



United States
Department of
Agriculture

National Institute
of Food
and Agriculture

AFRI

Agriculture and Food
Research Initiative

2011 Annual Synopsis

Sonny Ramaswamy
Director
sonny@nifa.usda.gov
(202)720-4423

Muquarrab Qureshi
Assistant Director
mqureshi@nifa.usda.gov
(202)720-5305

Deborah Sheely
Assistant Director
dsheely@nifa.usda.gov
(202) 401-5024

Bradley Rein
Acting Assistant Director
brein@nifa.usda.gov
(202) 720-0740

Robert Holland
Assistant Director
rholland@nifa.usda.gov
(202) 720-5004

Program Overview

The Food, Conservation, and Energy Act of 2008 (the 2008 Farm Bill), Public Law 110-234, established the Agriculture and Food Research Initiative (AFRI), which assumed all of the authorities of its predecessor program, the National Research Initiative. AFRI is the premier agricultural competitive grants program in the United States. The program was authorized through fiscal year (FY) 2013 to fund high priority research, education, and extension competitive grants that address food and agricultural sciences. AFRI supports research, education, and extension as well as integrated programs by awarding grants that address key problems of national, regional, and multi-state importance. These programs sustain all components of agriculture, including farm efficiency and profitability, ranching, renewable energy, forestry (both urban and agroforestry), aquaculture, rural communities and entrepreneurship, human nutrition, food safety, biotechnology, and conventional breeding. AFRI advances fundamental sciences as well as translational research and development in support of agriculture and coordinates opportunities to build on these discoveries. AFRI also supports education and extension that delivers science-based knowledge to people, allowing them to make informed practical decisions. Science programs that support agriculture were developed within the context of the authorized purposes of the U. S. Department of Agriculture (USDA) research, extension, and education. In addition, AFRI obtains additional input from Congress, the National Agricultural Research, Education, Extension, and Economics Advisory Board (NAREEEAB), as well as many university, scientific, and agricultural committees and organizations. The National Institute of Food and Agriculture (NIFA) developed a stakeholder's Web page (www.nifa.usda.gov/business/reporting/stakeholder.html) to document stakeholder input that is considered when developing and updating program area descriptions and priorities each year.

Background

In July, 2008, the National Institutes of Health (NIH), National Science Foundation (NSF), and U. S. Department of Energy (DOE) asked the National Research Council's Board on Life Sciences to convene a committee to *examine the current state of biological research in the United States and recommend how best to capitalize on recent technological and scientific advances that have allowed biologists to integrate biological research findings, collect and interpret vastly increased amounts of data, and predict the behavior of complex biological systems.* The committee produced a report entitled "New Biology for the 21st Century: Ensuring the United States Leads the Coming Revolution," and a set of recommendations that recognize that the most effective leveraging of investments would come from a coordinated, interagency effort to encourage the emergence of a new biology that would identify and address broad and challenging societal problems.

New biology is already emerging, but is, as yet, poorly recognized, inadequately supported, and delivering only a fraction of its potential. The committee concluded that the most effective way to speed the process is to challenge the scientific community to use new biology to tackle solutions to major societal problems in four broad areas: food; environment; energy; and health.

The four areas are:

1. *Generate food plants to adapt and grow sustainably in changing environments;*
2. *Understand and sustain ecosystem function and biodiversity in the face of rapid change;*
3. *Expand sustainable alternatives to fossil fuels; and*
4. *Understand individual health.*

Background (continued)

The committee chose to focus on these four areas because their benefits would be large, progress would be assessable, and both the scientific community and the public would find such goals inspirational. Each challenge will require technological and conceptual advances that are not now at hand, across a disciplinary spectrum that is not now encompassed by the field. In the committee’s view, one of the most exciting aspects of the New Biology Initiative is that success in achieving the four goals will propel advances in fundamental understanding throughout the life sciences. Because biological systems have so many fundamental similarities, the same technologies and sciences developed to address these four challenges will expand the capabilities of all biologists.

USDA – NIFA Approach

The report “New Biology for the 21st Century” bolsters the case for increasing the level and effectiveness of USDA’s agricultural research, education, and extension programs. These efforts have included creating NIFA and significantly increasing funding for its research, education, and extension programs.

AFRI is one of NIFA’s major programs through which to address critical societal issues such as those laid out in the “New Biology for the 21st Century” report. USDA leadership has integrated the six AFRI priority areas with the four challenges and the approach laid out in the “New Biology for the 21st Century” report to identify five primary challenge areas around which to structure the AFRI program and focus the Department’s investment in an integrated approach to biological research, education, and extension. USDA science will support the following challenges:

1. Keep American agriculture competitive while ending world hunger
2. Improve nutrition and end child obesity
3. Improve food safety for all Americans
4. Secure America’s energy future
5. Mitigate and adapt to climate change

To address these challenges at a meaningful scale and to achieve outcomes of relevance to the societal challenges, NIFA supported specific competitive programs on these issues. They address each of the five challenges, enable transition and re-focusing of grants made previously under AFRI, and provide pre- and postdoctoral fellowship opportunities. AFRI solicited applications for larger awards for longer periods of time to enable greater collaboration among institutions and organizations and integration of basic and applied research with deliberate education and extension programs.

Table 1. Summary of the relationship between the legislatively defined AFRI priority areas and the challenge areas. AFRI provided funding for both the legislatively defined areas individually and in combination to address the challenge areas

AFRI Priority Areas	FY 2011 AFRI Funding Support
Plant Health and Production and Plant Products	Climate Change Foundational Program Global Food Security Sustainable Bioenergy
Animal Health and Production and Animal Products	Climate Change Food Safety Foundational Program Global Food Security
Food Safety, Nutrition, and Health	Childhood Obesity Prevention Food Safety Foundational Program
Renewable Energy, Natural Resources, and Environment	Climate Change Foundational Program Sustainable Bioenergy
Agriculture Systems and Technology	Climate Change Food Safety Foundational Program Sustainable Bioenergy
Agriculture Economics and Rural Communities	Childhood Obesity Prevention Climate Change Food Safety Foundational Program Sustainable Bioenergy

USDA – NIFA Approach (Continued)

In FY 2011, AFRI solicited projects that addressed the challenges through two separate challenge area RFAs, addressing Childhood Obesity Prevention and Food Safety challenges. AFRI also supported research grants via the Foundational Program in the six AFRI priority areas to continue building a foundation of knowledge critical for solving current and future societal challenges (See Table 1).

Competitive Program Solicitation

FY 2011 was the third year that AFRI solicited competitive grant applications. Twenty-four programs solicited applications in FY 2011 addressing the areas of: Plant Health and Production and Plant Products; Animal Health and Production and Animal Products; Food Safety, Nutrition, and Health; Renewable Energy, Natural Resources, and Environment; Agriculture Systems and Technology; Agriculture Economics and Rural Communities; Food Safety; and Childhood Obesity Prevention. A total of 2,165 competitive grant applications, requesting \$1,448,050,446 were received and reviewed through a competitive peer review process (Table 2).

Peer Review Panel Characteristics

Nearly 400 experts from across the country participated in peer review panel evaluations to help select the most meritorious projects for funding. AFRI ensures the widest participation of qualified individuals in peer review by balancing the membership of panels carefully to reflect diversity in geographical region, type of institution, type of position, gender, and minority status. A breakdown of panel member characteristics is shown in Table 3. Additional expertise was brought to proposal evaluation by a number of scientists and other specialists through *ad hoc* reviews.

Table 2. The number of FY 2011 AFRI applications and total dollars requested, recommended for funding, and awarded

Applications	Number	Dollars
Requested	2,165	1,448,050,446
Recommended for Funding	1,308	933,454,938
Awarded	331	240,591,513

Table 3. Characteristics of FY 2011 AFRI peer review panelists by number and percent

Characteristic	Number	Percent
Geographic Region		
Northeast	84	22.0
North Central	96	25.1
Southern	130	34.0
Western	72	18.8
Type of Institution*		
Land Grant University		
1862 Land Grant University	215	57.8
1890 Land Grant University	36	9.7
1994 Land Grant University	3	0.8
Hispanic Serving	10	2.7
Public non-Land Grant	21	5.6
Private College/University	19	5.1
Private Research	8	2.2
Federal	48	12.9
Industry/Other	12	3.2
Type of Position		
Professor	105	27.4
Associate Professor	96	25.1
Assistant Professor	97	25.3
Federal	56	14.6
Industry	10	2.6
Other (Senior Lecturer)	19	5.0
Expertise Representation		
Researcher	241	63.9
Educator	70	18.6
Extension Educator	29	7.7
Other	37	9.8
Gender/Minority Representation		
Non-minority Male	139	36.4
Non-minority Female	105	27.5
Minority Male	85	22.3
Minority Female	53	13.9
Total Panelists	382	

*70 panelists represented the USDA Experimental Program to Stimulate Competitive Research (EPSCoR) states and 50 panelists represented small and mid-sized institutions.

Funding Portfolio

Success Rate - Awards totaling \$240,591,513 were made to the 331 highest-ranked applications. Table 4 (pages 6-7) shows the number of awards and total dollars awarded for each AFRI program area. An additional 977 proposals were recommended for funding by review panels and could have been supported, provided an additional \$693 million was available to the program (Table 2). The success rate for AFRI applications, calculated in terms of number of proposals funded excluding conferences, supplements, continuing increments of the same grant, and NIFA Fellowships divided by the number of proposals submitted for review was approximately 11 percent.

Award Types - AFRI awards are made in the form of single-function research; single-function education; single-function extension; and integrated research, education, and/or extension grants. See Table 5 for a breakdown of the total dollars and percent of support to each type. The mean award size for research projects was \$471,406 for up to 5 years, excluding Food and Agricultural Science Enhancement (FASE) Grants and Conference Grants. These excluded grant types are often shorter in duration and have lower budget limitations than do standard research awards.

Table 5. The total dollars and percent of funding for dimensions of FY 2011 AFRI awards

Award Dimension	Dollars	Percent
Fundamental Research	71,440,847	33
Mission-linked Applied Research	143,399,655	67
Multi-disciplinary	222,355,765	94
Single Discipline	14,807,518	6
Integrated Research, Education, and Extension	127,319,929	57
Single Function Research	88,536,490	40
Single Function Education	7,263,503	3
Single Function Extension	860,000	0

Integrated awards comprised 57 percent of the 2011 funding portfolio (Table 5). These projects bring together at least two of the three components of the agricultural knowledge system (e.g., research, education, and extension). Integrated projects hold the greatest potential to produce, transfer, and apply knowledge directly to end users, while providing educational opportunities to assure the development of agricultural expertise in future generations. The average award for integrated projects was \$2,044,877 for up to 5 years, excluding FASE Grants and Conference Grants. The mean includes Coordinated Agriculture Projects (CAP), which support large-scale, multi-million dollar projects to promote collaboration, open communication, and the exchange of information. CAPs greatly reduce duplication of effort and increase coordinated activities among individuals, institutions, states, and regions. CAP awards often have a longer duration but, as with many AFRI awards, are funded on a continuation basis, with awards coming as yearly increments to assure accountability and monitor ongoing success.

AFRI provided funds totaling \$389,476 in support of 18 Conference Grants. These conferences brought scientists together to identify research, education, and extension priorities; provide an update on research information; and/or advance an area of science important to U.S. agriculture, food, forestry, the environment, and rural communities.

Fundamental and Mission-Oriented Research - Thirty-three percent of AFRI awards support fundamental research to deliver basic knowledge to advance applied research and conceptual breakthroughs in fields relevant to agriculture. Mission-linked awards accounted for the remaining 67 percent to fund applied work to address specific problems, needs, or opportunities (Table 5).

Multidisciplinary Awards - Multidisciplinary awards encourage collaborations between institutions, agencies, and fields of study to solve complex problems and seek to initiate research in new areas of science and engineering that are relevant to agriculture, food, forestry, the environment, and rural communities. As shown in Table 5, 94 percent of AFRI awards made in 2011 are conducted by multidisciplinary teams.

Table 4. The number of applications, awards, and total dollars awarded for each AFRI program by area in FY 2011

Programs by Request for Application (RFA)	Applications	Number	Dollars
FOUNDATIONAL PROGRAMS RFA			
Plant Health and Production and Plant Products †			
Biology of Agricultural Plants	279	12	1,627,052
Controlling Weedy and Invasive Plants	49	7	3,000,000
Insects and Nematodes	119	11	4,010,951
Understanding Plant-Associated Microorganisms	103	6	1,947,990
Arthropod and Nematode Biology and Management: Protection of Managed Bees‡	1	1	1,000,000
Applied Plant Genomics Coordinated Agricultural Project‡	2	2	3,250,000
Animal Health and Production and Animal Products †			
Animal Breeding, Genetics, and Genomics‡	66	3	671,000
Animal Health and Disease	162	16	4,476,098
Animal Reproduction	60	7	2,665,000
Improved Nutritional Performance, Growth, and Lactation of Animals	97	1	9,906
Animal Health and Well-Being: Tools and Resources‡	1	1	13,406
Dual use of Animals for Dual Benefit	3	3	5,00,000
Food Safety, Nutrition, and Health			
Function and Efficacy of Nutrients	119	11	3,898,500
Improved Processing Technologies	84	11	4,499,700
Physical and Molecular Mechanisms of Food Contamination	48	4	1,380,406
Renewable Energy, Natural Resources, and Environment †			
Management in Agroecosystems	53	3	1,478,000
Processes and Transformation in Soil, Water, and Air	118	8	3,263,000
Thresholds in Agroecosystems	30	3	1,459,000
Agriculture Systems and Technology			
Nanotechnology for Agricultural and Food Systems	71	6	2,502,834
Engineering Products and Processes	48	5	2,417,564
Agriculture Economics and Rural Communities			
Entrepreneurship and Small Business Development	22	6	2,203,443
Environment	7	3	1,047,984
Markets and Trade	28	6	1,752,005
Rural Development	11	2	999,093
Small and Medium-Sized Farms	27	11	4,797,464
Disaster Resilience for Rural Communities	3	3	1,000,000
CHALLENGE AREA PROGRAM RFAs			
SUSTAINABLE BIOENERGY RFA			
Investing in America's Scientific Corps: Stimulating a New Era of Students and Faculty in Bioenergy	3	2	1,925,034
Sustainable Bioenergy Research §	43	44	29,268,633
Development and Sustainable Production of Regionally Appropriate Biomass Feedstocks	5	5	26,184,498
National Loblolly Pine Genome Sequencing‡	1	1	2,925,000
Sustainable Bioenergy: Plant Feedstock Genomics for Bioenergy‡	2	2	2,000,000

Table 4. Continued

Programs by Request for Application (RFA)	Applications	Number	Dollars
CLIMATE CHANGE RFA			
Regional Approaches to Climate Change	1	1	4,000,000
National Cereal Germplasm Phenotyping	1	1	5,000,000
Climate Change Mitigation and Adaptation in Agriculture	6	6	5,080,000
NASA Climate Change	10	3	909,090
FOOD SAFETY RFA †			
Addressing Critical and Emerging Food Safety Issues	84	4	4,154,026
Food Processing Technologies to Destroy Food-borne Pathogens	3	3	2,999,384
Microbial Ecology and Shiga toxin-producing Escherichia coli (STEC) Shedding in Cattle	3	3	4,373,514
National Education Programs for Food Safety	1	1	1,963,436
Prevention, Detection, and Control of Food-borne Viruses in Food: A Focus on Noroviruses	1	1	4,992,558
Prevention, Detection, and Control of Shiga toxin-producing Escherichia coli (STEC) from Pre-Harvest through Consumption in Beef Products	1	1	4,999,638
Prevention and Control of Salmonella and Campylobacter in Poultry Flocks and Poultry Products, including Eggs	33	0	0
GLOBAL FOOD SECURITY RFA			
Improved Sustainable Food Systems to Reduce Hunger and Food Insecurity Domestically and Globally	6	6	4,875,000
Oomycete Pathosystems in Crop Plants to Minimize Disease	2	2	3,705,000
Minimizing Losses from Dairy Diseases with Major Impact on Production, Marketing, and/or Trade	1	1	1,950,000
Improving Sustainability by Improving Feed Efficiency of Animals	3	3	2,925,000
CHILDHOOD OBESITY PREVENTION RFA †			
Community-based Childhood Obesity Prevention	1	1	4,945,272
Integrated Research, Education, and Extension to Prevent Childhood Obesity	115	14	51,831,002
Transdisciplinary Graduate Education and Training in Nutrition and Family Sciences or Child Development or Related Fields to Prevent Childhood Obesity	4	4	3,375,033
NIFA FELLOWSHIPS RFA			
NIFA Postdoctoral Fellowships	138	23	2,790,000
NIFA Predoctoral Fellowships	70	47	3,050,000
Grand Total	2,150*	331	235,591,514**
† Programs that accepted applications in 2011 but made awards with 2012 funds			
‡ Programs that funded continuing increments of awards from previous years			
§ Program funded an application that was submitted in a previous year			
*Some applications have been withdrawn			
**Some awards have de-obligated funds			
NOTE: Dollar amount represents only fiscal year 2011 appropriated funds.			

Broadening the Funding Portfolio - AFRI offers FASE Grants to enhance institutional capacity and attract new scientists into careers of high-priority areas of national need in agriculture, food, and environmental sciences. FASE grants provide support for postdoctoral fellowships; new investigators; and project directors at small, mid-sized, or minority-serving institutions with limited institutional success or at degree-granting institutions and state agricultural experiment stations in states in which institutions have been less successful in receiving

Table 6. The number and total dollars of FY 2011 awards awarded for each category-

Type of Award	Number	Dollars
Post Doctoral Fellowships	23	2,790,000
Predocctoral Fellowships	47	3,050,000
New Investigator Awards	6	4,166,861
Strengthening Awards		
Research Career Enhancement Awards	2	100,434
Equipment Grants	1	50,000
Seed Grants	13	1,797,937
Standard Strengthening Research Project Awards	20	19,072,326
Total	112	31,027,558

AFRI funding (these states are identified by NIFA as EPSCoR states). In FY 2011, approximately 16 percent of AFRI funds supported FASE grants. A breakdown of FASE awards is found in Table 6.

Transcending Topic Areas - AFRI makes awards that span several topics of major importance to USDA. Table 7 lists these crosscutting areas and identifies the number of awards and total amount of funding for each area.

Institution Types - AFRI engages a broad range of entities including land grant universities (1862, 1890, and 1994), public non-land grant universities, private colleges and universities, private research foundations, federal institutions, individuals, and industry. A breakdown of submitted applications, funded applications, and FY 2011 dollars awarded is provided by institution type in Table 8.

Training - Competitive grants administered by AFRI provide jobs to train the next generation workforce for agriculture. In 2011, AFRI provided funding for over 1,624 students and post-doctorates for over 1,500 years, cumulatively. Table 9 provides an overview of student and postdoctoral support provided by programs areas within AFRI.

Table 7. The number of awards and total amount of funding for crosscutting areas of major importance to AFRI and USDA in FY 2011. Some awards are listed in more than one area.

Area	Number	Dollars
Animal Genome	9	6,559,406
Animal Health	32	15,296,530
Food Safety	33	29,114,131
Forest Biology	18	30,834,119
Global Change	46	30,358,200
Integrated Pest Management	29	24,874,825
Plant Genome	18	21,659,163
Sustainable Agriculture	57	46,971,006
Water Quality	15	11,955,227

Table 8. The percent of applications submitted, applications awarded, and total funds awarded by institution type for AFRI in FY 2011.

Type of Institution	Percent of Applications Submitted	Percent of Applications Awarded	Percent of Total Dollars Awarded
Land Grant University			
1862 Land Grant University	74.97	79.46	81.24
1890 Land Grant University	2.54	1.81	2.43
1994 Land Grant University	0.28	0.30	0.61
Public non-Land Grant	6.19	4.23	5.40
Private College/University	5.91	4.83	4.29
Federal	4.71	3.32	2.49
Industry/Other*	5.40	6.04	3.54

*Includes non-federal Government, private for-profit, and other entities

Table 9. The number and length of time of undergraduate, graduate, and postdoctoral jobs provided by AFRI FY 2011 awards

Program	Number Supported	Months Supported
Foundational Programs		
Plant Health and Production and Plant Products		
Graduate Students	33	686
Post Doctoral Students	20	562
Undergraduate Students	92	897
<i>subtotal</i>	145	2,145
Animal Health and Production and Animal Products		
Graduate Students	19	639
Post Doctoral Students	14	468
Undergraduate Students	5	24
<i>subtotal</i>	38	1,131
Food Safety, Nutrition, and Health		
Graduate Students	48	496
Post Doctoral Students	6	132
Undergraduate Students	12	84
<i>subtotal</i>	66	712
Renewable Energy, Natural Resources, and Environment		
Graduate Students	21	581
Post Doctoral Students	4	98
Undergraduate Students	11	194
<i>subtotal</i>	36	873
Agriculture Systems and Technology		
Graduate Students	12	401
Post Doctoral Students	8	196
Undergraduate Students	14	312
<i>subtotal</i>	34	909
Agriculture Economics and Rural Communities		
Graduate Students	32	579
Post Doctoral Students	13	122
Undergraduate Students	14	97
<i>subtotal</i>	59	798
Challenge Areas		
Sustainable Bioenergy		
Graduate Students	130	2,389
Post Doctoral Students	59	1,356
Undergraduate Students	129	1,212
<i>subtotal</i>	318	4,957

Table 9. Continued

Program	Number Supported	Months Supported
Challenge Areas		
Climate Change		
Graduate Students	193	456
Post Doctoral Students	61	310
Undergraduate Students	75	172
<i>subtotal</i>	329	938
Food Safety		
Graduate Students	56	599
Post Doctoral Students	16	163
Undergraduate Students	29	154
<i>subtotal</i>	101	916
Global Food Security		
Graduate Students	44	426
Post Doctoral Students	16	163
Undergraduate Students	60	271
<i>subtotal</i>	120	860
Childhood Obesity Prevention		
Graduate Students	108	623
Post Doctoral Students	16	234
Undergraduate Students	36	216
<i>subtotal</i>	160	1,073
NIFA Fellowships		
Graduate Students	47	1,059
Post Doctoral Students	23	552
Undergraduate Students		
<i>subtotal</i>	70	1,611
Total	1,476	16,923
All Programs		
Graduate Students	743	8,934
Postdoctoral Students	256	4,356
Undergraduate Students	477	3,633