



United States
Department of
Agriculture

National Institute
of Food
and Agriculture

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Advancing U.S. Agriculture through Global Engagement

National Institute of Food and Agriculture (NIFA) grantees are including international activities as an effective way to help achieve research, education, and extension objectives important to U.S. agriculture. Only U.S. institutions can apply for NIFA grants, and any international activities must advance U.S. agriculture. The NIFA-funded projects described here are examples of how U.S. researchers and faculty through international collaborations and activities are achieving results to help promote U.S. agriculture, advance trade, serve U.S. food security and food safety needs, and address mutual interests in the global agricultural science community.



Phenotype-Specific Manipulation of Heterotrimeric G Protein Signaling for Rice Trait Improvement

Drought is one of the major factors affecting rice yields world-wide and there is a need to produce new rice cultivars that perform better under water-limited conditions. Researchers from **Pennsylvania State University** (PSU) will manipulate specific genes in rice called "G protein genes" to test the hypothesis that these manipulations will improve plant architecture and yield under both well-watered and water-limited conditions. PSU is collaborating with the International Rice Research Institute (IRRI) in the **Philippines**, using IRRI's standardized methods of conducting field trials to test impacts of drought and drought x density. **AFRI grant**



Marketing and Delivery of Quality Grains and Bioprocesses Coproducts

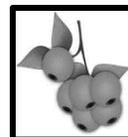
Researchers from **Texas A&M University** are exploring methods to measure and manage risks involving biological and chemical hazards in grains and bioprocess coproducts. Their project includes multi-institutional collaboration among faculty in the United States and **Africa** to improve food safety and security. Specifically, included are field validation of mycotoxin test kits, developing new methods to test high moisture corn for fumonisin, and RAMAN spectroscopy to identify and quantify biological and chemical contaminants

in grain and bioprocess coproducts. Predictive modeling of aflatoxin occurrence in production regions in **Kenya** will be performed. The project will utilize data from Africa where farmers use similar hybrid genetics to those in the U.S. and experience diverse climatic and edaphic conditions occurring across the U.S. corn-belt and southern Plains. **Hatch Multistate grant**



Characterization of Emerging Viruses

Given the scale and similarity of Brazilian and U.S. farming systems, the emergence of pathogens in one of these countries poses a threat to agriculture in the other. In a collaboration between researchers at the **University of Kentucky** and researchers in **Brazil**, soybean yellow shoot virus (SoyYSV), an emerging potyvirus infecting soybean plants in Brazil, was completely sequenced and its structural, biological, and molecular properties were determined. A more detailed characterization of this virus (SoyYSV) has become important to guide development of control measures in the future. **Hatch Multistate grant**

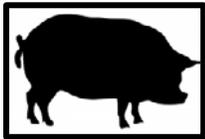


Improving Quality and Reducing Losses in Specialty Fruit Crops through Storage Technologies

Postharvest scientists from the **University of Florida** are collaborating with other scientists from the U.S. and **Canada** in this multistate research project to address a range of postharvest

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issues of fruits throughout the U.S. and Canada. Nonchemical and reduced-risk chemical methods of preventing losses will be studied or developed as a way to extend the storage life of highly perishable fruits such as berries. 1-methylcyclopropene (1-MCP), an ethylene action and ripening inhibitor developed by members of this project, has been adopted as a common commercial means to control ripening and maintain quality in storage of apple and continues to be a critical area of research. The researchers will investigate the use of 1-MCP to arrest the ripening of fruit at different ripeness stages. **Hatch Multistate grant**



Unraveling the Effect of Contact Networks & Socio-Economic Factors in the Emergence of Infectious Diseases at the Wild-Domestic Interface

The emergence of African Swine Fever (ASF) and its potential impact on the swine industry and food security is of increased concern. To prevent the global spread of ASF, researchers from the **University of California, Davis, Veterinary Medicine** (UCD-Vet-Med) aim to understand the evolution of ASF at its source, the **Southern African Development Community (SADC)** region, where ASF virus (ASFV) is believed to have originated or emerged and continues to be an active source of long-distance spread. SADC is also a region where 23 of the 24 ASFV genotypes are present, and both the domestic and sylvatic transmission cycles (involving domestic pigs, wild pigs and ticks) coexist. UCD Vet-Med researchers aim to: 1) assess the pig contact networks, pig management and socio-economic factors, tick involvement in ASFV transmission and viral diversity in the sylvatic and domestic cycles; 2) model ASFV transmission dynamics, economic impact and risk of introduction into free areas in different eco-epidemiological settings using multi-scale simulation models; and 3) integrate genomic-to population level data and modeling methods into

a comprehensive, open-access, user-friendly, long-term, analytical platform - an “ASF-BioPortal” - and develop interactive educational and training materials. **AFRI grant**



Strengthening Food Systems and Ecosystem Education and Training through Global Competence and Experiential Learning

Tuskegee University (TU), Delaware State University (DSU) and University of Maryland Eastern Shore (UMES) are partnering together with Earth University and the Tropical Agriculture Research and Higher Education Center (CATIE) in **Costa Rica** to develop and engage students and faculty in a program of experiential learning. Their four-week study abroad program will orient students to interdisciplinary, participatory research and extension on tropical food systems. The students will enhance their global competence and professional opportunities by building education, research, and extension partnerships with Costa Rican institutions, and will gain an understanding of critical national and international agricultural issues. **1890 grant**

Key for NIFA grant programs cited

AFRI grant – Agriculture and Food Research Initiative competitive grants

1890 grant – 1890 Institution Capacity Building Grants competitive grants

HSI grant – Hispanic Serving Institution competitive grants

MSP grant – Multicultural Scholars Program competitive grants

OREI grant – Organic Research and Extension Initiative competitive grants

SBIR grant – Small Business Innovation Research competitive grants

Hatch grant – Hatch Act of 1887 capacity grants

Hatch Multistate grant - Hatch Act of 1887 (Multistate Research Fund) capacity grants

McIntire –Stennis – McIntire-Stennis capacity grants

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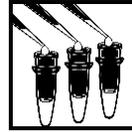
Structure and Function of Stream Ecosystems and their Responses to Global Change

To improve understanding of how stream ecosystems function in tropical and temperate environments and how they might be affected by predicted global changes, researchers from [North Carolina State University](#) are studying streams in Puerto Rico, [Costa Rica](#) and North Carolina. For example, for Costa Rica, using a long-term dataset, researchers identified the occurrence of climate-driven acidification events in lowland streams, which they hypothesize is the result of an influx of soil-derived CO₂ via subsurface flow paths that results in pH declines, signaling a tight coupling among rainfall, terrestrial, and aquatic ecosystems. **Hatch grant**



Tri-Partite Collaborative: Development and Validation of an On-Farm, Electric Disease Diagnosis Platform for Cattle

Researchers from the [Georgia Institute of Technology](#) (GT), [Queen's University Belfast](#) (QUB), the [Tyndall National Institute](#) (TYN) and [Teagasc \(Ireland's Agriculture and Food Development Authority\)](#) will develop, demonstrate and validate new sensor technology which allows simultaneous detection, on-farm, of animal exposure to viruses of recognized high importance to bovine animal health and performance. The sensor platform consists of two sensors with different sensing mechanisms (potentiometric and electrochemical impedance sensors) that facilitate parallel testing for multiple diseases, with enhanced specificity and sensitivity, providing robust clinical data to farmers and veterinarians. The team will validate and demonstrate the new technology for on-farm testing of blood and milk. This project will have a direct impact on the efficiency and sustainability of the agri-food sector. **AFRI grant**



37th Conference of the International Society for Animal Genetics

Sharing the latest developments in creating and applying community genetic and genomic tools and resources to aid advancements in the productivity, health and wellbeing of commodity species (i.e. cattle, sheep, pigs, horses, poultry, and aquaculture) is a major focus of the 37th Conference of the International Society for Animal Genetics (ISAG) in Lleida, [Spain](#) (in 2019). [Texas A&M University](#) under a conference grant is supporting up to ten U.S. graduate students or postdoctoral fellows to travel to ISAG and present their research. ISAG is popular in the animal molecular genetics community because of the camaraderie among researchers that develops in part because of the opportunities for rigorous scientific exchanges with international collaborators. **AFRI grant**



Building Analytical and Global Competencies through Agricultural Research Internships in Ecuador

Undergraduate social science students in agriculture from the [Virginia Polytechnic Institute and State University](#) (Virginia Tech) are being provided a summer experiential learning opportunity in [Ecuador](#), where Virginia Tech faculty PIs have established long-term relationships. Students will be guided in applying field methods and analytical techniques to help prepare them to meet critical workforce needs in U.S. agriculture. The students will have two weeks of language classes in Quito and will refine their research proposals with U.S. and Ecuadorean mentors. Students will then travel to the field to conduct their research together with host-country students, and U.S. and Ecuadorean mentors. In a research seminar course in the fall students will complete their data analysis and prepare scientific publications with faculty mentors. **AFRI grant**

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BTT Eager: A Pathway to the Exploitation of Epigenetic Variation in UK, US, and International Breeding Programmes

Kansas State University and the Earlham Institute in the **United Kingdom** are collaborating to offer a breakthrough advance in translation of fundamental work on DNA methylation to a technology that is transformative, relevant and accessible to wheat breeders for the development of new wheat cultivars. The project will design, build and test capture probe sets and investigate methylation states of 500 genes across 288 lines relevant to breeding programs in the U.K., U.S. and at CIMMYT (International Maize and Wheat Improvement Center) in **Mexico**. Investigating epigenetic variation across geographically different breeding programs will make it possible to test hypotheses about the role of DNA methylation in local adaptation and in the development of modern breeding programs targeting different environments in the U.K., U.S. and Mexico. **AFRI grant**



Cyclone Scholars: Preparing Multicultural Students for careers in the Global Food System

Iowa State University (ISU) will provide an integrated undergraduate educational experience to prepare a cohort of students, their “Cyclone Scholars” for successful careers in the global food system. Students in the Cyclone Scholars program will obtain a baccalaureate degree with a major in food science and a minor in food and society. Participants will have a study abroad experience in **France** to explore sustainable food systems. ISU’s Cyclone Scholar academic plan includes intense faculty and peer mentoring to ensure academic and social adaptation, required participation in research, international study and industry internship. **MSP Grant**



Phytochemicals as Antivirals: Molecules that Inhibit Deformed Wing Virus in Honey Bees

Deformed wing virus (DWV) is a major cause of overwintering honey bee colony collapse in the United States, but research by a laboratory at the University of Wuerzburg in **Germany** showed that propolis (a mixture of phytochemicals from plant resins combined with beeswax) can decrease DWV titers at the colony- level. Through a year-long sabbatical at the German laboratory, a U.S. natural product chemist from **Fort Lewis College** (Colorado) will screen a library of biologically active phytochemicals in DWV laboratory and field bioassays. The U.S. and German scientists will combine their expertise to elucidate which molecules within propolis display DWV antiviral activity. Potentially this sabbatical research could generate a novel therapy to be utilized by the beekeeping community for reducing colony mortality, as well as enable the U.S. scientist to learn and implement a variety of bioassays to greatly expand research and educational opportunities at Fort Lewis College. **AFRI grant**



Understanding and Exploring the Tremendous Potentials of Forest Products Trade with China

A **Michigan State University** researcher will profile the different segments of the forest products industry and the forest resource sector in **China** and identify the likely potentials for U.S. firms to export more products to China. The researcher will use carefully conceived and executed business and economic analyses based on statistical data gathered from Chinese customs agencies, UN Comtrade, and other sources. The project will provide important information and knowledge essential to the U.S. forest sector and forest products industry in pursuit of opportunities for trade with and investment in China. **McIntire-Stennis**

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Captive Reproduction, Hatchery Research and Production of Endothermic Pacific Bluefin Tuna Juveniles

Recent data show Pacific bluefin tuna (PBFT) wild stock are alarmingly overfished. A U.S. small business, **Ichthus Unlimited**, in partnership with Texas A&M University, the Unified Port of San Diego (SD) and the Spanish Institute of Oceanography in **Spain**, will address this problem through three objectives: 1) establish a brood stock population of PBFT at the North Coronado Island; 2) use fertilized eggs for production of larvae and juvenile fish; 3) establish a PBFT hatchery in the Port of SD; and 4) grow PBFT from early juveniles to advance juveniles in a protected environment. This research has the potential to assist in desperately needed PBFT population restoration efforts, and to provide an exceptional opportunity for the U.S. to culture this highly-valued fish. **SBIR Grant**



Managing for Climate Change: Climate Masters Outreach and Extension (CMOE)

The goal of the **New Mexico State University** Climate Masters Outreach and Extension (CMOE) model program is to increase climate change literacy and support both adaptation and mitigation activities, for different and diverse groups. The CMOE team will convene several focus groups of individuals, representative of target populations throughout the region, including in **Mexico** (in collaboration with the Universidad Autonoma de Chihuahua), evaluating how each audience responds to different types of climate change messages. The CMOE program will contribute to the potential long-range improvement in and sustainability of U.S. agriculture and food systems by connecting agricultural producers, rural families, tribes and small businesses with the information they need to better adapt to the effects of climate change. **AFRI grant**



Species with Binational Distributions as a Means for Engaging Hispanic Students into Forestry and Natural Resources

San Diego State University (SDSU) to increase recruitment of underrepresented students into the forest and agricultural sciences will provide undergraduate students with research experiences through summer internships, preparing them for scientific and professional careers in natural resources and forestry. Students will examine the genetic diversity and structure of trees and shrubs that are ecologically and economically important and distributed in both California and Baja California (**Mexico**). They aim to understand how natural and artificial barriers affect gene flow in these species with binational distributions. Undergraduate and graduate students will develop networks with collaborators from non-profit agencies and universities in the U.S. and Mexico, and become role models by explaining their research, its impact and significance to younger students through focused workshops. **HSI grant**



Introgression of Late Leaf Spot, Rust, Smut, Fall Armyworm, and TSWV Resistance from Wild Peanut Relative *A. correntina* into Cultivated Peanut *A. hypogaea*

Peanut varieties bred for stronger resistance, with more diverse sources of resistance, and with resistance to a greater number of pests are needed to feed the world's growing population in a sustainable manner. A **University of Georgia** researcher (under a predoctoral fellowship) aims to use one wild peanut relative, *Arachis correntina*, which has been reported to have strong resistance to many devastating pests such as Tomato Spotted Wilt Virus, late leaf spot, rust, smut, and fall armyworm, as a donor of resistance for peanut varieties. A goal of the project is to prevent a major

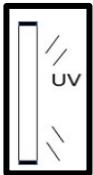
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epidemic from occurring by making peanut varieties resistant to smut, an emerging and economically devastating fungal pest found so far only in [Argentina](#), readily available. **AFRI grant**



Enhancing the Graduate Program through International Agricultural Experiential Learning and Extension Opportunities

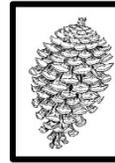
North Carolina A&T State University (NCA&T) established an international interdisciplinary graduate experiential learning program that teaches international applied learning experiences and extension to provide a challenging, scientific-based, and interdisciplinary training experience. For the international component NCA&T is cooperating with the University of [Belize](#). The training includes international orientation sessions for both faculty and graduate students and guidelines for conducting experiments in Belize and in North Carolina. Students participated in field work with selected farmers and attended workshops provided by the Belize Cooperative Extension Service, and the University of Belize Central Farm. Some of the graduate students have incorporated their international experiential learning into their thesis research. **1890 Grant**



The Novel Use of Light to Suppress a Broad Group of Plant Pathogens Affecting Sustainable Production of Organically Grown Crops

Powdery mildews are internationally important pathogens attacking a variety of crops. Researchers at the **New York Agricultural Experiment Station** (now named Cornell AgriTech) have extensive preliminary data to show that Ultraviolet-B (UV-B) lamps and Light-Emitting Diodes (LEDs) producing specific types of light that can disrupt spore production of a broad range of powdery mildews. This project's long-term goal is to exploit light as a natural and non-chemical means of

controlling powdery mildews for the benefit of those involved in organic crop production. Target audiences include lighting manufacturing companies and scientists, and the greenhouse and high-tunnel construction industry, as well as a broad range of growers of high value fruit and vegetable crops. Research and demonstration projects are underway in strawberry, grape, and hops in several U.S. states, in [Norway](#) (where the Norwegian Institute of Bioeconomy Research – NIBIO is a collaborator) and England. **OREI Grant**



Determining fire regimes for productive and sustainable use of pine ecosystems in the Americas

Pine forests support the economic and environmental health of the southeastern United States, Central America, and the Caribbean. Fires are a natural part of healthy pine forests; grasses fuel fires that kill some trees so there is enough sunlight and space for more young pine trees to grow. But in some locations, fires burn too frequently, killing too many young pines; in other locations fires do not burn frequently enough, allowing the forest to become too shady and dense for pines to grow. A **University of Florida** postdoctoral researcher will investigate how fires affect grass and pine growth and reproduction to identify the best way to manage fire for healthy, sustainable pine forests now and into the future. The postdoc will study grass and pine populations in Florida and in [Belize](#), marking and measuring grasses and pines in areas that burn frequently and infrequently, and at different times of the year, recording survival of individuals, growth, seed production, and how many seeds germinate and survive. These data will be used to model how different types of fires affect grass and pine populations over many years, and will help to understand when, where, and how to safely manage fire for healthy pine forests. **AFRI grant**

All project descriptions in this document are based on the reports from the grantees in the USDA Current Research Information System (CRIS) <https://cris.nifa.usda.gov/>

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Steps for Applicants to USDA NIFA programs interested in including international collaborations or activities in their proposals

Step 2

See if your interest fits within a NIFA Competitive or Capacity grant program

Competitive

- Agriculture and Food Research Initiative (AFRI), NIFA's flagship and largest competitive grant program has global engagement opportunities. NIFA supports global engagement that advances U.S. agricultural goals. Applicants to AFRI Requests for Application (RFAs) may include collaborations with international partners, but applications may only be submitted by eligible U.S. institutions. Such applications may include subcontracts to international partners or other institutions and must clearly demonstrate benefits to the United States. Additional information is on the AFRI International Partnerships webpage: <https://nifa.usda.gov/resource/afri-international-partnerships>
- Other competitive grant programs with opportunities for international activities include: 1890 Institution Teaching, Research, and Extension Capacity Building Grants; Higher Education Challenge Grants (HEC); Biotechnology Risk Assessment Grants (BRAG); Breakthrough Ideas to Advance Crop Breeding; Citrus Disease Research and Extension (CDRE); Food and Agricultural Sciences National Needs Fellowships (NNF); Food Safety Outreach Program (FSOP); Higher Education Multicultural Scholars Program (MSP); Hispanic Serving Institutions Grants (HSI); Minor Crop Pest Management Program Interregional Research Project #4 (IR-4); Organic Agriculture Research and Extension Initiative (OREI); Secondary, Post-Secondary Education & Ag. in the Classroom (SPECa); Signals in the Soil (SitS), Small Business Innovation Research (SBIR); Smith-Lever Special Needs Competitive Grants; Specialty Crop Research Initiative (SCRI); Sun Grants; Tribal College Research Grants Program (TCRGP); and Women and Minorities in STEM (WAMS). For details, see <https://nifa.usda.gov/opportunities-global-engagement>

For Capacity programs (primarily land-grant institutions)

- Check with your State Experiment Station Director, Research Director, Extension Director or Administrator, or Dean as appropriate. Many NIFA awardees have included international collaborations or activities in their capacity grants. <https://nifa.usda.gov/program/capacity-grantee-resources>

Step 1

Determine how an international collaboration or activity is important in accomplishing your research, education, or extension objectives

The preceding pages in this brochure give a variety of examples of how international collaboration or activity can serve an important role in accomplishing an objective important to U.S. food and agriculture.

Step 3

Identify potential collaborators, institutions, or locations

You are welcome to identify potential collaborators or foreign locations utilizing your own networks and professional contacts and include in your NIFA proposals as appropriate. You may also want to utilize partnerships NIFA has developed with foreign institutions and international organizations with whom NIFA has identified areas of mutual interest. These partnerships enable NIFA awardees to collaborate with foreign researchers that have funding from their own organizations or help NIFA awardees identify foreign collaborators they may want to write into their NIFA projects.

For more information on these and other NIFA global partnerships, please visit our website: <https://nifa.usda.gov/developing-global-partnerships>

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Quick guide to info on USDA NIFA programs and global engagement

NIFA's international partnerships

NIFA's Center for International Programs develops opportunities for U.S. scientists in NIFA-funded programs to link with international partners to achieve greater global impact and advances for U.S. agriculture.

<https://nifa.usda.gov/developing-global-partnerships>

International Partnership Videos

See researchers who through their NIFA grants are participating in NIFA international partnerships briefly share what they are doing, why it is important, and what international collaboration is enabling them to achieve.

<https://nifa.usda.gov/international-partnership-videos>

NIFA Competitive Grant RFAs with opportunities for global engagement to advance U.S. agriculture

See listing of NIFA's Requests for Applications (RFAs) and what's in those RFAs relevant to international activity.

<https://nifa.usda.gov/opportunities-global-engagement>

NIFA Capacity Grants

As noted in the NIFA Policy Guide, "NIFA supports global engagement that advances U.S. agricultural goals." Consult the NIFA Policy Guide on allowable costs related to international activity in Capacity Grants and check with your State Experiment Station Director, Research Director, Extension Director or Administrator, or Dean as appropriate.

<https://nifa.usda.gov/resource/nifa-federal-assistance-policy-guide-2018>

Learn more about USDA NIFA's Opportunities for Global Engagement to Advance U.S. Agriculture

USDA NIFA's Center for International Programs establishes connections between NIFA and other organizations, such as the U.S. Agency for International Development (USAID), the U.S. Department of State, the Food and Agriculture Organization of the United Nations (FAO), CGIAR system of international agricultural research centers, and other organizations, and with agricultural research agencies of other countries to globally advance the results and experience of NIFA and the institutions it serves, and achieve goals important to U.S. agriculture. To find out more about NIFA's international collaborations and opportunities in the different NIFA grant programs visit us on the web:

<https://nifa.usda.gov/program/global-engagement-programs>



This 2019 document can be found at <https://nifa.usda.gov/resource/advancing-us-agriculture-through-global-engagement>

NIFA invests in and advances agricultural research, education, and extension and promotes transformative discoveries that solve societal challenges. NIFA's integrated research, education, and extension programs support the best and brightest scientists and extension personnel whose work results in user-inspired, groundbreaking discoveries that combat childhood obesity, improve and sustain rural economic growth, address water availability issues, increase food production, find new sources of energy, mitigate climate variability, and ensure food safety. To learn more about NIFA's impact on agricultural science, visit www.nifa.usda.gov/impacts, sign up for email updates or follow us on Twitter @USDA_NIFA, #NIFAimpacts. | August 2019