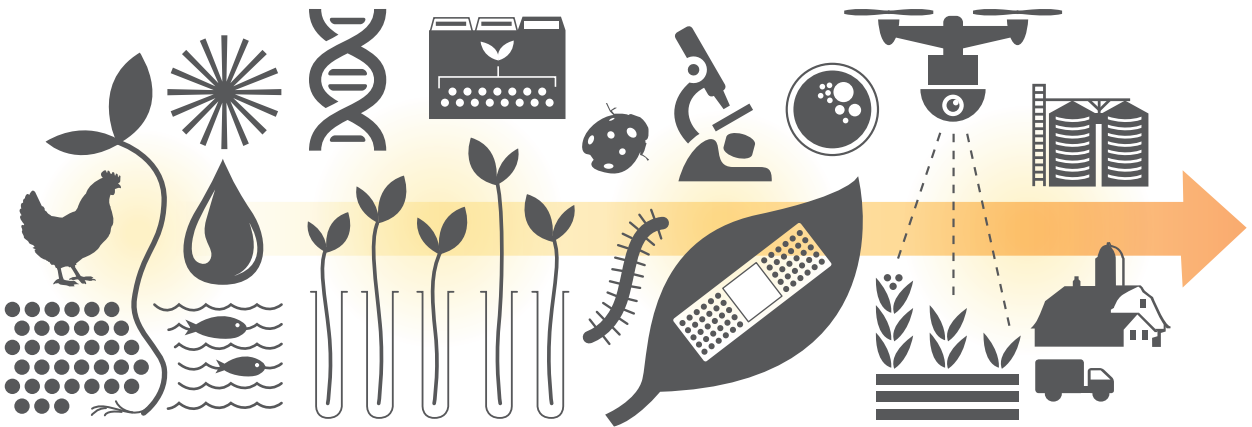




United States
Department of
Agriculture

National Institute
of Food
and Agriculture



INCREASING DIVERSIFYING PROTECTING DEVELOPING DEPLOYING PREPARING

FY 2017

NATIONAL INSTITUTE OF FOOD AND AGRICULTURE
FY 2017 PRESIDENT'S BUDGET PROPOSAL

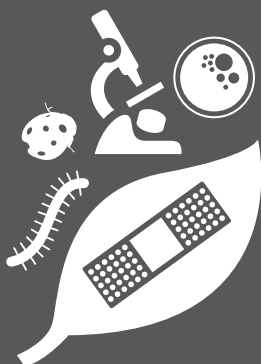
NIFA SUPPORTS RESEARCH AND EDUCATION THAT **SUSTAINABLY INCREASE PRODUCTIVITY** BY:



INCREASING
photosynthetic,
water use,
and nutrient use
efficiency in crops
and animals



DIVERSIFYING
the product stream
through novel
crops, organisms,
and processing
technologies



PROTECTING
these products
against predators,
parasites, diseases,
and pathogens
to ensure food
safety



**DEVELOPING
& DEPLOYING**
the industrial,
physical, and digital
technologies
to revolutionize
planting, cultivation,
harvest, storage,
and transportation

PREPARING the next generation of agriculture professionals through education, training, and leadership development.

NIFA FY 2017 PRESIDENT'S BUDGET PROPOSAL

THE NATIONAL INSTITUTE OF FOOD AND AGRICULTURE (NIFA) catalyzes transformative discoveries, education, and engagement to address agricultural challenges. NIFA-supported programs turn research into action—bringing groundbreaking discoveries from research laboratories to farms, communities, and classrooms. To ensure science is put into use, NIFA's integrated approach consists of three components:

RESEARCH to provide answers to the complex issues facing our nation and world.

EDUCATION to strengthen schools and universities to train the next generations of scientists, educators, producers, and citizens.

EXTENSION to translate the knowledge gained through research and education into innovations that can provide solutions to problems.

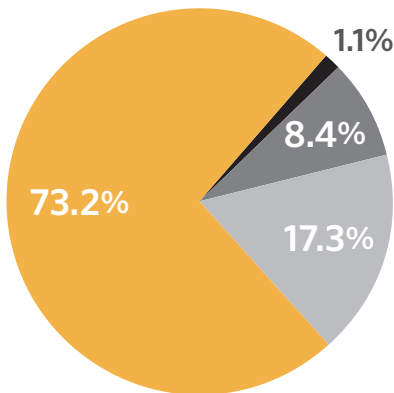
NIFA supports the best and brightest scientists and extension personnel to find innovative solutions to local and global problems. By working with 1862 land-grant universities (LGUs), 1890 LGUs, 1994 land-grant colleges, Hispanic-serving institutions, non-land-grant universities and colleges, and other academic institutions and organizations across the nation, NIFA ensures that benefits extend to all Americans. NIFA collaborates with other science agencies, and serves as a vital contributor to science policy decisionmaking.

For Fiscal Year (FY) 2017, the President's budget proposes doubling funding for the Agriculture and Food Research Initiative (AFRI), minor increases in funding for some programs, and sustained funding for others. NIFA uses these funds to deploy research that underpins transformative discoveries needed to solve challenges to our nation's nutritional security, including diminishing land and water resources, changing climate, and the need for environmental stewardship, in the context of the burgeoning population. Additionally, the proposed budget will provide critical funding for research, education, and extension in support of Presidential initiatives, including emerging issues of antimicrobial resistance and pollinator health, and the need for a highly skilled workforce and

the next generation of scientists.

Transformative innovations are needed in a number of areas, including engineering microbiomes to manipulate the productivity and health of crops and farm animals; approaches that ensure a safe food supply; approaches to significantly reduce food waste and food loss; developing climate-smart agriculture; reducing energy use in the food supply chain; bridging the productivity gap; efficient irrigation systems; deploying knowledge in genomics and synthetic biology to enhance yields, better water, nitrogen, phosphorus, and land use efficiencies; improving photosynthesis efficiencies and nitrogen fixation; better pest management approaches; and developing and deploying smart farming systems that use robotics, sensors, sentinels, and Internet-enabled systems. Additional developments in vertical farming, hydroponics, aquaponics and other methods will also become part of a portfolio of approaches we will need to ensure nutritional security. NIFA will invest in transdisciplinary and transformative agricultural systems projects to expand foundational knowledge, to engineer innovative technologies and advanced manufacturing, to devise prudent management strategies, and to develop inte-

TOTAL FY 2017 DISCRETIONARY, MANDATORY, AND ENDOWMENT FUNDING



DISCRETIONARY FUNDING: \$1,378,889,000
AFRI MANDATORY FUNDING: \$325,000,000
FARM BILL MANDATORY FUNDING: \$158,000,000
ENDOWMENT FUNDING: \$21,880,000

grated educational programs to ensure that we meet current and future demands for agricultural workforce. As a result of significant investments in fundamental and applied science, American citizens will be healthier and nutritionally secure, decisionmakers will have science-based information to make informed judgments, communities will be vibrant and sustainable, and our nation’s agricultural economy will continue to prosper and create jobs.

With the overall goal of significantly boosting agricultural production, while minimizing agriculture’s ecological footprint, NIFA will invest in strategic initiatives to promote and improve the use of systems approaches to collectively improve the many facets of the agricultural system, from farms to supply chain businesses to consumers and transform the way we produce, process, consume, and dispose of food. The rationale for supporting transdisciplinary approaches is that efforts of investigators from different disciplines working jointly will contribute to creating new conceptual, theoretical, methodological, and translational innovations that integrate and move

beyond discipline-specific approaches to address a common problem, as defined by the Harvard School of Public Health.

NIFA’s 2017 budget initiatives include:

- A doubling of AFRI funding to the fully authorized amount of \$700 million through a combination of discretionary and mandatory funds.
 - AFRI discretionary funding will support science priorities that focus on the creation, translation, delivery, and application of new knowledge in agriculturally-relevant areas, including the foundational sciences, water for food production systems, food safety, human nutrition, adaptation to impacts of and resilience to climate change, natural resource and environmental stewardship, rural development, and education and literacy.
 - AFRI mandatory funding will be invested in systems approaches that comprehensively identify solutions to complex agricultural challenges by developing the knowledge, technologies, and practices needed to sustainably increase agricultural production;
- A new competitive awards program in the 1890 Capacity Coordination Initiative to support three centers;
- Increased support for sustainable agricultural research and education for beginning farmers and ranchers;
- A new program to engage and support veterans in the agricultural sector;
- A new program to support home visits for remote areas program;
- Increased support to address regional and national pest management challenges, including pollinator health issues;
- Increased support for nationally-coordinated plant and animal disease diagnostic networks; and
- Increased support to enhance minority-serving institutions and youth-serving organizations.

FY2017 BUDGET HIGHLIGHTS

AGRICULTURE AND FOOD RESEARCH INITIATIVE (AFRI)

The proposed 2017 budget includes doubling the investment for the AFRI program. During the past seven years since its establishment, the AFRI program has led to transformative innovations and ground-breaking discoveries in agriculture to combat childhood obesity, improve and sustain rural economic growth, address water availability issues, increase food production, find new sources of bioenergy, mitigate the impacts of climate variability, enhance resiliency of our food systems, and ensure food safety.

With this increased investment in AFRI, new grant opportunities would open up for our nation's investigators. Currently nine out of 10 proposals submitted to the AFRI program are rejected for lack of funds, leaving thousands of innovative projects with no funding and no other source of funding. The burgeoning population, climate change, diminishing land and water resources, and the need to ensure nutritional security are becoming ever more urgent; funding shortfalls become even more daunting when one considers the urgency of new and invasive species of insects and pathogens of public, animal, and plant health importance, antimicrobial resistance, pollinator health, sustainable and agroecological approaches, poor public health and nutritional outcomes, and the need for innovations for advanced manufacturing and economic enterprises. Funding research to respond to these challenges should be considered as an investment in our nation's future, an investment that will pay big dividends in the years to come.

Additionally, the national employment outlook for agricultural fields in our nation is exceptionally strong, but our academic institutions are hard pressed to meet the demand. The increased AFRI funding will support new efforts to attract undergraduate and graduate students, along with postdoctoral researchers needed for our nation's agricultural workforce.

Discretionary funding in the amount of \$375 million will support high-priority issues:

FOUNDATIONAL SCIENCE

Research investments will support the discovery of foundational knowledge in the six farm bill priorities: plant health and production and plant products; animal health and production and animal products; food safety, nutrition, and health; bioenergy, natural resources, and environment; agriculture systems and technology; and agriculture economics and rural communities. Investments in foundational science also will support Presidential initiatives, including antimicrobial resistance and pollinator health. Additional funds will support the Critical Agricultural Research and Extension program, which helps to develop the urgent tools and technologies that producers need to deploy in their production systems. Funding also will support the Exploratory Research Grants program to fund projects that develop proof-of-concept for untested, innovative ideas, especially high-risk/high-reward work that may lead to significant improvements in U.S. agriculture.

WATER FOR FOOD PRODUCTION SYSTEMS

The Food Security and Water for Agriculture Challenge Areas are consolidated into Water for Food Production Systems. This new

challenge area will ensure sustainable production of safe and nutritious food by developing solutions to water constraints, including availability, quality, and quantity, which may impact food production. These investments will promote the development of an array of technological and strategic solutions to critical water problems in food production systems and will address the social and economic barriers for adoption of water conservation technologies and practices. Combined, the research, education, and outreach portfolio is expected to catalyze the next revolution in production agriculture by providing breakthrough technologies and data-driven decision tools, generating locally and regionally-adapted crop cultivars, and developing prudent water management practices for food production systems. Funding also will support research on improving the health and production of crops and livestock, and for work on water for agriculture initiated in previous years. Additional investments will support plant and animal breeding, agronomic and animal management, plant and animal protection, and other factors that may constrain achieving food security.

FOOD SAFETY

Funds will protect consumers from microbial and chemical hazards that may be present from "farm-to-fork," addressing problems such as food contamination by pathogens, toxins, and chemicals by natural or intentional causes along the entire food chain. In support of the President's National Strategy for Combating Antibiotic Resistant Bacteria, projects will comprehensively investigate antimicrobial resistance as well as microbial communities (microbiomes) associated with soil, air, water, production agriculture, and aquaculture.

continued page 7 >>

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

PROGRAMS

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AGRICULTURE AND FOOD RESEARCH INITIATIVE

Proposed Legislation for Mandatory Funding	\$0	\$325,000
Discretionary Funding	350,000	375,000
Subtotal	350,000	700,000

OTHER DISCRETIONARY FUNDING

CAPACITY PROGRAMS:

Hatch Act	243,701	243,701
McIntire-Stennis Cooperative Forestry	33,961	33,961
Evans-Allen Program	54,185	58,000
Animal Health and Disease, Section 1433	4,000	0

SPECIAL RESEARCH GRANTS:

Minor Crop Pest Management, IR-4	11,913	11,913
Agroclimatology (formerly Global Change, UV-B Monitoring)	1,405	1,405
Potato Research	2,000	0
Aquaculture Research	1,350	0

OTHER RESEARCH:

Aquaculture Centers	4,000	0
Sustainable Agriculture Research and Education Program	24,667	29,967
Supplemental and Alternative Crops	825	0
1994 Research Grants	1,801	3,914
Federal Administration (Direct Appropriation) a/	20,339	31,421
Farm Business Management and Benchmarking Program	1,450	0
Sun Grant Program	2,500	0
Capacity Building for Non-Land-Grant Colleges of Agriculture	5,000	0
Alfalfa and Forage Research	2,000	0
Food and Agriculture Resiliency Program for Military Veterans	0	2,500

HIGHER EDUCATION:

Institution Challenge, Multicultural Scholars and Graduate Fellowship Grants b/	9,000	0
1890 Institution Capacity Building Grants	19,336	30,410
Education Grants	(19,336)	(20,410)
Three Centers	(0)	(10,000)
Hispanic-Serving Institutions Education Grants Program	9,219	9,219
Tribal Colleges Education Equity Grants Program	3,439	3,654
Interest (Estimated) Earned on Tribal Colleges Endowment Fund	4,706	4,915
Secondary Education/2-Year Post Secondary b/	900	0
Alaska Native-Serving and Native Hawaiian-Serving Institutions	3,194	3,194
Veterinary Medical Services Act	5,000	5,000
Veterinary Services Grant Program	2,500	0
Grants for Insular Areas	2,000	1,800
Subtotal c/	824,391	1,174,974
Subtotal (does not include AFRI Mandatory Funding) c/	824,391	849,974

SECTION 406 LEGISLATIVE AUTHORITY:

Methyl Bromide Transition Program	2,000	0
Organic Transition Program	4,000	4,000
Crop Protection/Pest Management	17,200	20,200

OTHER LEGISLATIVE AUTHORITIES:

Regional Rural Development Centers	1,000	1,000
Food and Agriculture Defense Initiative	6,700	10,000
Subtotal	30,900	35,200

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

PROGRAMS

FY 2016
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CAPACITY PROGRAMS:

Smith-Lever Formula 3(b)&(c)	\$300,000	\$300,000
1890 Institutions	45,620	48,350

SMITH-LEVER 3(d) PROGRAMS:

Expanded Food and Nutrition Education Program	67,934	68,034
Farm Safety and Youth Farm Safety Education and Certification	4,610	4,610
New Technologies for Agricultural Extension	1,550	0
Children, Youth, and Families at Risk	8,395	8,395
Federally-Recognized Tribes Extension Program	3,039	5,839
Home Visits for Remote Areas	0	20,000

OTHER EXTENSION PROGRAMS:

Grants for Youth Serving Institutions	0	1,000
Extension Services at 1994 Institutions	4,446	6,724
Renewable Resources Extension Act	4,060	4,060
Rural Health and Safety	1,500	0
1890 Facilities (Section 1447)	19,730	21,703
Food Animal Residue Avoidance Database Program (FARAD)	1,250	0
Women and Minorities in Science, Technology, Engineering and Mathematics (STEM) Fields b/	400	0
Food Safety Outreach Program	5,000	5,000
Federal Administration d/	8,357	a/

Subtotal	475,891	493,715
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TOTAL, DISCRETIONARY AND AFRI MANDATORY FUNDING c/	1,331,182	1,703,889
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TOTAL, DISCRETIONARY FUNDING c/ (DOES NOT INCLUDE AFRI MANDATORY FUNDING)	1,331,182	1,378,889
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FARM BILL MANDATORY AND ENDOWMENT FUNDING

Hispanic-Serving Agriculture Colleges and Universities Endowment Fund	0	10,000
Tribal Colleges Endowment Fund	11,880	11,880
Organic Agriculture Research and Extension Initiative	18,640	20,000
Beginning Farmers and Ranchers Program	18,640	20,000
Biomass Research and Development Initiative (BRDI)	2,796	3,000
Specialty Crop Research Initiative	51,260	55,000
Emergency Citrus Research and Extension Program	23,300	25,000
Food Insecurity Nutrition Incentive Program	18,640	20,000
Biodiesel Fuel Education Program e/	932	1,000
Agriculture Risk Management Education Program e/	4,660	5,000
Community Food Projects Competitive Grants Program e/	9,000	9,000

TOTAL, FARM BILL MANDATORY AND ENDOWMENT FUNDING f/	159,748	179,880
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TOTAL, DISCRETIONARY, MANDATORY, AND ENDOWMENT FUNDING c/ f/	1,490,930	1,883,769
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TOTAL, DISCRETIONARY, FARM BILL MANDATORY, AND ENDOWMENT FUNDING (DOES NOT INCLUDE AFRI MANDATORY FUNDING) c/ f/	1,490,930	1,558,769
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NOTES:

a/ In FY 2017, Federal Administration costs are consolidated on one funding line.

b/ In FY 2017, program is part of a government-wide initiative to consolidate STEM programs.

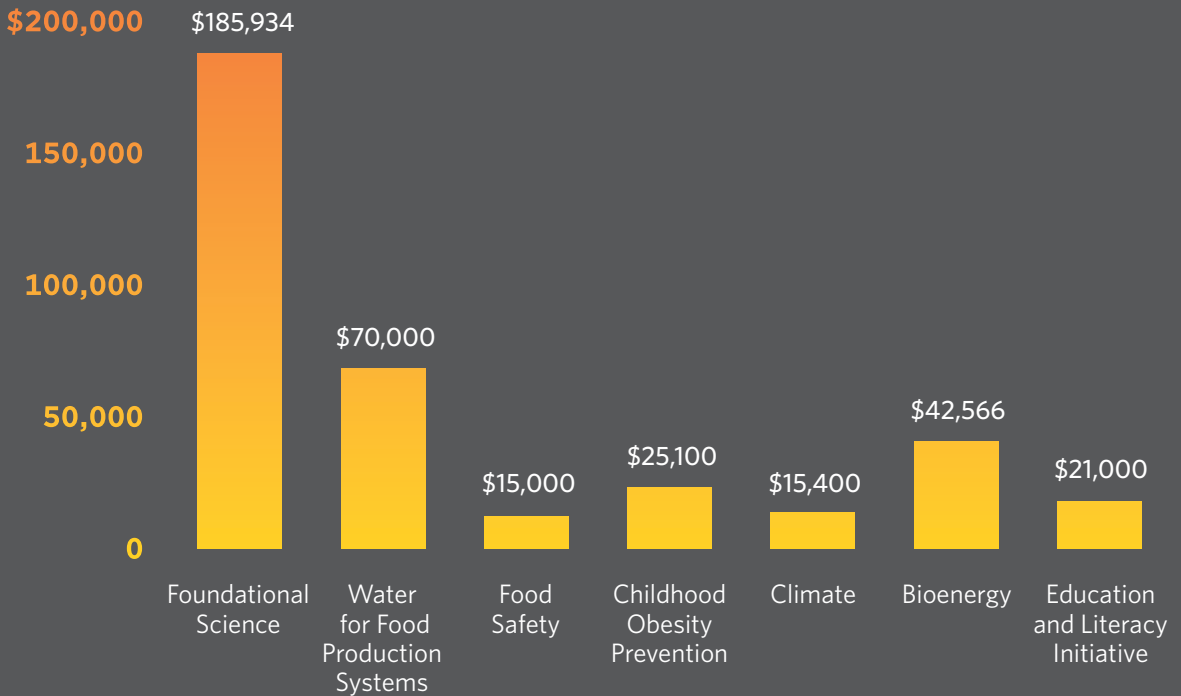
c/ Estimated interest on Tribal College Endowment Fund is included in the total.

d/ In FY 2016 appropriations, \$552,000 is provided within the total for Agriculture in the Classroom (AIRC).
In FY 2017 President's Budget, AIRC is part of a government-wide initiative to consolidate STEM programs.

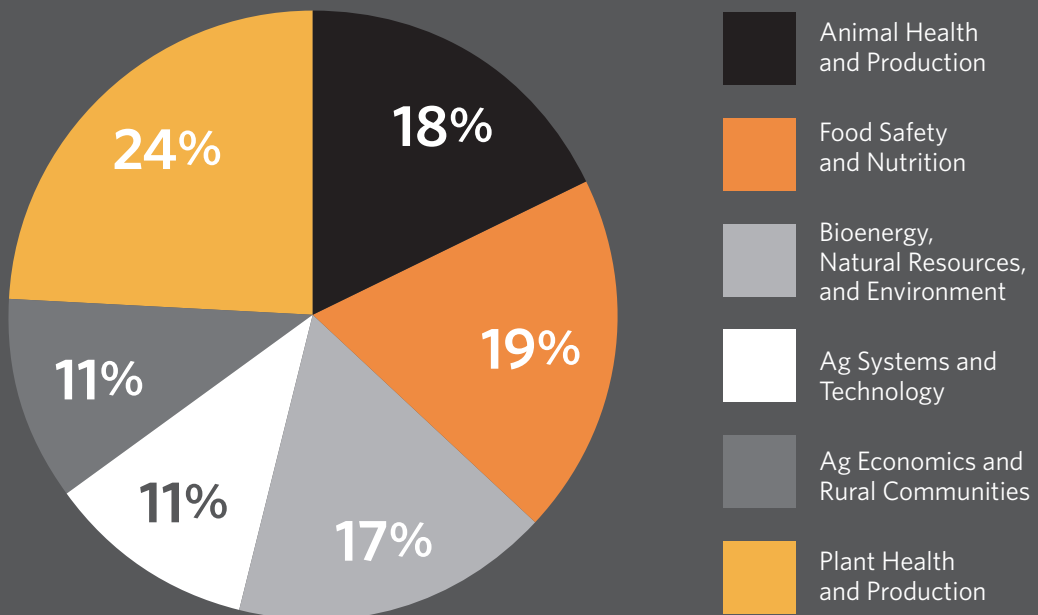
e/ Mandatory program delegated to another USDA agency but administered by NIFA.

f/ Farm Bill funding amounts are based on H.R. 2642, the Agricultural Act of 2014 and include impact of sequestration of mandatory funds in FY 2016.

ALLOCATIONS OF AFRI DISCRETIONARY FUNDS OF \$375 MILLION BY PROGRAM AREA (\$'000)



FY 2017 AFRI DISCRETIONARY INVESTMENTS BY FARM BILL PRIORITIES



CHILDHOOD OBESITY PREVENTION

Projects will focus on children and adolescents ages 2-19 in communities of greatest need and their access to nutritious food as well as their food and physical activity environments. Specifically, funded projects will identify, implement, and promote effective family, peer, community, and school-based interventions to prevent and reverse overweight and obesity trends; and to promote healthy behaviors in children and adolescents. The outcomes of these investments will result in long-term and sustained strategies to prevent childhood obesity by improving access to healthy food and enhancing the physical activity environments of communities with the greatest need.

CLIMATE VARIABILITY AND CHANGE

This challenge area will support the President's Global Climate Change Initiative. The outcomes of these investments will help farmers, ranchers, forest owners, and rural communities adapt to climate variation, reduce greenhouse gas emissions, and improve long-term sustainability of food and fiber production. The program will focus on climate-resilient land use for agriculture and forestry as well as the impact of climate on the microbiome of agricultural production systems.

SUSTAINABLE BIOENERGY

NIFA's Sustainable Bioenergy and Bioeconomy portfolio links feedstock development, production, conversion, and markets in the creation of commercial-scale, advanced non-ethanol biofuels and biobased products that are compatible with existing infrastructure. NIFA proposes continued funding for research, education, and extension work on grasses, willow, and beetle-killed trees

as feedstocks for biofuels while supporting the President's Clean Energy and Advanced Manufacturing Initiatives. Funding will focus on biomass crop protection, risk mitigation, and improving feedstock handling logistics and pre-processing technologies while integrating feedstock production with existing production systems. Additionally, support will improve plant breeding and water-efficiency in biomass crop production, preprocessing, and conversion to fuels and chemicals while also promoting efficient wastewater treatment.

EDUCATION AND LITERACY INITIATIVE

Through this initiative, NIFA will continue its efforts to support development of a diverse workforce in the food, agricultural, natural resources, and human sciences. This program will enhance workforce development by:

- 1 providing professional development opportunities for K-12 and community college education professionals to promote engaged learning and positive youth development in their classrooms;
- 2 enhancing experiential learning opportunities for undergraduates that provide the skills necessary to succeed in the food, agriculture, natural resource, and human sciences professions; and
- 3 advancing science by supporting graduate and postgraduate education. A new addition will include training grant opportunities in the food and agricultural sciences.

1890'S CAPACITY COORDINATION INITIATIVE

The funds will support three centers designed to increase diversity in the science, technology, engineering, and math (STEM) pipeline; increase profitability and jobs in underserved

and limited resource farming communities; and enhance talent preparation related to global food security. The centers also will increase coordination and collaboration between USDA and the 1890 institutions. The centers will each have a specific focus, including:

- 1 innovative and sustainable small farms, ranches, and landowners;
- 2 motivation and education of students for achievement; and
- 3 international engagement and development.

SUSTAINABLE AGRICULTURE RESEARCH AND EDUCATION

Funding will increase knowledge of and enable beginning farmers and ranchers to adopt practices that are profitable, environmentally sound, and beneficial for communities. Projects will support development of technical guides and handbooks and education and training for Cooperative Extension Service agents and other agricultural professionals. These services will be available in the university system, the private sector, or other government agencies involved in the education and transfer of technical information concerning sustainable agriculture.

FOOD AND AGRICULTURE RESILIENCY PROGRAM FOR MILITARY VETERANS (FARM-VETS)

The FARM-Vets program will deploy competitive funding for basic and applied research that explores career opportunities and pathways, therapeutic interventions, resource conservation, and related studies to attract veterans into the food and agriculture sector. Funded projects will inform future programming that will help veterans develop farming and ranching skills, business plans, and agriculture systems management.

SMITH-LEVER 3(d) PROGRAMS

A new competitive Home Visits for Remote Areas Program (HVRAP) will promote long-term, sustainable, and culturally-appropriate educational outreach to high-risk, high-need maternal, child, and family health in remote rural and tribal areas. The program complements existing federal programs, such as the U.S. Department of Health and Human Service's Maternal, Infant, and Early Childhood Home Visiting Program, by providing educational services to rural and tribal areas through the Cooperative Extension System. The program also complements NIFA programs, such as Children, Youth, and Families at Risk and community nutrition education programs. These programs deliver land-grant based programming primarily in community-level settings, whereas the HVRAP will focus on extension-supported home visits to address families experiencing transitions and challenges throughout the life cycle.

Additional increases under Smith-Lever 3(d) will continue nutrition education for low-income and minority populations through the Expanded Food and Nutrition Education Program, and double the number of staff engaged in 4-H activities for tribal youths through the Federally Recognized Tribes Extension Program.

CROP PROTECTION/PEST MANAGEMENT

In support of the President's Pollinator Health Initiative and to address new and emerging invasive pest species, increased funding is requested to focus on pollinator health issues under this program. Funds also will support activities for integrated pest management (IPM) projects that respond to pest management challenges with coordinated state, regional, and national research, education,

and extension programs, and promote further development and use of IPM approaches.

FOOD AND AGRICULTURE DEFENSE INITIATIVE

The program provides support and enhancement of nationally-coordinated plant and animal disease diagnostic networks and supports activities to identify and respond to high-risk biological pathogens in the food and agricultural system. The Extension Disaster Education Network is a national effort led by the state cooperative extension service that provides disaster education resources for extension educators. The requested increase will enable these three networks to better utilize improved diagnostic technologies and data infrastructure; upgrade their instrumentation; expand diagnostic test capabilities and throughput potential; and develop more effective laboratory information and data management.

MINORITY SERVING INSTITUTIONS

The 2017 budget proposes increases in Evans-Allen, 1890 Capacity Building Grants, 1890 Extension, and 1890 Facilities programs to universities to support innovation by funding applied research, education, and extension of thousands of minority, first-generation college students they serve. Funds also will enhance innovation; support the training of African-American students; and address epidemics within minority communities, such as adult and childhood obesity and diabetes.

NIFA also requests increases in the 1994 Research, Tribal Colleges Education Equity, and Extension Services at 1994 Institutions programs to assist these institutions in developing new partnerships, building research and extension capacity, and serving a larger American Indian student population.

GRANTS FOR YOUTH SERVING INSTITUTIONS

The budget includes a request to provide funding for Grants for Youth-Serving Institutions that support pilot-demonstration projects for youth-serving organizations in rural communities. This program is deemed a priority at the local and/or state levels for social capital and community development efforts.

HISPANIC-SERVING AGRICULTURAL COLLEGES AND UNIVERSITIES (HSACU) ENDOWMENT FUND

The Hispanic/Latino community is the fastest growing sector of the American population. This investment will help HSACUs develop capacity to compete effectively for NIFA competitive grants. Support for this HSACU endowment fund will help in critical development of a skilled and marketable student population for employment in the food and agricultural sector.

OTHER PROGRAMS

NIFA will continue funding other programs in order to serve the nation's needs through exemplary research, education, and extension that address many of the challenges that face agriculture, the environment, and nutrition. From agricultural production, nutrition and food safety to energy independence and the sustainability of our natural resources, NIFA's investment in science helps secure America's future. The budget proposes to eliminate aquaculture centers; however, topic areas will be covered through the AFRI competitive grants program. The budget proposes the consolidation of federal administration with most of the increase supporting modernization of NIFA's grant applications systems and processes.

CONSOLIDATION OF STEM PROGRAMS

The budget includes a proposal to consolidate STEM programs as part of a government-wide initiative. Affected NIFA programs include the Institution Challenge, Multicultural Scholars, and Graduate Fellowship Grants; Secondary/2-year Post Secondary Education Program; Women and Minorities in STEM Fields; and Agriculture in the Classroom.

MANAGEMENT INITIATIVE

NIFA's Strategic Plan highlights the importance of business processes and communication goals in supporting its goals and management initiatives. The budget also includes a proposal to eliminate the old account structure from NIFA's predecessor agencies and create a single, unified account to house all NIFA programs. Since NIFA's establishment in 2010, the agency has worked to integrate research, education, and extension activities across its programs and organizational structures. In recent years, NIFA consolidated funding lines for some programs (Sustainable Agriculture Research and Education, Crop Protection/Pest Management, Grants for Insular Areas) and received support for simplification in appropriations. Merging all funding lines within a single account structure will mirror the reorganization of the agency as a national institute with a unified mission and provide opportunities to streamline the administration of funds. The merger will not impact the function or funding level of any program, but it will help simplify the management of funds within the financial systems.

FARM BILL MANDATORY FUNDING

In FY 2017, funding for mandatory programs is included as authorized in the Agricultural Act of 2014 (2014 Farm Bill).

PROPOSED LEGISLATION FOR MANDATORY FUNDING FOR THE AGRICULTURE AND FOOD RESEARCH INITIATIVE (AFRI)

Mandatory funding in the amount of \$325 million is proposed as a complement to the discretionary AFRI funding. This funding will allow the agency to facilitate systems approaches that identify solutions to agricultural challenges by developing the knowledge, technologies, and practices needed to sustainably increase agricultural production in the context of climate change, diminishing land and water resources, and the need to ensure nutritional security for the burgeoning population.

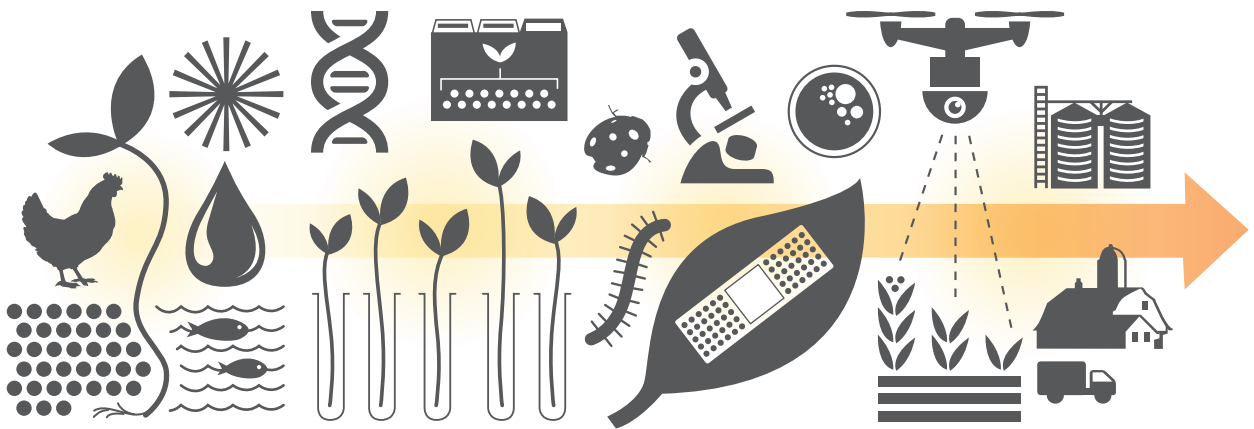
NIFA will invest in transdisciplinary and transformative agricultural systems projects to:

- 1 expand foundational knowledge,
- 2 engineer innovative technologies and advanced manufacturing,
- 3 devise prudent management strategies, and
- 4 develop integrated educational programs for meeting current and future agricultural workforce demands.

NIFA will support strategic initiatives that promote and improve the use of holistic approaches to collectively examine the many facets of the food system, from farms to supply chain businesses to consumers; and transform the way we produce, process, consume, and dispose of food. NIFA's investments in catalyzing transformative discoveries will allow our nation to protect agricultural environments across all scales, from microbiomes to large agroecosystems. This will result in new knowledge of how ecosystems and their components can influence and regulate soil productivity, environmental stability, production of crops and livestock and improve human health. NIFA also will significantly invest in transdisci-

plinary approaches to effectively catalog, organize, and analyze the complex information extracted from big data to solve agricultural systems challenges. Additionally, NIFA will provide training grants to support graduate students and postdoctoral scholars and enhanced opportunities for new investigators in the various food and agricultural sciences.

New technologies that allow us to better identify and protect agricultural environments, from microbial communities to large agroecosystems, will result in new knowledge of how ecosystems and their components can influence and regulate soil productivity, environmental stability, production of crops and livestock, and contribute to improving human health. This information is critical to increasing the production of food, feed, fiber, biofuel, and biobased products through the development of new innovative methods and technologies that require fewer resources and result in a reduced environmental footprint. It will also build upon and complement investments in similar areas of science, including advanced manufacturing, at other federal agencies. These new areas of science will also require developing the next generation of scientists and workforce who will be engaged in addressing current and future challenges in agriculture. To achieve this, NIFA will invest in targeted programs that will include training grants to support graduate students and postdoctoral scholars, as well as provide enhanced opportunities for new investigators in the various food and agricultural sciences, including for example plant and animal breeding, microbial, weed, and insect sciences, water and soil science and engineering, economics and social sciences, and nutrition and food technology.



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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 or following [@USDA_NIFA](https://twitter.com/USDA_NIFA) on Twitter.

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