, North Dakota, is doing its part to lower that number by mentoring nearly 450 people at five diabetes-related events. UTTC also produces three publications that were delivered to more than 11,000 local households. In 2017, UTTC plans to host three 6-week training sessions for 10-15 people each, covering topics such as understanding and monitoring the human body, nutrition, and physical activity.



# Safeguarding the Global Food Supply Through Sustainable Agricultural Systems

## IMPACTS

### WHAT'S IMPACTING THE MANILA CLAM?

In recent decades, there has been a steady decline of the Manila clam on the tidal flats of the Lummi Reservation, outside of Bellingham, Washington. The loss of this important food source directly impacts the tribal food security and sovereignty of the Lummi people. A research team from **Washington's Northwest Indian College** and **Oregon State University** have determined that the clam population's decline is caused by altered sulfur cycling and changes in the clam's food supply. The team and Northwest Indian College students are using biomarkers, including stable isotope and fatty acids, as well as advanced laboratory equipment to interpret data and apply cutting-edge food-chain models. By better understanding what is impacting the Manila clam, the team is preserving a vital reservation food source and protecting and growing revenue for the Lummi commercial and subsistence clam diggers.



### HIGH TUNNELS IMPROVE SHELF LIFE OF PRODUCE

**Kansas State University** and the **University of Florida** are sharing a \$1 million AFRI grant to learn more about improving the freshness and shelf life of locally-grown produce by using high tunnels, an inexpensive version of a greenhouse. The researchers discovered that, in addition to extending the growing season, crops grown in high tunnels have a longer shelf life than crops grown in the field. A longer shelf life makes the products more marketable and can dramatically add to the grower's profits. The researchers are now investigating how the light spectrum inside a high tunnel affects the development of a plant's natural antioxidants with the goal of increasing its nutritional quality.

### FINDING SOLUTIONS TO CITRUS GREENING

Huanglongbing, or citrus greening disease, is a disease that causes citrus trees to produce small, bitter fruit that drop prematurely and cannot be sold or used for juice. In Florida, the disease has reached epidemic proportions across the state. It is caused by a bacterial pathogen that is transmitted by the Asian citrus psyllid, which feeds on the stems and leaves of citrus trees. NIFA began supporting citrus greening research and extension efforts in February 2016 with \$20.1 million in grants through the Specialty Crop Research Initiative (SCRI) Citrus Disease Research and Extension Program. In Florida, where 95 percent of commercial groves are affected, the **University of Central Florida** is testing a

## THE GOAL OF THE SUSTAINABLE AGRICULTURAL PRODUCTION SYSTEMS

science emphasis area is to improve our nation's ability to produce food, fiber, and plant and animal products while protecting the environment, public health, communities, and animal welfare. NIFA-funded programs enhance food security, safety, nutrition, and resilience of the food supply, and advance competitiveness and sustainability of agriculture through scientific innovation, education, and delivery of enhanced agricultural products.



bactericide designed to kill the citrus greening bacteria. Their approach is to deliver two potent bactericides within a natural clay-based film-forming repellent. At **University of California, Riverside** there is a study to develop disease resistant varieties of citrus using genome editing.

---

### SUPPORTING THE AQUACULTURE INDUSTRY

Aquaponics, an integrated aquaculture and hydroponic system, is a popular sustainable agriculture system due to higher nutrient retention efficiency and lower water requirements. Little, however, is known about nitrogen transformation and its ultimate fate in aquaponics systems. Researchers at the **University of Hawaii** are using a \$499,000 AFRI grant to correlate nitrogen transformations with environmentally relevant microbial processes. They discovered that tomato, pak choi, and romaine lettuce were the best plants to grow for recycling nitrogen waste from fish tanks. They also found that controlling dissolved oxygen in biofilters and fish tanks and that

controlling the feed-to-plant ratio at neutral pH were the best ways to increase nitrogen utilization efficiency and reduce the nitrogen loss in aquaponics systems. A team of researchers from **Washington State University** and **University of Idaho** used a \$325,000 grant from the NIFA-supported **University of Washington**-based Western Regional Aquaculture Center to investigate Coldwater Disease in salmon and trout. The team found a way to combat the disease by using the fish's own gut bacteria as a probiotic to limit economic losses to the worldwide \$13.7 billion salmonid aquaculture industry.

---

### ADDRESSING POLLINATOR DECLINE

Honey bees pollinate about \$15 billion worth of U.S. agricultural crops each year, but since 2006 their population has declined each year by about 32 percent according to government studies. In May 2016, NIFA announced a new \$6 million funding opportunity through AFRI's Food Security Challenge Area to address declines in our nation's pollinators. Researchers at **Montana State University** are using a \$150,000 AFRI grant to study the biotic (pathogens and microbes) and abiotic (agrochemical and metabolic) factors that affect individual bee and colony health. Their research indicates that, in general, bees exposed to agrochemicals via their diet had less virus than bees not exposed to agrochemicals.

# Strengthening Youth, Family Development

IMPACTS

## INTRODUCING KIDS TO THE FARM

New Mexico's foundation in farming was formed centuries ago by indigenous tribes and Spanish and other Europeans explorers who each brought their own unique skills to the land. Today, people usually do not give much thought to where the food they eat comes from or the history behind it. Food Camp for Kids, created by **New Mexico State University** Cooperative Extension Service, offers youth between the ages of 9 and 14 the opportunity to learn about farming in their community. Kids learn the fundamentals of agriculture and food-related careers through hands-on training at local farms. They also learn about nutrition and food safety while preparing meals.



## 4-H'ERS PROVIDE LEADERSHIP IN MISSISSIPPI'S MARCH AGAINST HUNGER

In Mississippi, **Alcorn State University's** 4-H program and UnitedHealthcare teamed up to conduct the 4-H Food Smart Families Program to fight hunger and food insecurity. After receiving training that included the 4-H Food Smart Shopping Experience, 4-H teen leaders served as ambassadors and mentors to approximately 6,000 people throughout the state on how to prepare healthy meals on a budget.

## PROVIDING YOUTH WITH LIFETIME SKILLS

4-H began more than 100 years ago as a way to teach agriculture to youth. Today's 4-H'ers still learn agriculture, but 4-H also offers programs that keep pace with the modern world. A wide variety of STEM projects, including rocketry, robotics, environmental protection, and computer science, are available. 4-H'ers from **Tuscola County, Michigan**, took first runner-up honors at the 2016 National Team America Rocketry Challenge with a



## PROGRAMS IN THE YOUTH DEVELOPMENT SCIENCE EMPHASIS AREA

engage youth in constructive ways to develop strengths and promote civic engagement, healthy living, science education, and leadership skills. NIFA's positive youth development portfolio, in strategic partnership with Cooperative Extension, serves various audiences, including at-risk youth and military families, and are implemented through clubs, afterschool programs, camps, and other educational experiences. As the federal partner, NIFA facilitates successful and sustainable community change directed by youth and supported by caring adults through local programming delivered by the Cooperative Extension System. The Youth Development portfolio focuses on:

- Increasing capacity of the Cooperative Extension System to develop and implement positive youth programs;
- Increasing capacity of the Cooperative Extension System for evaluating program effectiveness and impacts; and
- Preparing the next generation with 21st century skills for a successful career and life.



launch that reached an altitude of 829 feet. In the Caribbean islands, the **Virgin Islands** National Guard Child and Youth Program delivered recreational, educational, and social programs to 295 National Guard families, mentoring youth in leadership, personal development, team building, and skills such as marine science and agriculture. As a community involvement effort, **West Virginia University** Extension 4-H operates Energy Express, an award-winning, eight-week summer reading program for children in rural West Virginia. For 20 years, about 3,000 children per year have engaged in the Energy Express reading, writing,

drama, and art program and have received hundreds of thousands of books to keep and read. Participants also receive a nutritious breakfast and lunch as they stay academically engaged during the summer months.

---

### TUCSON VILLAGE FARM RECONNECTS YOUTH TO HEALTHFUL FOOD

Tucson Village Farm (TVF) is a working urban farm built by and for the youth of Pima County, Arizona. A 4-H program from the **University of Arizona**, TVF is a seed-to-table program that reconnects young people to a healthy food system, teaches them how to grow and prepare fresh food, and empowers them to make healthy life choices. The year-round, hands-on program focuses on the building the soil, integrative pest management, weed management, crop rotation, and cover cropping. TVF hosts more than 2,000 community members at a harvest fair and youth programs such as “Growing Forward” for K-5th graders and “L’il Sprouts” for tots. TVF teaches youth, and their families, about healthy food options, food selection and preparation, and food budgeting.



# OUR PARTNERS

## LAND-GRANT COLLEGES AND UNIVERSITIES

### ALABAMA

Alabama A&M University, Normal  
Auburn University, Auburn  
Tuskegee University, Tuskegee

### ALASKA

Ilisagvik College, Barrow  
University of Alaska, Fairbanks

### AMERICAN SAMOA

American Samoa Community College, Pago Pago

### ARIZONA

Diné College, Tsaile  
University of Arizona, Tucson  
Tohono O'odham Community College, Sells

### ARKANSAS

University of Arkansas, Fayetteville  
University of Arkansas at Pine Bluff, Pine Bluff

### CALIFORNIA

D-Q University, (Davis vicinity)  
University of California System, Davis and Riverside

### COLORADO

Colorado State University, Fort Collins

### CONNECTICUT

University of Connecticut, Storrs

### DELAWARE

Delaware State University, Dover  
University of Delaware, Newark

### DISTRICT OF COLUMBIA

University of the District of Columbia, Washington

### FLORIDA

Florida A&M University, Tallahassee  
University of Florida, Gainesville

### GEORGIA

Fort Valley State University, Fort Valley  
University of Georgia, Athens

### GUAM

University of Guam, Mangilao

### HAWAII

University of Hawaii, Honolulu

### IDAHO

University of Idaho, Moscow

### ILLINOIS

University of Illinois, Urbana

### INDIANA

Purdue University, West Lafayette

### IOWA

Iowa State University, Ames

### KANSAS

Haskell Indian Nations University, Lawrence

Kansas State University, Manhattan

### KENTUCKY

Kentucky State University, Frankfort  
University of Kentucky, Lexington

### LOUISIANA

Louisiana State University, Baton Rouge  
Southern University and A&M College, Baton Rouge

### MAINE

University of Maine, Orono

### MARYLAND

University of Maryland, College Park  
University of Maryland Eastern Shore, Princess Anne

### MASSACHUSETTS

University of Massachusetts, Amherst

**MICHIGAN**

Bay Mills Community College, *Brimely*  
 Keweenaw Bay Ojibwa Community College, *Baraga*  
 Michigan State University, *East Lansing*  
 Saginaw Chippewa Tribal College, *Mount Pleasant*

**MICRONESIA**

College of Micronesia, *Kolonia, Pohnpei*

**MINNESOTA**

Fond du Lac Tribal & Community College, Cloquet  
 Leech Lake Tribal College, Cass Lake  
 University of Minnesota, St. Paul  
 White Earth Tribal and Community College, Mahnomen

**MISSISSIPPI**

Alcorn State University, Lorman  
 Mississippi State University, Starkville

**MISSOURI**

Lincoln University, Jefferson City  
 University of Missouri, Columbia

**MONTANA**

Blackfeet Community College, Browning  
 Chief Dull Knife College, Lame Deer  
 Aaniiih Nakoda College, Harlem  
 Fort Peck Community College, Poplar  
 Little Big Horn College, Crow Agency  
 Montana State University, Bozeman  
 Salish Kootenai College, Pablo  
 Stone Child College, Box Elder

**NEBRASKA**

Little Priest Tribal College, Winnebago  
 Nebraska Indian Community College, Winnebago  
 University of Nebraska, Lincoln

**NEVADA**

University of Nevada, Reno

**NEW HAMPSHIRE**

University of New Hampshire, Durham

**NEW JERSEY**

Rutgers University, New Brunswick

**NEW MEXICO**

Navajo Technical College, Crownpoint  
 Institute of American Indian and Alaska Native Culture and Arts Development, Sante Fe  
 New Mexico State University, Las Cruces  
 Southwestern Indian Polytechnic Institute, Albuquerque

**NEW YORK**

Cornell University, Ithaca

**NORTH CAROLINA**

North Carolina A&T State University, Greensboro  
 North Carolina State University, Raleigh

**NORTH DAKOTA**

Fort Berthold Community College, New Town  
 Cankdeska Cikana Community College, Fort Totten  
 North Dakota State University, Fargo  
 Sitting Bull College, Fort Yates  
 Turtle Mountain Community College, Belcourt  
 United Tribes Technical College, Bismarck

**NORTHERN****MARIANAS**

Northern Marianas College, Saipan

**OHIO**

Central State University, Wilberforce  
 Ohio State University, Columbus

**OKLAHOMA**

College of the Muscogee Nation, Okmulgee  
 Langston University, Langston  
 Oklahoma State University, Stillwater

**OREGON**

Oregon State University, Corvallis

**PENNSYLVANIA**

Pennsylvania State University, University Park

**PUERTO RICO**

University of Puerto Rico, Mayaguez

**RHODE ISLAND**

University of Rhode Island, Kingston

**SOUTH CAROLINA**

Clemson University, Clemson  
 South Carolina State University, Orangeburg

**SOUTH DAKOTA**

Oglala Lakota College, Kyle  
 Si Tanka/Huron University, Eagle Butte  
 Sinte Gleska University, Rosebud  
 Sisseton Wahpeton Community College, Sisseton  
 South Dakota State University, Brookings

**TENNESSEE**

Tennessee State University, Nashville  
 University of Tennessee, Knoxville

**TEXAS**

Prairie View A&M University, Prairie View  
 Texas A&M University, College Station

**UTAH**

Utah State University, Logan

**VERMONT**

University of Vermont, Burlington

**VIRGIN ISLANDS**

University of the Virgin Islands, St. Croix

**VIRGINIA**

Virginia Tech, Blacksburg  
 Virginia State University, Petersburg

**WASHINGTON**

Northwest Indian College, Bellingham  
 Washington State University, Pullman

**WEST VIRGINIA**

West Virginia State University, Institute  
 West Virginia University, Morgantown

**WISCONSIN**

College of Menominee Nation, Keshena  
 Lac Courte Oreilles Ojibwa Community College, Hayward  
 University of Wisconsin, Madison

**WYOMING**

University of Wyoming, Laramie

# CERTIFIED NON-LAND-GRANT COLLEGES OF AGRICULTURE

## ALABAMA

University of  
West Alabama

## ARIZONA

Arizona State University

## ARKANSAS

Arkansas State University  
Arkansas Tech University  
Southern Arkansas  
University

## CALIFORNIA

California State  
Polytechnic University,  
Pomona  
California State  
University, Bakersfield  
California State  
University,  
Channel Islands  
California State  
University, Chico  
California State  
University, Fresno  
California State  
University, Monterey Bay  
California State  
University, Northridge  
California State  
University, Stanislaus  
California State  
University, San Francisco  
California State  
University, San Marcos

## FLORIDA

College of Central Florida  
Florida State University

## GEORGIA

Georgia Institute of  
Technology

## ILLINOIS

Illinois State University  
Western Illinois  
University

## INDIANA

Ball State University  
Indiana State University  
Lehman College

## KANSAS

Fort Hays State University

## KENTUCKY

Eastern Kentucky  
University  
Murray State University  
Western Kentucky  
University

## LOUISIANA

The University  
of Louisiana at Monroe

## MAINE

The University  
of Southern Maine

## MARYLAND

University of  
Maryland, Baltimore  
County

## MICHIGAN

Wayne State University

## MINNESOTA

Minnesota State  
University, Mankato  
Southwest Minnesota  
State University

## MISSISSIPPI

The University of  
Southern Mississippi

## MISSOURI

Missouri State University  
Northwest Missouri  
State University  
Southeast Missouri  
State University  
University of Central  
Missouri

## NEW JERSEY

Montclair State University

## NEW YORK

City University  
of New York,  
Queens College  
State University  
of New York College  
of Agriculture and  
Technology at  
Cobleskill

## NORTH CAROLINA

Appalachian  
State University  
East Carolina University  
The University  
of North Carolina  
The University of North  
Carolina at Chapel Hill  
The University of North  
Carolina–Pembroke

## NORTH DAKOTA

Dickinson State  
University  
University of North  
Dakota–Grand Forks

## OHIO

Bowling Green State  
University  
Miami University,  
Oxford Ohio

## OKLAHOMA

The University  
of Central Oklahoma  
The University  
of Oklahoma

## OREGON

University of Oregon

## PENNSYLVANIA

Bloomsburg University  
of Pennsylvania

## SOUTH CAROLINA

The University  
of South Carolina

## TENNESSEE

Austin Peay  
State University  
Middle Tennessee  
State University  
Tennessee Technological  
University  
The University  
of Tennessee at Martin  
University of Tennessee  
at Chattanooga

## TEXAS

Angelo State University  
Sam Houston

State University  
Sul Ross State University  
Tarleton State University  
Texas A&M University–  
Commerce  
Texas Southern  
University  
Texas Tech University  
The University  
of Texas at Austin  
University of North Texas  
West Texas  
A&M University

## UTAH

Southern Utah University

## VERMONT

Vermont Technical  
College–Randolph Center

## VIRGINIA

George Mason University  
Virginia Institute  
of Marine Science,  
*Gloucester Point*

## WISCONSIN

The University of  
Wisconsin–Platteville  
The University of  
Wisconsin–River Falls  
The University of  
Wisconsin–Stevens Point  
The University of  
Wisconsin–Stout

# HISPANIC-SERVING INSTITUTIONS (HSIs)

## ARIZONA

Arizona State University,  
Downtown Phoenix  
Arizona State University,  
West  
Arizona Western College\*  
Central Arizona College  
Cochise College\*  
College America, Phoenix  
Estrella Mountain  
Community College  
GateWay Community  
College  
Glendale Community  
College  
Phoenix College\*  
Pima Community  
College\*  
South Mountain  
Community College

## CALIFORNIA

Allan Hancock College\*  
Alliant International  
University  
Antelope Valley College\*  
Antioch University,  
Los Angeles\*  
Azusa Pacific Online  
University  
Bakersfield College\*  
Barstow Community  
College  
Berkeley City College  
Brandman University  
Cabrillo College  
California Baptist  
University\*  
California Christian  
College  
California College  
San Diego, National City  
California College San  
Diego, San Marcos  
California College  
San Diego, San Diego  
California Lutheran  
University\*  
California State  
Polytechnic University,

Pomona  
California State  
University, Bakersfield  
California State  
University, Channel  
Islands  
California State  
University, Chico  
California State  
University,  
Dominguez Hills\*  
California State  
University, East Bay\*  
California State  
University, Fresno  
California State  
University, Fullerton  
California State  
University, Long Beach\*  
California State  
University, Los Angeles  
California State  
University, Monterey Bay  
California State  
University, Northridge  
California State  
University, Sacramento  
California State  
University,  
San Bernardino\*  
California State  
University, San Marcos  
California State  
University, Stanislaus  
Canada College  
Casa Loma College,  
Van Nuys  
CBD College  
Cerritos College  
Cerro Coso  
Community College  
Chabot College  
Chaffey College  
Citrus College  
Coastline Community  
College  
College of Marin  
College of San Mateo\*  
College of the Canyons  
College of the Desert\*

College of the Sequoias\*  
Community Christian  
College  
Contra Costa College  
Crafton Hills College  
Cuesta College  
Cuyamaca College  
Cypress College  
De Anza College  
East Los Angeles College  
El Camino College,  
Compton Center  
El Camino Community  
College District\*  
Evergreen Valley College  
Fresno City College  
Fresno Pacific University  
Fullerton College\*  
Gavilan College  
Glendale Community  
College  
Golden West College\*  
Grossmont College  
Hartnell College\*  
Holy Names University  
Humboldt State  
University  
Humphreys College,  
Stockton & Modesto  
Campuses  
Imperial Valley College\*  
John F. Kennedy  
University  
Lake Tahoe Community  
College  
La Sierra University  
Las Positas College  
Life Pacific College  
Loma Linda University  
Long Beach City College\*  
Los Angeles City College\*  
Los Angeles County  
College of Nursing and  
Allied Health  
Los Angeles  
Harbor College  
Los Angeles  
Mission College  
Los Angeles  
Pierce College\*

Los Angeles  
Southwest College  
Los Angeles  
Trade Technical College  
Los Angeles  
Valley College  
Los Medanos College  
Marymount California  
University  
Mendocino College\*  
Merced College\*  
Merritt College  
MiraCosta College\*  
Modesto Junior College\*  
Monterey Peninsula  
College\*  
Moorpark College  
Moreno Valley College  
Mount St. Mary's College  
Mt. San Antonio College\*  
Mt. San Jacinto  
Community College  
District\*  
Napa Valley College  
National University\*  
Norco College  
Notre Dame  
de Namur University  
Orange Coast College  
Oxnard College  
Pacific Oaks College  
Pacific Union College\*  
Palo Verde College  
Palomar College  
Pasadena City College  
Porterville College\*  
Reedley College\*  
Rio Hondo College  
Riverside City College  
Sacramento City College  
Saddleback College  
Saint Mary's College  
of California\*  
San Bernardino  
Valley College  
San Diego City College\*  
San Diego Mesa College\*  
San Diego  
State University\*

\*HSI with Hispanic-Serving Agricultural Colleges and Universities (HSACU) Certification

San Francisco State University  
 San Joaquin Delta College  
 San Jose City College  
 San Jose State University  
 Santa Ana College\*  
 Santa Barbara City College  
 Santa Monica College  
 Santa Rosa Junior College  
 Santiago Canyon College  
 Sierra College  
 Skyline College  
 Solano Community College  
 Sonoma State University  
 Southwestern College  
 Taft College  
 University of California, Merced  
 University of California, Riverside\*  
 University of California, Santa Cruz  
 University of California-Santa Barbara  
 University of La Verne\*  
 University of the West  
 Vanguard University of Southern California  
 Ventura College  
 Victor Valley College  
 West Hills College Coalinga\*  
 West Hills College Lemoore  
 West Los Angeles College  
 West Valley College  
 Whittier College\*  
 Woodbury University  
 Woodland Community College  
 Yuba College

**COLORADO**

Adams State College  
 Aims Community College  
 College America, Denver  
 College America, Fort Collins  
 Colorado State University, Pueblo  
 Community College

of Denver  
 Otero Junior College  
 Pueblo Community College  
 Trinidad State Junior College\*

**CONNECTICUT**

Capital Community College  
 Housatonic Community College  
 Norwalk Community College

**FLORIDA**

Atlantic Institute of Oriental Medicine  
 Barry University  
 Broward College\*  
 Carlos Albizu University, Miami  
 City College, Altamonte Springs  
 City College, Hollywood  
 City College, Miami  
 Edison State College  
 Florida International University\*  
 Hillsborough Community College  
 Hodges University  
 Keiser University, Ft Lauderdale  
 Miami Dade College\*  
 Nova Southeastern University\*  
 Palm Beach State College  
 Polytechnic University of Puerto Rico, Miami  
 Polytechnic University of Puerto Rico, Orlando  
 Remington College, Tampa Campus  
 Saber College  
 Saint John Vianney College Seminary  
 South Florida State College  
 Saint Thomas University  
 Trinity International University, Florida  
 Valencia College\*

**ILLINOIS**

City Colleges of Chicago,

Harold Washington College  
 City Colleges of Chicago, Harry S Truman College  
 City Colleges of Chicago, Richard J Daley College  
 City Colleges of Chicago, Malcolm X College  
 City Colleges of Chicago, Wilbur Wright College  
 College of Lake County/Dominican University  
 Elgin Community College  
 Lexington College  
 Morton College  
 National Louis University  
 Northeastern Illinois University  
 Robert Morris University Illinois  
 Saint Augustine College  
 Saint Xavier University  
 Triton College  
 University of Illinois at Chicago  
 Waubesa Community College

**INDIANA**

Calumet College of Saint Joseph

**KANSAS**

Dodge City Community College  
 Donnelly College  
 Garden City Community College  
 Seward County Community College and Area Technical School

**LOUISIANA**

Saint Joseph Seminary College

**MASSACHUSETTS**

Cambridge College  
 Northern Essex Community College  
 Springfield Technical Community College  
 Urban College of Boston

**NEVADA**

College of Southern Nevada\*

Truckee Meadows Community College

**NEW JERSEY**

Bergen Community College  
 Cumberland County College  
 Essex County College  
 Fairleigh Dickinson University, Metropolitan Campus  
 Felician College  
 Hudson County Community College  
 Kean University  
 Middlesex County College  
 New Jersey City University  
 Passaic County Community College  
 Pillar College  
 Saint Peter's College  
 Union County College  
 William Paterson University of New York

**NEW MEXICO**

Central New Mexico Community College\*  
 Clovis Community College  
 Eastern New Mexico University, Main Campus\*  
 Eastern New Mexico University, Roswell Campus  
 Eastern New Mexico University, Ruidoso Campus\*  
 Luna Community College  
 Mesalands Community College\*  
 New Mexico Highlands University\*  
 New Mexico Institute of Mining and Technology\*  
 New Mexico Junior College  
 New Mexico State University, Alamogordo  
 New Mexico State University, Carlsbad  
 New Mexico State

University, Dona Ana  
 New Mexico State  
 University, Grants  
 New Mexico State  
 University, Main Campus  
 Northern New Mexico  
 College\*  
 Santa Fe  
 Community College  
 University  
 of New Mexico,  
 Los Alamos Campus  
 University  
 of New Mexico,  
 Main Campus\*  
 University  
 of New Mexico,  
 Taos Campus  
 University of New  
 Mexico, Valencia  
 County Campus  
 University of the  
 Southwest  
 Western New Mexico  
 University\*

#### **NEW YORK**

Borica College  
 College of Mount  
 Saint Vincent  
 CUNY Borough  
 of Manhattan  
 Community College  
 CUNY Bronx  
 Community College\*  
 CUNY City College  
 CUNY Hunter College  
 CUNY Hostos  
 Community College  
 CUNY John Jay College  
 of Criminal Justice  
 CUNY LaGuardia  
 Community College\*  
 CUNY Lehman College  
 CUNY New York City  
 College of Technology  
 CUNY Queens College  
 CUNY Queensborough  
 Community College  
 Dominican College  
 of Blauvelt  
 LIU Brentwood  
 Mercy College  
 Nyack College  
 Orange County

Community College  
 Professional Business  
 College  
 Stella and Charles  
 Guttman Community  
 College  
 SUNY Westchester  
 Community College  
 Vaughn College  
 of Aeronautics and  
 Technology

#### **OHIO**

Union Institute &  
 University

#### **OREGON**

Mount Angel Seminary  
 Columbia Gorge  
 Community College

#### **PENNSYLVANIA**

Reading Area  
 Community College

#### **PUERTO RICO**

American University  
 of Puerto Rico, Bayamon  
 American University  
 of Puerto Rico, Manati  
 Atenas College  
 Atlantic University  
 College  
 Bayamon Central  
 University\*  
 Caribbean University,  
 Bayamon  
 Caribbean University,  
 Carolina  
 Caribbean University,  
 Ponce  
 Caribbean University,  
 Vega Baja  
 Carlos Albizu University-  
 San Juan  
 Colegio Universitario  
 de San Juan  
 Dewey University-  
 Bayamon  
 Dewey University-  
 Carolina  
 Dewey University-  
 Fajardo  
 Dewey University-  
 Hato Rey  
 Dewey University-  
 Manati

Dewey University-  
 Mayaguez  
 EDP University of Puerto  
 Rico Inc, San Juan  
 EDP University of Puerto  
 Rico Inc, San Sebastian  
 Escuela de Artes Plasticas  
 de Puerto Rico  
 Humacao Community  
 College  
 Instituto Tecnologico  
 de Puerto Rico,  
 Recinto de Guayama  
 Instituto Tecnologico  
 de Puerto Rico,  
 Recinto de Manati\*  
 Instituto Tecnologico  
 de Puerto Rico,  
 Recinto de Ponce  
 Instituto Tecnologico  
 de Puerto Rico,  
 Recinto de San Juan  
 Inter American University  
 of Puerto Rico, Aguadilla\*  
 Inter American University  
 of Puerto Rico, Arecibo  
 Inter American University  
 of Puerto Rico,  
 Barranquitas  
 Inter American University  
 of Puerto Rico, Bayamon\*  
 Inter American University  
 of Puerto Rico, Fajardo  
 Inter American University  
 of Puerto Rico, Guayama  
 Inter American University  
 of Puerto Rico, Metro\*  
 Inter American University  
 of Puerto Rico, Ponce\*  
 Inter American University  
 of Puerto Rico,  
 San German\*  
 Pontifical Catholic  
 University  
 of Puerto Rico, Arecibo  
 Pontifical Catholic  
 University of Puerto Rico,  
 Mayaguez  
 Pontifical Catholic  
 University of Puerto Rico,  
 Ponce\*  
 Puerto Rico  
 Conservatory of Music  
 San Juan Bautista  
 School of Medicine  
 Trinity College of Puerto  
 Rico

Universal Technology  
 College of Puerto Rico  
 Universidad Adventista  
 de las Antillas  
 Universidad Central  
 del Caribe  
 Universidad del Este  
 Universidad del Sagrado  
 Corazon  
 Universidad del Turabo\*  
 Universidad  
 Metropolitana\*  
 Universidad  
 Pentecostal Mizpa  
 Universidad Politecnica  
 de Puerto Rico  
 Universidad Teologica  
 del Caribe  
 University of Puerto Rico,  
 Aguadilla  
 University of Puerto Rico,  
 Arecibo\*  
 University of Puerto Rico,  
 Bayamon  
 University of Puerto Rico,  
 Carolina  
 University of Puerto Rico,  
 Cayey  
 University of Puerto Rico,  
 Humacao\*  
 University of Puerto Rico,  
 Mayaguez  
 University of Puerto Rico,  
 Medical Sciences  
 Campus\*  
 University of Puerto Rico,  
 Ponce  
 University of Puerto Rico,  
 Rio Piedras Campus\*  
 University of Puerto Rico,  
 Utuado\*

#### **TEXAS**

Alvin Community College  
 Amarillo College  
 Angelo State University  
 Austin Community  
 College District  
 Baptist University  
 of the Americas  
 Brazosport College  
 Brookhaven College  
 Coastal Bend College  
 College of Biblical Studies,  
 Houston

\*HSI with Hispanic-Serving Agricultural Colleges and Universities (HSACU) Certification

College of the Mainland  
 Del Mar College  
 Eastfield College  
 El Centro College  
 El Paso Community College  
 Galveston College  
 Hallmark College  
 Houston Baptist University  
 Houston Community College\*  
 Howard College  
 Jacksonville College, Main Campus  
 Laredo Community College  
 Lee College\*  
 Lighthouse Career Center (CTC)  
 Lone Star College System  
 McLennan Community College  
 Midland College  
 Mountain View College  
 North Lake College  
 Northeast Texas Community College  
 Northwest Vista College  
 Northwood University, Texas

Odessa College  
 Our Lady of the Lake University, San Antonio  
 Palo Alto College\*  
 Remington College, Dallas Campus  
 Remington College, Fort Worth Campus  
 Remington College, Houston Campus  
 Remington College, Houston Southeast Campus  
 Remington College, North Houston Campus  
 Richland College\*  
 Saint Edward's University\*  
 San Antonio College\*  
 San Jacinto Community College  
 Schreiner University  
 South Plains College  
 South Texas College  
 Southwest Collegiate Institute for the Deaf  
 Southwest Texas Junior College\*  
 Southwestern Adventist University  
 St. Mary's University\*

St. Philip's College  
 Sul Ross State University  
 Tarrant County College District  
 Texas A&M International University, Laredo\*  
 Texas A&M University, Corpus Christi\*  
 Texas A&M University, Kingsville\*  
 Texas Lutheran University  
 Texas State Technical College, Harlingen\*  
 Texas State Technical College, West Texas  
 Texas State University\*  
 Texas Women's University  
 The University of North Texas at Dallas  
 The University of Texas at Arlington\*  
 The University of Texas at Brownsville\*  
 The University of Texas at El Paso\*  
 The University of Texas at San Antonio\*  
 The University of Texas Health Science Center at San Antonio  
 The University of Texas

MD Anderson Cancer Center  
 The University of Texas of the Permian Basin  
 The University of Texas - Rio Grande Valley  
 University of St. Thomas\*  
 University of Houston\*  
 University of Houston, Clear Lake\*  
 University of Houston, Downtown  
 University of Houston, Victoria  
 University of the Incarnate Word\*  
 Victoria College  
 Wayland Baptist College  
 Western Texas College  
 Wharton County Junior College

**WASHINGTON**

Big Bend Community College  
 Columbia Basin College\*  
 Heritage University  
 Wenatchee Valley College\*  
 Yakima Valley Community College\*

\*HSI with Hispanic-Serving Agricultural Colleges and Universities (HSACU) Certification

**NIFA'S PARTNERS**

**STATE & FEDERAL:**

U.S. Department of Commerce  
 U.S. Department of Defense  
 U.S. Department of Energy  
 U.S. Department of Health and Human Services  
 U.S. Department of Housing and Urban Development  
 U.S. Department of the Interior  
 U.S. Environmental Protection Agency  
 Tennessee Valley Authority  
 National Science Foundation

National Institutes of Health

**USDA AGENCIES:**

Agricultural Marketing Service  
 Agricultural Research Service  
 Food and Nutrition Service  
 Food Safety and Inspection Service  
 Foreign Agricultural Service  
 Forest Service  
 Natural Resources Conservation Service  
 Rural Development

**OTHER:**

Association of Public and Land-grant Universities  
 Association of American Universities  
 Foundation for Food and Agricultural Research  
 National Agricultural Research, Education, Extension and Economics Advisory Board



# THE NUMBERS

## NATIONAL INSTITUTE OF FOOD AND AGRICULTURE (\$000)

**PROGRAMS**

**FY 2016 CONSOLIDATED  
APPROPRIATIONS**

**DISCRETIONARY FUNDING**

Agriculture and Food Research Initiative	\$350,000
--	-----------

**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
----------------------------------	--------

Agroclimatology (formerly Global Change, UV-B Monitoring)	1,405
---	-------

Potato Research	2,000
-----------------	-------

Aquaculture Research	1,350
----------------------	-------

**OTHER RESEARCH:**

Aquaculture Centers	4,000
---------------------	-------

Sustainable Agriculture Research and Education Program	24,667
--	--------

Supplemental and Alternative Crops	825
------------------------------------	-----

1994 Research Grants	1,801
----------------------	-------

Federal Administration (Direct Appropriation)	20,339
---	--------

Farm Business Management and Benchmarking Program	1,450
---	-------

Sun Grant Program	2,500
-------------------	-------

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

Alfalfa and Forage Research	2,000
-----------------------------	-------

**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	4,706
---	-------

Secondary Education/2-Year Post Secondary	900
---	-----

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

Veterinary Medical Services Act	5,000
---------------------------------	-------

Veterinary Services Grant Program	2,500
-----------------------------------	-------

Grants for Insular Areas	2,000
--------------------------	-------

<b>Subtotal a/</b>	<b>824,391</b>
--------------------	----------------

**SECTION 406 LEGISLATIVE AUTHORITY:**

Methyl Bromide Transition Program	2,000
-----------------------------------	-------

Organic Transition Program	4,000
----------------------------	-------

Crop Protection/Pest Management	17,200
---------------------------------	--------

**OTHER LEGISLATIVE AUTHORITIES:**

Regional Rural Development Centers	1,000
------------------------------------	-------

Food and Agriculture Defense Initiative	6,700
---	-------

<b>Subtotal</b>	<b>30,900</b>
-----------------	---------------

## NATIONAL INSTITUTE OF FOOD AND AGRICULTURE (\$000)

### PROGRAMS

### FY 2016 CONSOLIDATED APPROPRIATIONS

#### CAPACITY PROGRAMS:

Smith-Lever Formula 3(b)&(c)	\$300,000
1890 Institutions Extension	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	4,446
Renewable Resources Extension Act	4,060
Rural Health and Safety	1,500
1890 Facilities (Section 1447)	19,730
Food Animal Residue Avoidance Database Program (FARAD)	1,250
Women and Minorities in Science, Technology, Engineering and Mathematics (STEM) Fields	400
Food Safety Outreach Program	5,000
Federal Administration b/	8,357
<b>Subtotal</b>	<b>475,891</b>

**TOTAL, DISCRETIONARY FUNDING A/** **1,331,182**

#### MANDATORY AND ENDOWMENT FUNDING

Tribal Colleges Endowment Fund	11,880
Organic Agriculture Research and Extension Initiative	18,640
Beginning Farmers and Ranchers Development Program	18,640
Biomass Research and Development Initiative (BRDI)	2,796
Specialty Crop Research Initiative	51,260
Emergency Citrus Research and Extension Program	23,300
Food Insecurity Nutrition Incentive	18,640
Biodiesel Fuel Education Program c/	932
Agriculture Risk Management Education Program c/	4,660
Community Food Projects Competitive Grants Program c/	9,000

**TOTAL, MANDATORY AND ENDOWMENT FUNDING D/** **159,748**

**TOTAL, DISCRETIONARY AND MANDATORY FUNDING A/D/** **1,490,930**

- NOTES:**
- a/ Estimated interest on Tribal College Endowment Fund is included in total.
  - b/ In FY 2016 appropriations, \$552,000 is provided within the total for Agriculture in the Classroom.
  - c/ Mandatory program delegated to another USDA agency but administered by NIFA.
  - d/ Farm Bill funding amounts are based on HR 2642, the Agricultural Act of 2014, and include impact of sequestration of mandatory funds in FY 2016.

## STATES AWARD STATISTICS FOR FISCAL YEAR 2016 NON-FORMULA AWARDS \*

PERFORMING ORGANIZATION	NUMBER OF AWARDS	TOTAL FUNDING	% PER NUMBER	% PER FUNDING
1862 Land-Grant University	847	\$399,179,512	59	64
1890 Land-Grant University	74	50,116,963	5	8
1994 Land-Grant University	89	9,486,274	6	2
Non-Land-Grant Public University or College	52	20,724,199	4	3
Other	23	10,123,674	2	2
Private for Profit	117	28,845,665	8	5
Private Nonprofit	122	47,914,494	9	8
Private University/College	51	30,179,224	4	5
State, Local, or Tribal Government	14	2,345,638	1	0
USDA Agency	21	20,379,783	1	3
<b>Total</b>	<b>1,410</b>	<b>\$619,295,426</b>		

\* estimated

## STATES AWARD STATISTICS FOR FISCAL YEAR 2016 FORMULA AWARDS \*

PERFORMING ORGANIZATION	NUMBER OF AWARDS	TOTAL FUNDING	% PER NUMBER	% PER FUNDING
1862 Land-Grant University	801	\$612,314,539	77	85
1890 Land-Grant University	183	99,529,202	18	14
1994 Land-Grant University	0	0	0	0
Non-Land-Grant Public University or College	18	2,987,911	2	0
Other	10	2,612,397	1	0
Other Federal Agency	0	0	0	0
Private for Profit	0	0	0	0
Private Nonprofit	0	0	0	0
Private University/College	8	1,339,980	1	0
Public Secondary School	0	0	0	0
State, Local, or Tribal Government	12	1,597,492	1	0
USDA Agency	0	0	0	0
<b>Total</b>	<b>1,032</b>	<b>\$720,381,521</b>		

\* estimated



# OUR LEADERSHIP AND ORGANIZATION



# OUR LEADERSHIP

## **DIRECTOR**

Dr. Sonny Ramaswamy

## **ASSOCIATE DIRECTOR FOR PROGRAMS**

Dr. Meryl Broussard

## **ASSOCIATE DIRECTOR FOR OPERATIONS**

Dr. Robert Holland

## **CHIEF OF STAFF**

Dr. William Hoffman

## **DIRECTOR, CONGRESSIONAL AFFAIRS**

Joshua Stull

## **INSTITUTE OF BIOENERGY, CLIMATE CHANGE, AND ENVIRONMENT**

Dr. Luis Tupas

## **INSTITUTE OF FOOD PRODUCTION AND SUSTAINABILITY**

Dr. Parag Chitnis

## **INSTITUTE OF FOOD SAFETY AND NUTRITION**

Dr. Denise Eblen

## **INSTITUTE OF YOUTH, FAMILY, AND COMMUNITY**

Dr. Muquarrab Qureshi

## **OFFICE OF GRANTS AND FINANCIAL MANAGEMENT**

Cynthia Montgomery

## **OFFICE OF INFORMATION TECHNOLOGY**

Michel Desbois

## **CENTER FOR INTERNATIONAL PROGRAMS**

Dr. Otto Gonzalez

## **PLANNING, ACCOUNTABILITY, AND REPORTING STAFF**

Barton Hewitt

## **EQUAL OPPORTUNITY STAFF**

Vacant

## **BUDGET STAFF**

Paula Geiger

## **COMMUNICATIONS STAFF**

Virginia Bueno

# OUR ORGANIZATION

**OFFICE OF THE DIRECTOR**

CHIEF OF STAFF  
CONGRESSIONAL AND LEGISLATIVE DIRECTOR  
EQUAL OPPORTUNITY STAFF

## PROGRAMS

**CENTER FOR INTERNATIONAL PROGRAMS**

**PLANNING, ACCOUNTABILITY, AND REPORTING STAFF**

**INSTITUTE OF BIOENERGY, CLIMATE, AND ENVIRONMENT**

**INSTITUTE OF FOOD PRODUCTION & SUSTAINABILITY**

**INSTITUTE OF FOOD SAFETY & NUTRITION**

**INSTITUTE OF YOUTH, FAMILY, & COMMUNITY**

DIVISION OF BIOENERGY  
DIVISION OF GLOBAL CLIMATE CHANGE  
DIVISION OF ENVIRONMENTAL SYSTEMS

DIVISION OF AGRICULTURAL SYSTEMS  
DIVISION OF ANIMAL SYSTEMS  
DIVISION OF PLANT SYSTEMS - PRODUCTION  
DIVISION OF PLANT SYSTEMS - PROTECTION

DIVISION OF FOOD SAFETY  
DIVISION OF NUTRITION

DIVISION OF COMMUNITY AND EDUCATION  
DIVISION OF FAMILY & CONSUMER SCIENCES  
DIVISION OF YOUTH AND 4-H

## OPERATIONS

**BUDGET STAFF**

**COMMUNICATIONS STAFF**

**OFFICE OF GRANTS & FINANCIAL MANAGEMENT**

**OFFICE OF INFORMATION TECHNOLOGY**

AWARDS MANAGEMENT DIVISION  
FINANCIAL OPERATIONS DIVISION  
POLICY AND OVERSIGHT DIVISION

APPLICATIONS DIVISION  
INFORMATION POLICY, PLANNING, AND TRAINING DIVISION  
OPERATIONS AND ADMINISTRATIVE SYSTEMS DIVISION

## USEFUL LINKS

### **PUBLIC WEBSITE**

[www.nifa.usda.gov](http://www.nifa.usda.gov)

### **TWITTER PAGE**

[@USDA\\_NIFA](https://twitter.com/USDA_NIFA)

### **IMPACTS HASHTAG**

[#NIFAImpacts](https://twitter.com/hashtag/NIFAImpacts)

### **Flickr**

[www.flickr.com/photos/usda\\_nifa](http://www.flickr.com/photos/usda_nifa)

### **YOUTUBE**

[www.youtube.com/user/usdaagscience](http://www.youtube.com/user/usdaagscience)

### **FACEBOOK**

[www.facebook.com/USDA](http://www.facebook.com/USDA)





NIFA invests in and advances agricultural research, education, and extension and seeks to make transformative discoveries that solve societal challenges. Learn more by visiting [WWW.NIFA.USDA.GOV](http://WWW.NIFA.USDA.GOV) or following [@USDA\\_NIFA](https://twitter.com/USDA_NIFA) on Twitter.