Minnesota Renewable Energy Roundtable

March 2018

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AGENDA

• Updates from DC

• NIFA Programs
  • Overview
  • Bioproducts, Bioenergy, and Bioeconomy Programs

• Small Business Innovation Research
Washington DC update

- Secretary Sonny Perdue: “Do Right and Feed Everyone”
- Sonny Ramaswamy leaving NIFA in May 2018
- 2018 budget: Spending caps have been agreed upon, but officially on CR through March 23
- NIFA gets its funding authority from the Farm Bill… 2018?
USDA Strategic Goals (2018-2022)

1. Ensure USDA programs are Delivered Efficiently, Effectively, and with Integrity and a Focus on Customer Service
2. Maximize the Ability of American Agricultural Producers to Prosper by Feeding and Clothing the World
3. Promote American Agricultural Products and Exports
4. Facilitate Rural Prosperity and Economic Development
5. Strengthen the Stewardship of Private Lands through Technology and Research
6. Ensure Productive and Sustainable Use of our National Forest System Lands
7. Provide all Americans access to a safe, nutritious, and secure food supply
MISSION: Invest in and advance agricultural research, education, and extension to solve societal challenges.

GOALS: Our scientific goals include catalyzing exemplary and relevant research, education, and extension programs:

• Achieve global food security and fight hunger
• Mitigate climate change impacts on agricultural, forest, and rangeland systems
• Improve and increase the production of goods and services from working lands while protecting the nation’s natural resource base and environment
• Contribute to the nation’s bioeconomy, and enhance food production systems by creating ecosystem services through sustainable production of bioenergy and biobased industrial products
• Combat childhood obesity by ensuring the availability of affordable, nutritious, and safe food and providing individuals and families science-based nutritional guidance
• Ensure the development of human capital, communities, and a diverse workforce
WE ACHIEVE THOSE GOALS through extramural funding of:

- Competitive awards: Agriculture and Food Research Initiative ($350M in FY16)
- Capacity grants: Includes land-grant institutions and state ag experiment stations
  - Smith-Lever Act, Evans-Allen Research Program, 1890 Institutions ($439M in FY16 for Land Grant Institutions)
  - Hatch Act of 1887 ($244M in FY16 for State Agricultural Experiment Stations)
- And many other competitive and capacity programs
  - Expanded Food and Nutrition Education Program ($68M in FY16)
  - Specialty Crop Research Initiative ($51M in FY16)
  - McIntire-Stennis Cooperative Forestry ($34M in FY16)

NOTE: Funding amounts shown reflect appropriated funds
NIFA Supports...

➢ **30 Competitive Federal Financial Assistance Programs:**

- Agriculture and Food Research Initiative (AFRI), [https://www.nifa.usda.gov/program/agriculture-and-food-research-initiative-afri](https://www.nifa.usda.gov/program/agriculture-and-food-research-initiative-afri)

- Specialty Crop Research Initiative (SCRI), [https://www.nifa.usda.gov/program/specialty-crop-research-initiative-scri](https://www.nifa.usda.gov/program/specialty-crop-research-initiative-scri)


- Sun Grant Program, [https://nifa.usda.gov/funding-opportunity/sun-grant-program](https://nifa.usda.gov/funding-opportunity/sun-grant-program)

MN State Liaison: Mary Purcell-Miramontes (mpurcell@nifa.usda.gov)
Agriculture and Food Research Initiative (AFRI) is NIFA’s flagship competitive grants program.

Program Areas designed to align with Farm Bill Priorities

- Plant health and production, plant products
- Animal health and production, animal products
- Food safety, nutrition, and health
- Bioenergy, natural resources, environment
- Agriculture systems and technology
- Agriculture economics and rural communities
AFRI Program: MN in 2017
https://nifa.usda.gov/afr-i-funded-projects-state

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among others…
AFRI Food and Agricultural Science Enhancement (FASE) Grants

New Investigator Grants (no set-aside)

- Strengthening Grants (11.25% of AFRI funding)
  - Eligibility:
    - EPSCoR states
    - Minority-serving institutions not among the most successful
    - Small or mid-sized institutions not among the most successful

Pre- and Postdoctoral Fellowship Grants (3.75% of AFRI funding)

- Sabbatical Grants
- Equipment Grants
- Seed Grants
- Strengthening Standard Grants
- Strengthening CAP (Coordinated Agricultural Project) Grants
- Strengthening Conference Grants

https://nifa.usda.gov/resource/afri-fase-epscor-program
Renewable Chemicals: Feedstock to Product Value Chain

Certification → Production → Harvest → Processing

Processed Oils → Meals → Fiber

Pharma → Foods & Feeds → Fuels → Manufactured Products
Renewable Chemicals: Feedstock to Product Value Chain

Funding to address individual bottlenecks…

…as well as large integrated projects

Explanatory notes of the President’s Budget
(https://nifa.usda.gov/archived-budget-information)

To achieve the transformation of U.S. agricultural systems, NIFA proposes the AFRI program to include investments in three major complementary foci: 1) Sustainable Agricultural Systems [large, integrative projects], 2) Foundational and Applied Science, and 3) Education and Workforce Development.
Renewable Chemicals: Feedstock to Product Value Chain

**AFRI Plant Health and Production and Plant Products**
- Agricultural Production Systems
- Pests and Beneficials in Agricultural Production Systems
- Physiology of Agricultural Plants
- Plant Breeding for Agricultural Production

**AFRI Agricultural Systems and Technology**
- Agricultural Engineering
- Bioprocessing and Bioengineering

**Processed Oils**

**Certification**

**Production**

**Harvest**

**Processing**

**Foods & Feeds**

**Minor Crop Pest Management Program**

**Sustainable Agriculture Research and Education (SARE)**

**AFRI Critical Agricultural Research and Extension**

**Fuels**

**USDA-NRCS Conservation Innovation Grants**

**Fiber**

**AFRI Exploratory Research Program**

**Manufactured Products**

**Crop Protection and Pest Management Extension IPM**
- Regional IPM Centers
- Applied Research and Development

**USDA Small Business Innovation Research Grants**

**USDA RD Value-Added Producer Grants**

**USDA AMS Fed-State Marketing Improvement Program**

**Biomass Research and Development Initiative**

**AFRI Critical Agricultural Research and Extension**

**AFRI Food Safety, Nutrition, and Health**

**AFRI Animal Nutrition, Growth, and Lactation**

**AFRI Sustainable Bioenergy and Bio-products**
Renewable Chemicals: Feedstock to Product Value Chain

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Processed Oils

Fuels

Fiber

Manufactured Products

USDA-NRCS Conservation Innovation Grants

AFRI Critical Agricultural Research and Extension

Certification

Production

Harvest

Processing

Minor Crop Pest Management Program

Sustainable Agriculture Research and Education (SARE)

USDA Small Business Innovation Research Grants

USDA RD Value-Added Producer Grants

AFRI Exploratory Research Program

USDA AMS Fed-State Marketing Improvement Program

Biomas Research and Development Initiative

AFRI Food Safety, Nutrition, and Health

AFRI Animal Nutrition, Growth, and Lactation

AFRI Sustainable Bioenergy and Bio-products
AFRI: Agriculture and Food Research Initiative, Sustainable Bioenergy and Bioproducts

• Foundational Program
  • Grants address bioproducts (lignin, nano-cellulosics, etc); feedstock genetics and evaluation; logistics; conversion; policy, social and environmental impacts
    ➢ Dr. Neil Nelson, UMN Duluth, $1M for hybrid poplar genetic development for yield and disease resistance for a bioenergy feedstock

• Coordinated Agricultural Projects (CAPs)
  • Large transdisciplinary awards to stimulate regional supply chains of bioenergy and bioproducts

SBIR: Small Business Innovative Research

USDA & DOE Joint solicitations

• Plant Feedstock Genomics Program
• Biorefinery Optimization
• Biomass Research and Development Initiative
Bioenergy & Bioproducts Division Portfolio

**AFRI:** Agriculture and Food Research Initiative, Sustainable Bioenergy and Bioproducts

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**SBIR:** Small Business Innovative Research

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CAP Feedstocks and Project Regions
Two NEW AFRI CAPs Join the Community

SPARC led by University of Florida
• Partnering with Agrisoma and ARA, others
• Targeting alternative jet fuel and animal feed from the oilseed crop Brassica carinata (Carinata)

SBAR led by University of Arizona
• Partnering with Bridgestone America, New Mexico State, others. Targeting natural rubber, industrial chemicals, and alternative jet fuel from the dry land crops guayule (why-oo-ley) and guar.
2011, $25M

Research Partners
Iowa State University
Purdue University
University of Illinois–Champaign
University of Minnesota–Twin Cities
University of Nebraska–Lincoln
University of Vermont–Burlington
University of Wisconsin–Madison
USDA ARS

Why Focus on Perennial Grasses?
- Yields high biomass
- Utilizes native species
- Reduces soil erosion
- Improves soil quality
- Increases carbon sequestration
- Reduces water runoff
- Increases water infiltration
- Provides wildlife habitat

UMN headed System Performance team
Jim Heilman, FAA
Hileman and Stratton (Transport Policy, 2014)

*N. Heilman, FAA

NARA, CenUSA, NewBIO, IBSS, BANR, AHB, SBAR

SUBI

SPARC

Terrestrial Oil Crops & Waste FOG

Oil extraction

Bio-processing

Sugar & Starch Crops

Lignocellulosic Biomass

Saccharification

Pyrolysis

Gasification

Natural Gas

Solid Waste

Coal

Waste Gas

Advanced thermo-processing

Bio-processing

Intermediate

Process

Resource

Product

Alternative Jet Fuel and Blending Components

Or alternative products, co-products...

*Jim Heilman, FAA

SPARC

Catalytic Hydrothermalysis

Lipids

Bio-processing

Sugars

Bio-oil

Alcohols

Syngas

F-T Synthesis

Thermo-processing

Thermo-processing

Hydro-processing

* Jim Heilman, FAA
Renewable Chemicals Efforts Across USDA Mission Areas

Farm and Foreign Agricultural Services

BCAP: Biomass Crop Assistance Program has incentivized >800 producers on >47,000 acres in 12 states to establish and produce 7 different energy crops. Commodity oilseeds don’t qualify but new oilseeds do (eg. Camelina).

Rural Development

9003: Loan guarantees for existing and pioneer biorefineries, renewable chemicals, and biobased product manufacturing

Research, Education, and Economics

Intramural research on feedstock production, logistics, conversion, and product development at many locations including the Bioproducts Research Unit in Albany, CA and the National Center for Ag Utilization Research in Peoria, Ill (including a microbial culture collection).

Among other Mission Areas: Marketing and Regulatory Programs; Food Safety; Food, Nutrition, and Consumer Services; Natural Resources and Environment
Phase I Deadline & Timeline

• FY 2018 Phase I Solicitation has been released: https://nifa.usda.gov/funding-opportunity/small-business-innovation-research-program-phase-i
• FY 2018 Phase I proposal deadline October 5, 2017
• Panels expected to meet in January & February of 2018
• Award Decisions expected to be made in March 2018
• Phase I Grant Period expected to be from June, 2018 through January, 2019

USDA SBIR programs:

• Stimulate innovations in the private sector
• Strengthen the role of small businesses in meeting federal research and development needs
• Increase the commercialization of innovations derived from SBIR-supported private sector research and development efforts
• Foster participation by women-owned and socially and economically disadvantaged small businesses
SBIR Topic Areas and Contacts

Dr. Charles Cleland
Forests and Related Resources

Dr. Robert Nowierski
Plant Production and Protection – Biology

Dr. Rachel Melnick
Plant Production and Protection - Engineering

Dr. Robert Smith
Animal Production and Protection

Dr. Karelyn Cruz
Air, Water and Soils

Scott Dockum
Program Coordinator, SBIR

Dr. Jodi Williams
Food Science and Nutrition

Dr. Brent Elrod
Rural and Community Development

Dr. Gene Kim
Aquaculture

Dr. Toby Ahrens
Biofuels and Biobased Products

Dr. Denis Ebodaghe
Small and Mid-Size Farms

Elden Hawkes
Program Specialist, SBIR
USDA SBIR Topic Area 8.8: Biobased Products & Biofuels

- In general, a very broad category that covers process improvements or new product development for biobased products
  
  - New non-food biobased products from new industrial crops
  
  - New process for the manufacture of biobased industrial products, chemicals or biofuels
  
- Except:
  
  - Aquaculture including photosynthetic algae (apply to 8.7)
  - Woody biomass production or logistics (apply to 8.1)
  - Engineering aspects of plant production & logistics (apply to 8.13)
  - Genetic engineering of plants (apply to 8.2)

➢ If you are unsure about where it fits, ask us! All of the Topic Area leads communicate constantly...
Examples of Recent SBIR Awardees in Minnesota

RURAL AND COMMUNITY DEVELOPMENT (Topic Area 8.6)

**DETECTING DISTRESS EVENTS OF ISOLATED ELDERLY LIVING IN REMOTE RURAL REGIONS** (2016, Phase I)
- MOAI Technologies (Plymouth, MN)

**HOME TELEMEDICINE SYSTEM FOR RURAL TECHNOLOGY DEPENDENT CHILDREN** (2017, Phase II)
- Advanced Medical Electronics Corporation (Maple Grove, MN)

PLANT PRODUCTION AND PROTECTION – ENGINEERING (Topic Area 8.13)

**WILDFIRE MOBILE EMERGENCY PERIMETER SYSTEM** (2017, Phase I)
- Architecture Technology Corporation (Eden Prairie, MN)

AQUACULTURE (Topic Area 8.7):  
**FISHMEAL ALTERNATIVE FROM RENEWABLE FEEDSTOCK** (2017, Phase I)
- Sasya (Plymouth, MN)

FOOD SCIENCE AND NUTRITION (Topic area 8.5)

**HIGH THROUGHPUT SALMONELLA DETECTOR** (2016, Phase II)
- NVE Corporation (Eden Prairie, MN)
Final Thoughts (1/2)

Shift to bioenergy AND bioproducts or bioproducts alone...

- Energy security argument has changed

- Environmental benefits should be spelled out
  - Don’t assume that just because it is bio-based that it is inherently good.

- Economic arguments also need to be well-articulated
  - Price or performance benefit
  - Potential addressable market share
  - Understanding place in the value/supply chain
  - Technoeconomics including final product specifications after separations/purification, etc
Final Thoughts (2/2)

Foundational research will continue to be balanced with interdisciplinary efforts and partnerships

• Industrial partners and public-private partnerships: market relevance!

• A majority of students in scientific fields will not go on to careers in academia – include training that will help them in the private sector

  • Soft skills (communication, teamwork, creativity, etc)

  • Entrepreneurship, joint efforts with business schools, etc
Please engage with us any time!

Toby Ahrens
National Program Leader, Agricultural Bioproducts
toby.ahrens@nifa.usda.gov
Thank you!

• NIFA is the extramural funding arm of USDA and makes a big effort to coordinate investments with other USDA mission areas and other agencies

• Regional supply chains a top priority to support a vibrant, robust bioeconomy. Education and Extension are critical links.

• Renewable chemicals are expected to play a role in the bioeconomy, but research needs remain before major inroads in commodity markets.
  • Developments in co-products, ecosystem service valuation, germplasm improvement, and agronomic practices can build on demonstrated supply chains

• Soft skills are also critical!
Education and Training

• Multicultural Scholars
• National Needs Graduate Fellowships
• Higher Education Challenge (HEC)
  • Curriculum development, instructional delivery systems and expanding student career opportunities
  • Faculty preparation and enhancement for teaching
  • Facilitating interaction with other academic institutions

• AFRI Education and Literacy Initiative (ELI)
Education and Literacy Initiative (ELI)

- Professional development opportunities for K-14 teachers and education professionals total $150,000 for 3 years
- Training of undergraduate students in research and extension (total $300,000 for 4 years)
- Fellowships for predoctoral candidates (total $95,000 for 2 years) and postdoctoral scholars (total $165,000 for 2 years)
- Approximately $18M
2014 Farm Bill changes to NIFA Programs

• Matching Requirement Provision
  https://nifa.usda.gov/resource/new-matching-requirements-competitive-grant-awards

• Centers of Excellence Provision
  https://nifa.usda.gov/centers-excellence

• Commodity Boards Provision
  https://nifa.usda.gov/commodity-boards

2018 Farm Bill & Legislative Principles: