

2015-2021

A Review of Organic Agriculture Research and Extension Initiative (OREI) and Organic Transitions (ORG) Programs



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Photo: James Kotcon

AUTHORS: THELMA VÉLEZ, HEATHER ESTRADA, MARK SCHONBECK, GORDON MERRICK
DESIGN: ASHLEY DULANEY, BRIAN GEIER

NIFA Disclaimers

Project Funding Source

This report is a component of a project funded through a three-year **cooperative agreement** between USDA's National Institute of Food and Agriculture (NIFA) and the Organic Farming Research Foundation (OFRF). This agreement was initiated by NIFA and did not use any program funds from the Organic Agriculture Research and Extension Initiative (OREI) or Organic Transitions (ORG) appropriations. Instead, NIFA used internal administrative funds to cover all project activities. As a cooperative agreement, rather than a standard competitive grant, the parties worked collaboratively to accomplish project goals. However, the authors acted independently in developing findings, conclusions and drafting the report.

Data Source and Type

NIFA provided OREI and ORG award data to OFRF. The data set included the following information: proposal number, fiscal year submitted, title, Project Director (PD) name, PD institution, and state. The public can access that data and more through NIFA Enterprise Search Fastlinks for [OREI](#) and [ORG](#).

NIFA provided OFRF with information on unsuccessful proposal submissions (those reviewed by the panel) for the period of review, including proposal number, fiscal year submitted, and name of organization. Due to confidentiality requirements, identifying information on unsuccessful proposal submissions was not shared with OFRF. Additionally, demographic information of PDs, successful or unsuccessful, was not shared with OFRF.

Award mechanisms for OREI and ORG grants

All awards are made on a competitive basis using a merit system. This process is required by law: Agricultural Research, Extension, and Education Reform Act of 1998 ([7 U.S.C. 7613\(c\)\(2\)](#)). All proposals received go through an initial administrative screening to ensure compliance with the requirements set in the Request for Applications (RFA). Applications in compliance are then subjected to a peer review panel of experts. Proposal evaluation criteria for both OREI and ORG are specified in the published RFAs. Only the top projects are recommended for funding. Therefore, lack of funding or low level of funding in a specific area or discipline may be a result of multiple factors independent of NIFA efforts. These limitations include but are not limited to: (i) no or few applications submitted by under-represented entities or focusing on under-represented areas or (ii) submitted projects are not placed by the peer-review panel among the top projects recommended for funding.

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LIST OF ABBREVIATIONS

Abbreviation	Definition
FACT	Food, Agriculture, Conservation, and Trade
FY	Fiscal Year
HSI	Hispanic-serving Institution
IPM	Integrated Pest Management
LGU	Land-grant University
NAREEEAB	National Agricultural Research, Extension, Education, and Economics Advisory Board
NASS	National Agricultural Statistics Service
NIFA	National Institute of Food and Agriculture
NLG	Non-land grant
NOP	National Organic Program
NORA	National Organic Research Agenda
NOSB	National Organic Standards Board
OFRF	Organic Farming Research Foundation
OREI	Organic Agriculture Research and Extension Initiative
ORG	Organic Transitions
OSA	Organic Seed Alliance
PD	Project Director
RFA	Request for Applications
SARE	Sustainable Agriculture Research and Education
USDA	United States Department of Agriculture

EXECUTIVE SUMMARY

USDA's National Institute of Food and Agriculture (NIFA) has made substantial investments through its Organic Programs, the Organic Agriculture Research and Extension Initiative (OREI) and Organic Transitions (ORG) programs. OREI and ORG serve distinct but complementary roles within NIFA's portfolio and represent key efforts to address the evolving needs of organic and transitioning farmers by advancing scientific research that drives resilience, innovation, and long-term sustainability in the U.S. organic sector.

This report, commissioned by NIFA and conducted by the Organic Farming Research Foundation, evaluates the impacts of the OREI and ORG programs over a seven-year period, FY 2015-2021. The evaluation includes analysis on awards by institution type, priority area, commodity focus, and alignment with farmer-identified challenges. The findings of this report reveal that OREI projects addressed USDA legislative priorities through advances in soil health, pest management, and crop breeding, emphasizing practical, scalable solutions that contribute to ecosystem stability and production resilience, and ORG-funded projects made significant strides in supporting ecological services and site-specific solutions for transitioning farms.

During the review period, OREI and ORG received 825 proposal submissions and awarded 197 grants, demonstrating a high level of competition with an average success rate of 24 percent. Over half of OREI submissions made during the review period went to Integrated projects (research plus at least one other component: education or Extension), demonstrating a high interest from the organic community in securing funding for impactful projects. Institutional data reveal that 1862 Land-grant Universities have been the predominant sources of submissions and awards in both OREI and ORG.

Most OREI research addressed multiple USDA and legislative priority areas, highlighting the complex and systems-based focus of organic research. High-impact areas include advanced on-farm research (65 percent of OREI projects), organic integrated weed, insect pest, and disease management (34 percent), and plant breeding and organic seed production (31 percent). While still impactful, research on improving post-harvest handling and processing, as well as marketing, policy, and socioeconomic barriers represented 10 percent and 9 percent of projects, respectively.

Similarly, a review of ORG research indicates many of the projects addressed overlapping priorities with a significant focus on organic practices addressing soil health, soil fertility, and enhanced biodiversity (75 percent of ORG projects), as well as research to reduce the barriers to organic transition (64 percent). Over the review period, 85 percent of OREI and ORG projects focused on at least one crop commodity, with both programs investing significantly in research to improve organic vegetables (32 percent of all projects), field crops (32 percent), and livestock commodities (25 percent).

Overall, NIFA's Organic Programs have generated impactful scientific research critical for addressing the complex challenges in organic farming systems while supporting economic growth in the sector.

CHAPTER 1. INTRODUCTION

The Organic Farming Research Foundation (OFRF) entered into a cooperative agreement in 2022 with the National Institute of Food and Agriculture (NIFA), part of the United States Department of Agriculture (USDA), to conduct a program evaluation of two competitive federal grant programs: Organic Agriculture Research and Extension Initiative (OREI) and Organic Transitions (ORG). The evaluation focused on OREI and ORG programmatic activity between 2015 and 2021. This report is the final product of that evaluation and provides an analysis of both programs.

1.1. OREI AND ORG OVERVIEW

The Organic Agriculture Research and Extension Initiative (OREI) and Organic Transitions (ORG) represent cornerstone competitive grant programs administered by NIFA. Both the OREI and ORG grant programs are charged with funding projects that investigate organic agriculture research, Extension, and education topics. The two programs, collectively referred to in this report as Organic Programs, underscore USDA NIFA's commitment to research and innovation in the organic sector, and serve as complementary opportunities for supporting research that addresses critical challenges in the organic farming industry.

The Food, Agriculture, Conservation, and Trade (FACT) Act of 1990 (7 U.S.C. 5925b) as amended, authorized the Secretary of Agriculture, in consultation with the National Agricultural Research, Extension, Education, and Economics Advisory Board (NAREEEAB), to make competitive grants to support research, education, and Extension activities regarding organically grown and processed agricultural commodities. The OREI grant program, and initial mandatory funding, was established in the Farm Security and Rural Investment Act of 2002 (2002 Farm Bill), representing a significant step in recognizing organic agriculture as an agricultural system and economic driver worthy of scientific investigation and support. The program is an important component of advancing organic research and therefore, of primary importance for the organic sector. OREI has eight legislatively defined objectives and annual priorities which are further refined within the Request for Applications (RFA).

The ORG was established as part of the Integrated Research, Education, and Extension Competitive Grants Program authorized under Section 406 of the Agricultural Research, Extension, and Education Reform Act of 1998 (7 U.S.C. 7626). This act enables the Secretary of Agriculture to establish a competitive grants program that provides funding for integrated, multifunctional agricultural research, Extension, and education activities. Since 2002, ORG funding has supported the development of tools and tactics for farmers and processors wanting to transition from conventional farming practices to organic farming practices. Funded projects address various issues faced by growers and processors who are adopting organic practices, including mitigating ecological and

economic risks of transitioning from conventional to organic production. Funding priorities for ORG grants are set forth in its annual RFA.

1.2. PROGRAM FOCUS, ELIGIBILITY, AND PROJECT TYPES

The OREI program aims to fund high priority research, education, and Extension projects that will enhance the ability of organic producers and processors to grow and market their products. Projects funded through OREI focus on building general knowledge of organic production, economic and ecological benefits of organic production, developing new cultivars for organic production, and whole-farm systems studies. The ORG program is geared toward supporting research into scientifically based management practices that help producers transitioning to organic production. Projects funded through ORG focus on assessing and providing solutions to barriers that producers face in transitioning into organic production, as well as documenting ecosystem services associated with that transition.

While both the OREI and ORG programs accept applications from entities across the United States, eligibility differs as defined by their authorizing legislation. The OREI program allows proposal submissions from most U.S. entities, including state agricultural experiment stations; colleges and universities; university research foundations; other research institutions and organizations; federal agencies; national laboratories; nonprofit organizations; private organizations, foundations; corporations; and individuals who are United States citizens or nationals. The ORG program only funds applications from universities and colleges. During recent years, funding allocations for OREI and ORG have seen substantial growth, reflecting increased national investment in organic agriculture. OREI funding (enacted budget) increased from \$20 million in Fiscal Year (FY) 2015 to \$25 million in FY 2021. Similarly, ORG's funding (enacted budget) increased from \$4 million in 2015 to \$7 million in 2021, reinforcing the program's pivotal role in facilitating transition to organic farming practices.

The programs differ with respect to the project types, as well as the funding amounts for the different project types (Table 1.1). OREI accepts four project types: conference projects, planning projects, curriculum development projects, and three tiers of integrated projects (Tier 1: multi-regional, Tier 2: regional, Tier 3: targeted), accommodating projects of varying scope and impact. In 2021, OREI funding limits for the different project types ranged from \$50,000 for conferences and planning awards to \$3M for integrated Tier 1 projects. ORG funds integrated projects only, including substantive research and Extension and/or education, with grants up to \$600,000 in 2021. Both programs have the flexibility to consider single-function projects—either research-only or Extension-only—provided they align with programmatic goals and demonstrate clear justification for their approach.

Table 1.1. OREI and ORG project types, periods, and maximum award amounts in 2021.*

OREI Project Types	Project Periods	Grant Types	Max. Award Amount
Planning Proposal	1 year	Planning	\$50,000
Conference Proposal	1 year	Conference	\$50,000
Curriculum Development Proposal	3-4 years	Standard	\$750,000
Integrated Project Proposals - Tier 3	3-4 years	Standard	\$750,000
Integrated Project Proposals - Tier 2	3-4 years	Standard	\$1,500,000
Integrated Project Proposals - Tier 1	3-4 years	Standard	\$3,000,000
ORG Project Types	Project Periods	Grant Types	Max. Award Amount
Integrated Project Proposal	1-4 years	Standard	\$600,000

*The table shows 2021 award maximums and does not capture increases in maximum award amounts between 2015-2021. In 2015 OREI Integrated Tier 1 maximum was \$2M, Tier 2 maximum was \$1M, and both Tier 3 and Curriculum Development maximum was \$500,000. ORG funding increased from \$500,000 in 2015 to \$600,000 in 2021.

1.3. METHODOLOGY

In the data collection phase of this project, OFRF downloaded all publicly available data for OREI and ORG projects from FY 2015 through FY 2021 (a seven-year period), accessible through the USDA NIFA Data Gateway enterprise search tool at: <https://nifa.usda.gov/data>. Data accessed through this search tool included project abstracts, nontechnical summaries, objectives, any interim or final progress reports, as well as data shared by Project Directors (PD) on impact, outreach and publications. All downloaded data was stored securely by OFRF.

The following information was extracted:

- Project and accession number
- Fiscal year

- Program code
- Project Director
- Funded entity
- Project Type
- Amount of award
- Abstract

NIFA provided OFRF with additional data on OREI and ORG proposal submissions for the period of review. The submission data included proposal numbers, fiscal year submitted, and name of entity, and state. Demographic information of project directors, whether successful or unsuccessful, was not shared with OFRF.

The OFRF team reviewed all available project data for 197 organic research projects, including all project reports, to categorize projects and identify:

- Success rate by project type and institution type (see section 2.5)
- Geographic distribution of awards
- Project partners and entities funded
- State, region, and national focus of each project
- RFA and Legislative priorities addressed in each project
- Commodities included in research projects
- Organic research priorities addressed by projects

Once sorted, the data was reviewed by a minimum of two staff to ensure accuracy and to remove duplicates due to continuations or no-cost extensions. Data were coded specifically for regional focus, commodity focus, and RFA, Legislative, and research priorities. Coding category detail is provided within respective sections of this report.

There are certain limitations to the findings of this evaluation. First, the data in sections 2.4 and 2.5 of this report are evaluated primarily by lead institutions, which may not capture the full impact of projects with partner institutions. However, the report does include data for projects with formal partner institutions categorized as historically underrepresented. Additionally, full OREI and ORG proposal submissions for the project period were not shared with the OFRF team for confidentiality reasons. Submission proposal data could have enhanced the evaluation by providing a more detailed understanding of how well submissions and awards aligned with the priority and commodity areas in chapters 3 and chapter 4.

CHAPTER 2. OREI AND ORG SUBMISSIONS AND AWARDS

2.1. PROPOSAL REVIEW AND AWARD DECISIONS

All proposals submitted to both Organic Programs undergo a merit-based review. Applications are screened internally to ensure eligibility of applicants and compliance with the program requirements. Applications deemed in compliance are then organized to undergo a merit-based peer-review process. The review process is organized jointly by NIFA Program Leaders and staff, as well as an experienced panel manager external to NIFA. All reviews are conducted independently by a panel of experts that is organized by the panel manager. Proposal evaluation criteria for both OREI and ORG, which are specified in the RFAs, are key areas discussed by the review panels, with each proposal receiving equal opportunity for review by a minimum of three panelists who score the proposals based on merit. Proposals are reviewed within their respective category or project type, ensuring a fair evaluation of projects. Proposals are ranked by the review panel with those with the greatest scientific merit and highest probability of achieving project objectives placed highest in the ranking order. NIFA staff use the ranking order to develop funding recommendations.

2.2. OVERALL SUBMISSIONS, AWARDS AND FUNDING, FY 2015-2021

A total of 825 proposals were submitted to the OREI and ORG competitive grants programs, with 583 submissions to OREI and 242 to ORG. Over this review period, the OREI program supported 130 grants, amounting to nearly \$131 million, while the ORG program supported 67 grants, totaling just under \$33 million (Table 2.1). OREI typically funded between 15 and 22 projects annually, compared to ORG's support of 7 to 12 projects per year. Variations in the number of awards reflect the differing funding limits of each program. Detailed annual project data for OREI and ORG awards can be found in Appendix A, Table A1 and Table A2. Overall, the success rate of organic program submissions averaged 24 percent, ranging from 17-30 percent across FY 2015-2021 (Figure 2.1).

Table 2.1. Total numbers of OREI and ORG funded projects and funding distributed during FY 2015-2021.

Program	Number of Funded Projects
OREI	130
ORG	67

Program	Funding Distributed
OREI	\$130,819,241
ORG	\$32,694,733

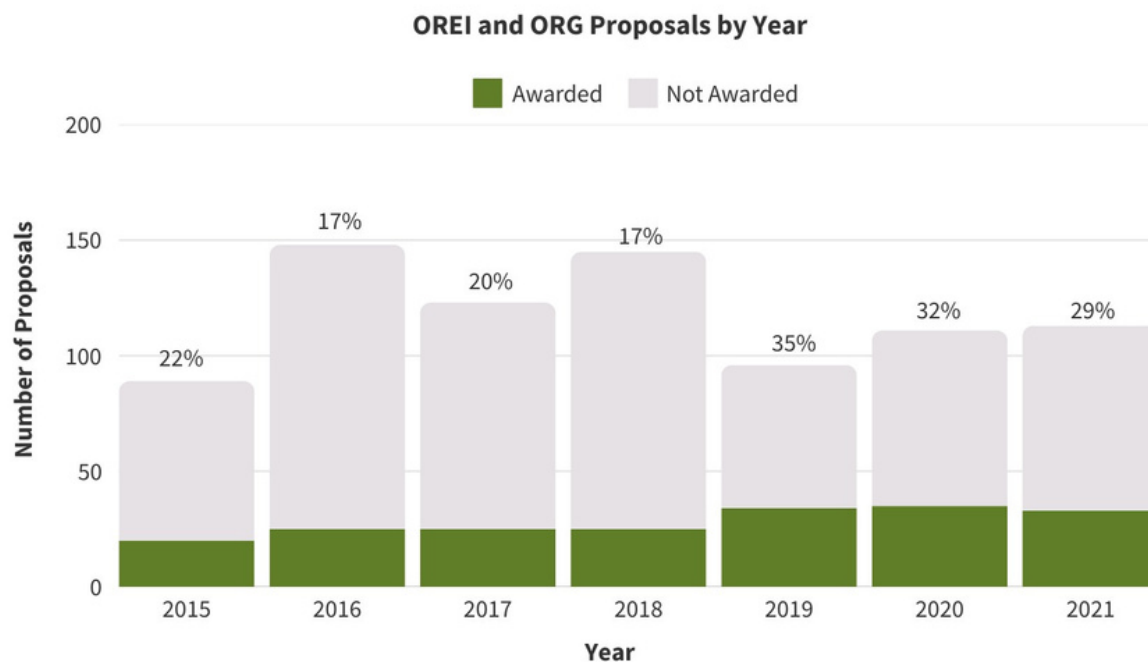


Figure 2.1. Total submissions to, and awards through, OREI and ORG programs from FY 2015-2021. Percent success rate for funding is provided above each column.

2.3. SUBMISSIONS AND AWARDS BY PROJECT TYPE

Since OREI accepts submissions for various project types, this section includes the distribution of funding across the various OREI project categories. ORG is not included in this analysis as the program is limited to one project type, integrated. Between FY 2015 and 2021, the most

submissions to the OREI program came from projects in the integrated categories, which averaged 158 submissions for Tier 1, Tier 2, and Tier 3 projects (Table 2.2). While fewer than one-tenth of submissions went to the planning and conference project categories, these had the greatest success rate of all project types. This is promising given that planning grants are considered a tool for leveraging success in future proposal submissions. Based on a review of project director names and project titles, 13 of 24 planning grants funded from 2015-2021 led to successful OREI or ORG project proposals during that same period. This count may be incomplete given that awards made after 2021 are not included in this evaluation, and project titles may change substantially from the planning stage to full proposal stage.

Curriculum development proposals made up just 2 percent of total submissions. This may reflect a greater interest in securing integrated project funding (with larger award amounts) and the opportunity to embed curriculum development within those projects. While integrated projects attract the most proposal submissions, there are differences in success rates, with Tier 3 submissions reflecting a lower success rate than Tier 1 projects.

Table 2.2. Total number of OREI submissions, awards, and success rate by project type, FY 2015-2021.

OREI Project Types	Submissions	Awards	Success Rate
Planning	58	24	41%
Conference	40	17	43%
Curriculum Development	12	2	17%
Integrated - Tier 3	142	12	9%
Integrated - Tier 2	174	30	17%
Integrated - Tier 1	157	45	29%

2.4. STATE BREAKDOWN

The data indicate that submissions and awards within the NIFA Organic Programs are generally concentrated in states representing the biggest sales in organic products, often referred to as organic hotspots (Figure A1 in Appendix A). The top 10 states for organic sales, from highest to lowest, include: California, Washington, Pennsylvania, Texas, Oregon, New York, Wisconsin, North Carolina, Michigan, and Colorado ([NASS 2022](#)).

The most proposal submissions came from institutions in Texas (55), California (51), Washington (47), New York (39), and Pennsylvania (35) (Figure 2.2). In contrast, Alaska and Rhode Island each had only one submission during the review period, while Nevada and Delaware did not submit any OREI or ORG proposals. The majority of awards went to institutions in New York (15), Pennsylvania (12), Oregon (11), Minnesota (11), and Washington (10) (Figure 2.3). The strongest proposals from the top 10 organic-producing states (in terms of sales) came from entities in New York, Pennsylvania, Oregon, and Washington (NASS 2022). Despite California and Texas representing a significant portion of the organic market share and submitting the most proposals, neither state was in the top 10 for OREI and ORG funding (Figure A2 in Appendix A).

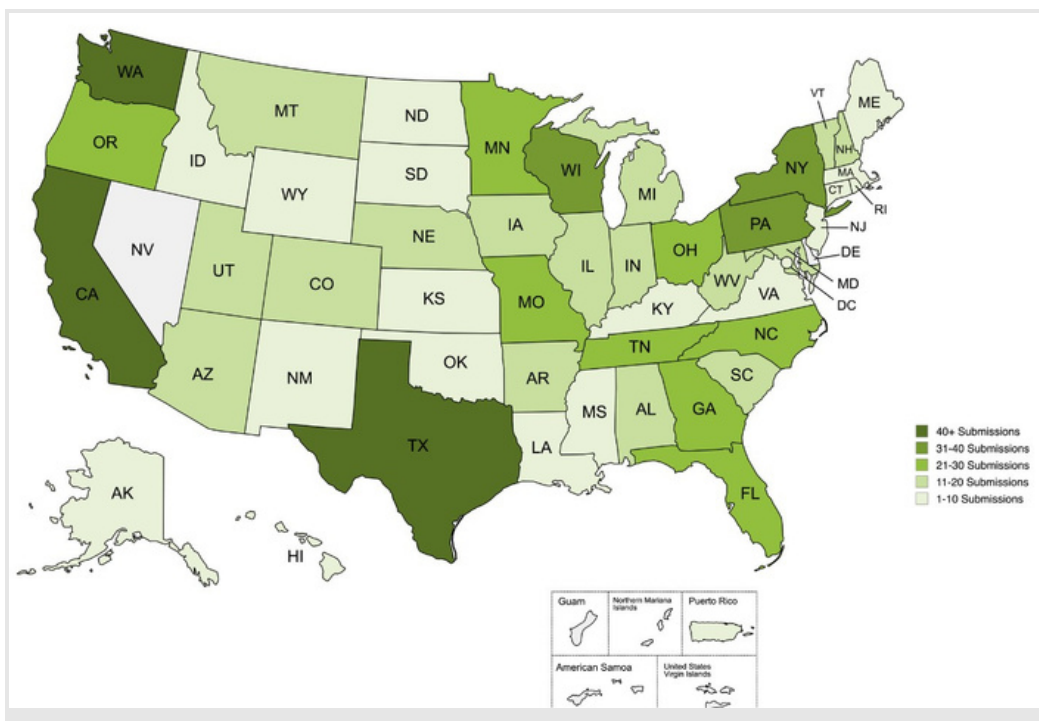


Figure 2.2. Map of OREI and ORG proposal submissions by state.*

*Submissions for this map are categorized by the state where the lead institution is located.

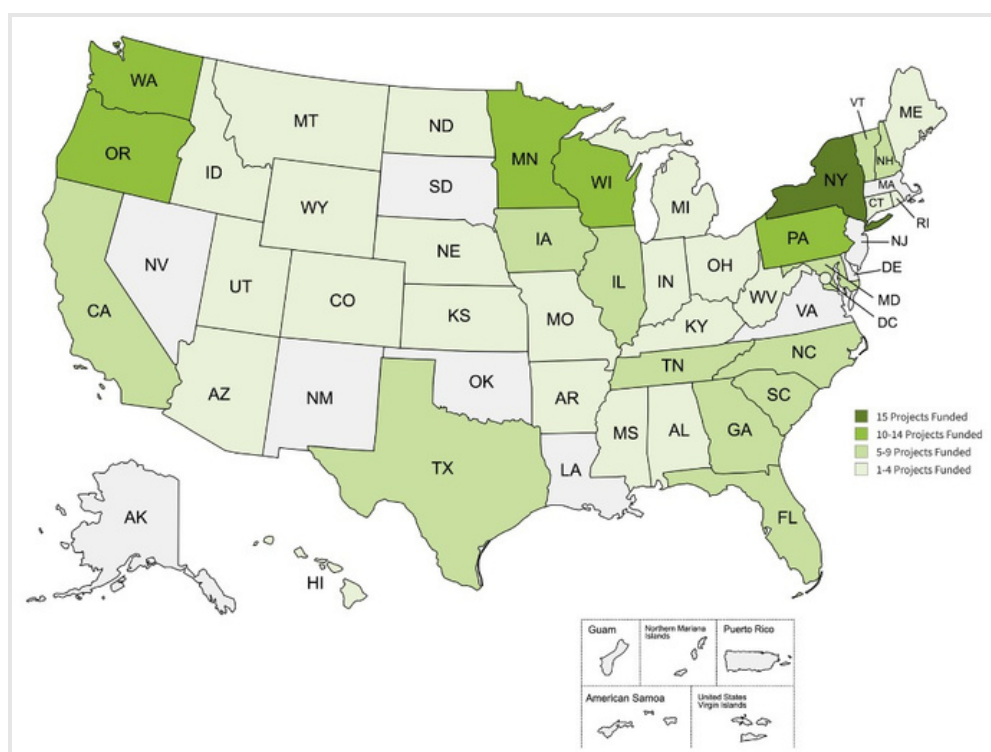


Figure 2.3. Map showing distribution of OREI and ORG awards by state.*

*Awards for this map are categorized by the state where the lead institution is located and is not indicative of funding allocation/distribution.

2.5. INSTITUTION TYPE

In the annual RFA, both OREI and ORG encourage applicants to form partnerships with small- or mid-sized accredited colleges and universities, 1890 Land-grant Universities (LGU), 1994 Land-grant Institutions, Hispanic-serving Institutions, and/or other institutions serving high-risk, underserved, or hard-to-reach audiences. For this analysis, the focus was primarily on institution types within the LGU system, given the challenge of identifying substantial or meaningful collaborations with institutions serving high-risk, underserved, or hard-to-reach audiences beyond 1890 LGUs and 1994 LGUs (refer to Figure A3 in Appendix A for a map of the LGU system). Additionally, it is difficult to distinguish collaborations between 1862 LGUs and Hispanic-serving Institutions (HSI), recognizing that some institutions qualify as both.

Applications received during the review period were categorized by lead institution type. The institution type categories for this review include 1862 LGU, 1890 LGU, 1994 LGU, non-land grant public institutions (NLG), private college and universities, agencies, nonprofit organizations, and for-profit organizations. The highest number of OREI submissions came from 1862 LGUs, followed by Non-Profits, Agencies, and then 1890 LGUs and non-land grant (NLG) institutions (Table 2.3). In general, the success rate for OREI proposals was higher for submissions coming from agencies and 1862 LGUs when compared with those originating from 1890 LGUs. It is important to note the data below take into account lead institutions, and not partnerships. From 2015-2021 there were nine OREI projects and three ORG projects that included partners from 1890 LGU institutions. While submissions from nonprofit organizations showed relative success, both NLG institutions and for-profit companies had a zero percent success rate. Again, projects that include NLG as partners are not captured here. Most ORG submissions came from 1862 LGUs, with the remainder mainly coming from NLG institutions, 1890 LGUs, and private universities or colleges (Table 2.4). There were no submissions from 1994 LGUs across the seven-year review period, and none of the projects included partners from 1994 LGUs. Only universities and colleges are eligible to submit applications to ORG.

Table 2.3. OREI submissions, number of awards, submission success rate, and funding amounts by lead institution from FY 2015-2021.*

OREI*	1862 LGU	1890 LGU	1994 LGU	NLG	Private University	Agency	Non Profit	For-Profit
Submissions	421	25	0	13	8	27	61	20
Percent of Total	72%	4%	-	2%	1%	5%	10%	3%
Awards	103	3	-	0	1	10	13	0
Success Rate	24%	12%	-	0%	13%	37%	21%	0%

* Not shown in this data are seven unfunded submissions from individuals and one unfunded submission from a city. LGU is Land-grant Universities; NLG is nonland grant public institutions (NLG).

Table 2.4. ORG submissions, number of awards, submission success rate, and funding amounts by lead institution from FY 2015 to 2021.*

ORG	1862 LGU	1890 LGU	1994LGU	NLG	Private University
Submissions	216	7	0	16	2
Percent of Total	89%	3%	-	7%	1%
Awards	64	1	-	2	0
Success Rate	30%	14%	-	13%	0%

*One ineligible submission from an agency is not show above. LGU is Land-grant Universities; NLG is non-land grant public institutions (NLG).

CHAPTER 3: OREI AND ORG PRIORITIES

In this section of the report, the projects funded through both the OREI and ORG program are evaluated based on the research priorities outlined by NIFA in the annual RFA, as well as the priorities set forth in OREI's authorizing legislation. This assessment focuses on the extent to which projects align with the RFA priorities and legislative priorities for OREI, followed by an assessment of ORG projects and their alignment with the RFA priorities.

3.1. OREI RFA PRIORITIES

To assess the extent to which RFA priorities were addressed by OREI projects, OFRF reviewed and coded projects by the priority topics addressed. The OREI FY 2021 RFA priorities are listed below, followed by the short-hand code assigned to each priority topic in bold. While not discussed in-depth, the RFA priorities may be modified from year to year in response to emerging producer needs, research developments, and input received through public comment. The overarching themes of the first eight OREI priorities remained consistent from FY 2015 through to FY 2021. The ninth priority on policy, marketing, and socio-economic constraints, was added in FY 2018.

1. Conduct advanced on-farm crop, livestock, or integrated livestock-crop research and development that emphasize observation of, experimentation with, and innovation for organic farms, including production, marketing, and socioeconomic considerations. These issues could include both identification of factors reducing yields, efficiency, productivity, and economic returns on organic farms and the economic and socio-economic contributions of organic farming to producers, processors and local communities. This priority includes studies that help producers monitor and improve soil health and fertility as well as studies focusing on soil, plant and/or livestock associated microbiome with practical applications to organic production systems. The development of tools and testing methodologies that can help protect organic integrity is encouraged under this priority.

Coded **1A. Advanced On-Farm R&D; 1B. Planning; 1C. Conference**

2. Develop and demonstrate educational tools for Cooperative Extension personnel and other professionals who advise producers on organic practices. Applications bringing end-users together with OREI-funded research, education, and Extension teams are encouraged. Coordination of the development of online content with eXtension and the eOrganic Community of Practice is encouraged but is not a requirement for a successful application.

Coded **2. Educational Tools**

3. For both plant and animal-based organic products: evaluate, develop, and improve allowable post-harvest handling, processing, and food safety practices to reduce

toxins and microbial contamination, while increasing shelf-life, quality, and other economically important characteristics.

Coded 3. Post-Harvest Improvement

4. Strengthen organic crop propagation systems, including seed and transplant production and protection, and plant breeding for organic production conditions, with an emphasis on publicly available releases. Goals of organic breeding and propagation systems proposals can include, but are not limited to: disease, weed, and pest resistance; stress tolerance including resilience to drought, flood, and disrupted seasonal patterns resulting from climate change; nutrient use efficiency; performance in soil-improving and climate-friendly systems such as organic no-till; quality and yield improvement; and genetic mechanisms to prevent inadvertent introduction of GMO traits through cross-pollination. This priority includes cover crop breeding for enhanced performance in organic systems. Projects dealing solely with cultivar evaluation do not fit under this priority.

Coded 4. Seed Systems

5. Explore technologies that meet the requirements of the National Organic Program (NOP) and protect soil, water, and other natural resources. This includes developing, improving, and evaluating systems-based integrated management programs to address diseases, nematodes, weeds and insect pests-related problems for organically grown crops. Systems-based evaluations can include the safety and efficacy of allowable pest management materials and practices. Proposals addressing organic management of diseases, nematodes, weeds, and insect pests in the Southern Region are especially encouraged. Where possible, the projects should engage emerging technologies such as automation, remote sensing, artificial intelligence, and digital scouting to enhance plant protection and weed control as well as improve productivity.

Coded 5. Organic IPM

6. Develop or improve systems-based animal production, animal health, and pest management practices to improve animal productivity, health, and welfare while retaining or enhancing economic viability, including, but not limited to grazing and pasture-based systems (including rotational grazing), integrated livestock-crop systems, and the National Organic Standards Board (NOSB) confinement standards. Capitalize on emerging opportunities such as automation, artificial intelligence, deep learning, and precision management in animal production, welfare and health; managing risk as appropriate, to continue to advance animal research programs and sustain effective technology transfer.

Coded 6. Animal Systems

7. Breed, evaluate, and select animal breeds and genotypes adapted to organic systems. This would include but is not restricted to: identification of and selection for pest,

parasite, and disease resistance; health and performance under organic pasture and feed regimens (especially soil-enhancing and climate friendly systems such as management of intensive rotational grazing and multispecies grazing); resilience to heat, fluctuating forage quality, and other stresses related to climate change; and performance in small, mixed, or other innovative farming operations.

Coded **7. Animal Breeding**

8. Develop undergraduate and/or graduate curriculum for organic agriculture. Education activities under this priority may include instructional delivery programs and experiential learning including student-farmer engagement for students enrolled in associate, baccalaureate, masters, and Ph.D. degree Programs.

Coded **8. Curriculum Development**

9. Identify marketing, policy, and other socioeconomic barriers to the expansion of organic agriculture in the United States and develop strategies to address them. Lobbying and advocacy activities are not appropriate under this priority.

Coded **9. Marketing, Policy, Barriers**

Most OREI projects addressed multiple priority areas, highlighting the complex and systems-based focus of OREI-funded projects. Table 3.1 shows the distribution of OREI awards that have addressed the RFA priorities. **Advanced on-farm** research was the priority most addressed by OREI projects, including projects that: A) conducted research **on farms** and at agricultural experiment stations, B) **planning projects** focused on future advanced on-farm research, and C) **conferences** that facilitated discussion and sharing of outcomes of advanced on-farm research.

Table 3.1. shows the total number and percent of OREI projects during FY 2015-2021 addressing each priority area listed in the request for applications (RFA).

OREI RFA Priorities	Number of Projects Addressing Priority	Percent of Total Projects (out of 130) ^{*,**}
1A. Advanced On-Farm R&D	83	64%
1B. Planning	18	14%
1C. Conference	11	8%
2. Educational Tools	33	25%
3. Post Harvest	13	10%
4. Seed Systems	40	31%
5. Organic IPM	46	35%
6. Animal Systems	29	22%
7. Animal Breeding	3	2%
8. Curriculum	14	11%
9. Marketing/ Policy	12	9%

* Percents rounded to the nearest whole number.

** Percentages will not total to 100 as many projects address multiple priority areas.

Considerable attention was given to research into organic integrated weed, insect pest, and disease management (**Organic IPM**) and plant breeding and organic seed production (**Seeds Systems**). Approximately one quarter of the funded OREI projects focused on organic animal production (**Animal Systems**) and the creation of education and training materials for Extension or service providers (**Educational Tools**) (Table 3.1). **Animal Breeding**, **Marketing/Policy**, and **Post-Harvest** processing and handling of organic products were among the priorities addressed less frequently. An annual breakdown showing OREI projects by RFA priorities addressed can be found in Appendix B, Table B1. The number of projects addressing each of the priority areas is consistent. The addition of a ninth RFA priority, **Marketing/Policy**, in 2018 may have promoted additional research into this topic, with 12 awards addressing this priority during FY 2018-2021.

Projects addressing **Educational Tools** were coded as such only for projects whose reports clearly evidenced outputs such as training webinars and workshops, Extension manuals and bulletins, and decision support tools directed toward Extension professionals. Projects that developed educational components for producers or students were categorized under **Curriculum**. Since this evaluation is

based on project reports and associated outputs shared by the project directors, it is possible that educational outputs were under-reported, and projects categorized under educational tools or curriculum in Table 3.1 may be underestimated.

3.2. OREI LEGISLATIVE PRIORITIES

This report also includes an assessment of the extent to which OREI-funded projects aligned with the legislative priorities. The authorizing legislation that established OREI includes the eight legislative priorities listed below. Each goal is followed by the code used for the evaluation in parentheses.

1. Facilitating the development and improvement of organic agriculture production, breeding, and processing methods.

Coded **1. Production**

2. Evaluating the potential economic benefits of organic agricultural production and methods to producers, processors, and rural communities.

Coded **2. Economic Benefit**

3. Exploring international trade opportunities for organically grown and processed agricultural commodities.

Coded **3. Export**

4. Determining desirable traits for organic commodities.

Coded **4. Commodity Traits**

5. Identifying marketing and policy constraints on the expansion of organic agriculture.

Coded **5. Marketing/Policy**

6. Conducting advanced on-farm research and development that emphasizes observation of, experimentation with, and innovation for working organic farms, including research relating to production, marketing, food safety, socioeconomic conditions, and farm business management.

Coded **6. Advanced On-Farm**

7. Examining optimal conservation, soil health, and environmental outcomes relating to organically produced agricultural products.

Coded **7. Conservation Benefits**

8. Developing new and improved seed varieties that are particularly suited for organic agriculture

Coded **8. New Cultivars**

Similar to the OREI RFA analysis, many projects fell within multiple legislative priority areas, averaging about three goals per project. Nearly all OREI projects within the review period included research within the broad scope of organic **Production** (Table 3.2). Greater than half of funded projects conducted some form of **Advanced On-Farm** research and over one-third of the projects addressed the legislative priorities related to **Economic Benefits** and **Conservation Benefits**. Of the projects addressing the economic benefits priority, some conducted cost-benefit analyses as a smaller component of a larger project, and others conducted extensive economic analysis for commodities such as rice, dairy, or honeybees. Soil health management practices such as cover crops, compost, or reduced tillage played a substantial or central role in most of the projects addressing the **Conservation Benefits** priority. There was an increase in projects addressing conservation benefits in 2019 and 2021 (Table B2), which may be due to the addition of language on soil health to the OREI RFA priorities in 2018.

Table 3.2. The total number and percent of OREI projects during FY 2015-2021 addressing each priority area in the legislative authorization.

OREI Legislative Priorities	Number of Projects Addressing Priority	Percent of Total Projects (out of 130)*,**
1. Production	124	95%
2. Economic Benefit	48	37%
3. Export	2	2%
4. Commodity Traits	35	27%
5. Marketing/Policy	29	22%
6. Advanced On-Farm	83	64%
7. Conservation Benefits	47	36%
8. New Cultivars	37	28%

* Percent rounded to the nearest whole number.

** Percentages do not total to 100 as many projects address multiple priority areas.

Research focused on **Commodity Traits** and **New Cultivars** remained relatively consistent with some projects focusing exclusively on cultivar development and others incorporating farmer-participatory plant breeding. Most projects included evaluation of market traits as well as agronomic traits and disease resistance. **Export**, defined as exploring international trade opportunities for organically grown and processed agricultural commodities, was addressed the least. Two OREI projects examined quality needs for domestic and export markets, specifically for alfalfa hay and dairy products, but none delved into export market opportunities.

3.3. ORG RFA PRIORITIES

OFRF reviewed and coded all ORG projects by the priority topics addressed in the ORG RFA. Again, many projects encompassed multiple priority areas and were coded as such in Table 3.3. The ORG 2021 RFA priorities are listed below followed by the short-hand code assigned to each priority topic in bold.

1. Document and understand the effects of organic practices on soil health and fertility; greenhouse gas mitigation; enhanced biodiversity; and understanding of weeds, pests and diseases dynamics for better management. These practices include, but are not limited to crop rotation; livestock feeding and management; livestock-crop system integration; organic manure, mulch, and/or compost additions; cover crops; and reduced or conservation tillage

Coded: **1. Organic Practices**

2. Develop improved technologies, methods, models, and metrics to document, describe, and optimize the ecosystem services and the climate variability adaptation and mitigation ability of organic crop, livestock, and integrated crop-livestock production systems.

Coded: **2. Ecosystem Services**

3. Develop cultural practices and other allowable alternatives to substances recommended for removal from NOP's National List of Allowed and Prohibited Substances. This may include effective substitutes or new technologies, cultural practices, cultivars, or breeds that render the NOP-cited substance in question less limiting to production under organic standards. Studies of alternatives should include evaluation of efficacy based on resulting productivity, profitability, and natural resources stewardship effects. We encourage a sustainable whole-systems approach but will also consider proposals that are narrower in scope.

Coded: **3. Alternative. National List**

4. Overcome barriers to organic transition. Projects under this priority should address major barriers that limit the transition to organic agriculture in a specific region, crop, or animal production systems, and develop practical information and tools for producer use. These can include, but are not limited to, production challenges during the transition period, local and regional infrastructure constraints, marketplace challenges, and administrative or policy barriers. Any constraint must be acknowledged by growers and other stakeholders. Proposals to improve organic animal or crop production management strategies and production systems should be submitted to the Organic Agriculture Research and Extension Initiative (OREI). Lobbying and advocacy activities are not allowed.

Coded: **4. Transition Barriers**

Table 3.3. The total number and percent of ORG projects during FY 2015-2021 addressing each priority area listed in the RFA.

ORG RFA Priorities	Number of Projects Addressing Priority	Percent of Total Projects (out of 67) ^{*,**}
1. Organic Practices	50	75%
2. Ecosystem Services	21	31%
3. Alternative National List	5	8%
4. Transition Barriers	43	64%

* Percent rounded to the nearest whole number.

** Percentages will not total to 100 as many projects address multiple priority areas.

There were 67 ORG projects awarded during FY 2015-2021. Several of these addressed overlapping priorities of the RFA. Of the 67 projects, 50 addressed RFA Priority 1 (**Organic Practices**) and 43 addressed Priority 4 (**Transition Barriers**). A few examples of innovative ORG-funded research related to these two priorities include research into cover crop mixtures for site-specific conditions, research on microbial management to improve soil health, research on salt-tolerant rice cultivars for organic farms impacted by sea level rise, and research optimizing organic no-till soybean production in roll-crimped rye.

There were 21 projects that addressed Priority 2, Ecosystems Services, including five projects that analyzed carbon sequestration and net GHG emissions from different organic systems and 16 projects investigating a wider range of metrics including soil microbial functional diversity, nitrogen fixation and mineralization, and other soil health attributes (Table B3). Across the review period, research projects addressing **alternatives** to materials on the **National List** of NOP-allowed synthetic substances remained consistently lower, representing only five of 67 projects. One reason for this may be that most ORG-funded projects researched, developed, and tested IPM strategies or complementary tactics to address insect, disease, or weed problems, thereby reducing the need for NOP-allowed pesticides, including those on the National List. Therefore, this analysis may have underestimated the degree to which ORG-funded research has addressed Priority 3.

CHAPTER 4. COMMODITY ANALYSIS

The commodity analysis includes a review of the commodities researched through OREI and ORG awards. It incorporates total organic sales for each commodity and the percent of sales or market share from the 2021 USDA Certified Organic Survey (USDA, 2022) specifically (Table 4.1).

Table 4.1. National organic sales by commodity type and total number of OREI and ORG projects addressing commodity type.

Commodity Category	Organic Sales ^a		Total OREI & ORG Projects Addressing Commodity	% OREI and ORG Projects Addressing Commodity ^c
	\$million	%sales ^b		
All commodities	11,205	100%	197	100%
All crops	6,153	54.9%	167	85%
Vegetables	2,062	18.4%	63	32%
Herbs	30	0.3%	3	2%
Fruit (tree, vine, shrub)	1,864	16.6%	28	14%
Tree nuts	126	1.1%	2	1%
Cut flowers	45	0.4%	1	< 1%
Nursery stock	7	<0.1%	-	-
Field crops	1,130	10.1%	63	32%
Corn (grain)	424	3.8%	26	13%
Soybean	242	2.2%	19	10%
Wheat	139	1.2%	23	12%
Cotton	36	0.3%	3	2%
Rice	53	0.5%	4	2%

Other field crops ^d	236	2.1%	32	16%
Forages ^e	306	2.7%	24	12%
All livestock products	5,052	45.1%	50	25%
Beef	250	2.2%	2	1%
Dairy from cows	1,633	14.6%	23	12%
Pork	8	<0.1%	5	3%
Poultry and eggs	3,092	27.6%	5	3%
Sheep and goats ^f	4	<0.1%	4	2%

a 2021 Certified Organic Survey (USDA, 2022).

b Organic sales of commodity divided by total organic sales × 100.

c Percent calculated as the number of projects addressing the commodity divided by the total number of projects.

d Includes barley, oats, rye, grain sorghum, ancestral wheats, other specialty grains, buckwheat, quinoa and other “pseudograins,” peanuts, sunflower and other oilseeds, dry beans, dry peas, lentils and other pulses, and tobacco.

e Hay, silage (including corn), haylage and greenchop (alfalfa, sorghum, grasses, etc.).

f Meat, dairy products, and fiber.

Organic sales in the United States are almost evenly split between crop (55 percent) and livestock (45 percent) products (Table 4.1). Within those pools, the five commodity categories with the most U.S. total organic farmgate sales were poultry and eggs (combined), followed by vegetables, fruit, dairy products from cows, and field crops, each grossing greater than \$1 billion annually and representing greater than 10 percent of organic sales. Of these, OREI and ORG have continued to receive strong applications leading to extensive research into vegetables and field crops. There were fewer OREI and ORG projects that addressed research on fruit crops, cow dairy, and especially poultry and eggs (Table 4.1).

4.1. CROP COMMODITIES

Over the review period, 85 percent of OREI and ORG projects focused on at least one crop commodity (Table 4.1). Both programs invested heavily in vegetable research (i.e., carrots, cucurbits, sweet potato, tomato), funding a variety of projects, notably those with long-term objectives for organic farming systems (i.e., cover cropping, soil health, and crop breeding). OREI and ORG programs funded a relatively large number of projects dealing with organic field crops (32 percent), despite the lower market share of field crops.

A strength of OREI and ORG has been investment in minor commodities that can play vital economic and ecological roles in the success of organic farming systems. Minor commodities are represented under other field crops (Table 4.1), which also includes rye, oats, barley, specialty grains, pseudograins such as buckwheat and quinoa, pulses and oilseed crops. Of the 63 OREI and ORG projects addressing field crops, half of those included one or more minor commodities in the study. Additionally, at least one integrated OREI project addressed each of the following commodities: quinoa, hemp, perennial grains, maple syrup, and mushrooms. Annual organic maple syrup sales now exceed \$82 million (USDA, 2022), and OREI-funded research has made significant progress overcoming constraints on sustainable organic maple syrup production.

Cotton and rice were identified as commodity research gaps in a previous report evaluating OREI and ORG awards from 2002-2014 (Schonbeck et al., 2016). During this review period, both cotton and rice received focused attention in several projects. This research led to significant advances in organic rice production and IPM, and research into major weed, water, and soil health challenges in organic cotton. Additional research to identify and overcome barriers to organic cotton production, and build on initial successes with rice, could expand organic production and profitability in these two commodities.

4.2. LIVESTOCK COMMODITIES

Meat, poultry, dairy, eggs, and animal-derived fiber accounted for 45 percent of organic sales in 2021 (Table 4.1), but only 25 percent of OREI and ORG projects addressed livestock commodities.

The number of OREI and ORG projects addressing both pork and beef production were generally aligned with the market share and included projects on feeding, nutrition, and parasite management challenges in pork, and projects on forage production for beef. None of the projects addressed health care, living conditions, or grazing management for organic beef cattle. Research is needed to identify and address barriers to increasing organic meat production, with pork and beef considered organic commodity gaps.

Poultry and eggs had the highest organic produce sales volume topping \$3 billion, yet there were only five projects during 2015-2021 that addressed challenges and opportunities facing organic poultry farmers. These include crop-poultry integration; identifying natural sources of d-methionine to replace synthetic d-methionine; managing poultry parasites and pathogens; and upgrading infrastructure to meet new Organic Livestock and Poultry Standards requirements for outdoor access.

CHAPTER 5. NATIONAL ORGANIC RESEARCH AGENDA

In 2019, OFRF and the Organic Seed Alliance (OSA) received OREI funding to develop the 2022 National Organic Research Agenda (award 2019-51300-30249). OFRF conducted a survey of 1,059 certified organic and 71 transitioning organic farmers in 2020 and held 16 focus groups with organic and transitioning producers across the country (Snyder et al., 2022). The 2022 National Organic Research Agenda (NORA) is currently the most comprehensive report focused on organic production in the United States and includes an analysis of USDA-funded organic research. Additionally, in 2016 OFRF published the Taking Stock report, a review of OREI and ORG-funded research between 2002-2014, which was funded through OREI's competitive grant program (award number 2014-05348). This chapter incorporates findings from both of those reports to provide additional evaluation of USDA's Organic Programs.

Data are also evaluated on the regional distribution and scope of awards broken down by USDA Sustainable Agriculture Research and Education (SARE) regions (Appendix C). This regional classification system was selected to align with the categorizations used in the 2022 NORA report (Snyder et al. 2022) and 2016 Taking Stock report (Schonbeck et al. 2016). In addition to a regional analysis, the extent to which OREI and ORG projects addressed research priorities in the NORA report, which are directly informed by the challenges and technical assistance needs identified by organic producers across the United States, was also assessed.

5.1. REGIONAL ANALYSIS

To capture collaborations and partnerships across regions, both project location and scope were identified for each OREI and ORG project. The **location** of a project is categorized as the region where the project directors and lead entity are located. Projects were also classified by **regional scope**, which includes not only the funded entities, but also the location for project partners, collaborators, and where the project took place, therefore under this categorization, one project may span multiple regions.

Partial findings from the 2016 Taking Stock report are included here for comparison. Between 2002 and 2014, the percent of total OREI and ORG awards that went to institutions in each region are as follows: North Central region (33 percent), Western region (28 percent), Northeast region (21 percent), and Southern region (18 percent). The differences in total awards across regions from 2002-2014 indicated substantial differences in awards focused on the South versus the North Central region. However, those numbers seem to have leveled out between 2015-2021 as shown on Table 5.1. For this review period, differences are narrow, with funded entities for OREI and ORG

projects slightly more concentrated in the Northeast or North Central regions (Table 5.1). This may be attributed to OREI RFA changes that specifically encouraged proposals from the Southern region to develop organic integrated weed, insect pest, and disease management strategies.

Table 5.1. Number of OREI and ORG projects by location of funded entity and regional scope between 2015 and 2021*

Location of Funded Entity	OREI Projects	ORG Projects	Total Projects	% of Total Projects
North Central	36	20	56	28
Northeast	37	16	53	27
Southern	26	19	45	23
Western	31	12	43	22
Regional Scope of Project	OREI Projects	ORG Projects	Total Projects	% of Total Projects
North Central	85	21	106	54
Northeast	77	25	102	52
Southern	75	30	105	53
Western	69	16	85	43

* Funded entity = the institution or organization who received the award.

Regional scope = project with funded entity, partners, and farmer collaborators within the region.

Of the 130 OREI projects funded, 36 percent had a national scope (defined as projects that spanned all four SARE regions within the project scope or partners), 23 percent were multiregional, and 41 percent conducted research and/or education and outreach activities entirely within the funded entity's region. Of the 67 ORG awards during 2015-2021, 73 percent were single region, 19 percent were multiregional, and 7 percent were national in scope. Differences in regional scope between the two programs likely reflect the difference in programmatic requirements, project types, and funding levels. OREI tends to fund larger integrated research projects addressing organic production challenges of multiregional or national scope when compared to ORG. In addition, OREI funds conferences and planning projects, many of which bring together

stakeholders from all regions to discuss organic producer needs and priorities to develop plans to tackle problems of national scope.

5.2. RESEARCH PRIORITIES

The 2022 NORA report identified the top research priorities for meeting production challenges and technical assistance needs (Table 5.2). These priorities reflect the most pressing production challenges of U.S. organic farmers and ranchers.

Table 5.2. NORA 2022 research priorities for meeting production challenges and technical assistance needs, and numbers and total funding of OREI and ORG projects awarded during FY 2015 - 2021 that addressed each priority.

NORA 2022 Research Priority	Number of Projects			% of Projects
	OREI	ORG	Total	
Soil health science and practice	24	38	62	32
Soil biology	14	24	38	19
Reduced tillage	8	14	22	11
Integrated soil health systems	11	16	27	14
Nutrient management and amendments	7	4	11	6
Soil health during organic transition	0	8	8	4
Soil health monitoring	2	5	7	4
Climate mitigation and adaptation	9	23	32	16
Climate ecosystem services	7	22	29	15
Climate resilience	6	2	8	5
Integrated weed management (IWM)	22	21	43	22
Multi-component IWM	10	5	15	8

Soil-friendly IWM	5	5	10	5
IWM during organic transition	2	12	14	7
Weed-resilient crop cultivars	8	0	8	4
IWM for invasive perennial weeds	2	2	4	2
Organic Integrated Pest Management (IPM) for insect pests and diseases	39	14	53	27
Targeted IPM	11	8	19	10
Agroecosystem IPM	28	6	34	17
Organic seeds and crop cultivars	39	4	43	22
Organic seed production	14	0	14	7
Farmer-plant breeder network	25	1	26	13
Cultivars for organic systems	39	4	43	22
Climate-resilient cultivars	4	1	5	3
Organic livestock systems	25	15	40	20
Livestock production, health, and breeding	23	11	34	17
Grazing management	10	8	18	9

NIFA's Organic Programs made substantial investments in several key aspects of **soil health**, including soil and plant root microbiomes and their functioning under organic management, reducing tillage intensity, and integrated soil health practices for enhanced production and conservation (Table 5.2). The ORG program funded eight projects addressing a challenge often faced by producers transitioning into organic production, that is, the restoration of biologically depleted soils necessary to maintain economic viability in organic operations.

OREI and ORG have continued to make substantial investments (almost 50 percent of projects) in

developing ecologically based, **organic integrated weed management** (IWM) and **organic pest and disease management** (IPM) strategies. The ORG program has supported a dozen projects that addressed integrated weed management during transition, and OREI has supported development of agroecological IPM strategies, including the development of cultivars to build resilience to multiple pests and pathogens in organic rice, tomato, sweet potato, onion, and cucurbits, among other crops. OREI continues to make an especially valuable contribution to **plant breeding and cultivar development** (22 percent) (Table 5.2).

Both OREI and ORG have funded research into **organic livestock production and grazing management** (20 percent), including topics such as parasite management for small ruminants, dairy cattle health and forage management, and crop-livestock integration. However, there were fewer projects investigating other key topics related to organic meat, dairy, and egg production, especially advanced rotational grazing systems, parasite management in more species, and livestock breeding and selection for pasture-based organic systems. Similarly, there were fewer OREI and ORG projects addressing the challenges of **climate mitigation and adaptation**, possibly reflecting the complexity of such studies.

CHAPTER 6. DISCUSSION

Organic research, education and Extension funding through the OREI and ORG programs contributes to the success and resilience of the organic sector across the country. Over the 2015-2021 period, these programs funded high-quality research into organic crop production, soil health and fertility, plant breeding for organic systems, and NOP-compliant integrated management of weeds, pests, and diseases. The two programs play complementary roles in supporting the organic sector. OREI develops practical solutions for certified organic producers and has excelled in supporting farmer-participatory cultivar development and providing valuable educational and networking opportunities through conferences and symposia. ORG focuses on overcoming barriers to the transition from conventional to organic practices, as well as documenting and optimizing the ecosystem services provided through organic farming. The integrated nature of these two programs has been critical to delivering research results to farmers. Both programs emphasize whole-farm and multidisciplinary approaches to overcoming challenges faced by certified and transitioning organic producers.

This discussion chapter synthesizes the findings from the previous sections, highlighting key observations and insights derived from the data. This review of projects included a deeper look at the success rate by state, entity type, geographic region, legislative and RFA priorities, as well as a commodity analysis using farmgate sales and a comparison between 2022 NORA priorities and OREI and ORG awards.

Through this review we have identified the following areas as strengths:

- Strong support for collaborative organic research and multi-regional projects.
- Advanced on-farm research addressing organic production challenges.
- Organic soil health, reduced tillage, and nutrient management research.
- Organic integrated weed, insect and nematode pest and disease management research.
- Organic crop cultivar development.

Through this review we have identified the following areas as gaps:

- Livestock breeding and selection for organic systems.
 - Organic production of beef, pork, poultry, and eggs.
- Post-harvest handling and food safety (for plant and animal systems; alternatives to chemical treatments.)
 - Organic production of nursery stock, crop seeds, and transplants.
- Climate resilience in organic systems.

6.1. PROGRAM PERFORMANCE AND AWARDS

The evaluation period from FY2015 to 2021 highlighted significant growth in funding for both OREI and ORG, reflecting a strong commitment from the federal government to advance domestic organic agriculture research. The average success rate for proposals submitted to the OREI and ORG programs was 24 percent, indicating that these programs are competitive and generate high-quality project submissions. OREI's larger budget and broader eligibility has allowed for a more diverse array of projects, including high-impact integrated projects and smaller-scale initiatives such as conferences and planning grants. The distribution of awards across project types within OREI highlights an emphasis on larger integrated research, particularly Tier 1 projects, which often involve multi-regional collaborations. This aligns with OREI's objective to support comprehensive, large-scale studies that address significant challenges in organic agriculture. In contrast, ORG's more focused approach has led to growth in research addressing specific barriers faced by transitioning producers and investigations into organic practices that can facilitate the shift to organic farming.

6.2. GEOGRAPHIC AND INSTITUTIONAL DISTRIBUTION

The geographic distribution of project submissions and awards shows a concentration in states with high organic produce sales (Figure 2.3). This trend likely reflects the established infrastructure and research capacity for studying organic agricultural systems in these regions. Institutional data reveal that 1862 LGUs have been the predominant sources of submissions and awards in both OREI and ORG. This trend indicates that these institutions are well-positioned and resourced to conduct organic agriculture research compared with other institutions. The relatively lower representation of 1890 and 1994 LGUs and minority-serving institutions suggests potential gaps in inclusion and collaboration. Increased support for these institutions could enhance the diversity and inclusivity of research outputs and address underserved areas within the organic farming sector. For both OREI and ORG, the RFAs require activities to be conducted in certified organic facilities to make results readily applicable to organic production. Unfortunately, this seems to be a constraint for many smaller institutions, due to the high cost of maintaining certified organic research facilities.

6.3. ALIGNMENT WITH PROGRAM PRIORITIES

OREI Priorities: The analysis of OREI-funded projects reveals a strong alignment with the program's priorities. The funding emphasis on advanced on-farm research underscores OREI's priority in this area, and the program's focus on addressing critical challenges in organic production. Research into integrated pest management (IPM), plant breeding, and organic seed production constituted a significant portion of the funded projects. There have been promising results from projects focused on strategic rotations, cover cropping, and innovative tactics and

technologies. These results illustrate the importance of continuing and expanding research efforts in organic weed management.

OREI continues to make an especially valuable contribution toward meeting the need for crop cultivars better suited to organic production through plant breeding and cultivar development, as well as evaluation of existing cultivars. Farmer participation plays a key role in the success of plant breeding endeavors. Many groups were successful at securing renewed funding from OREI. These include several robust farmer-researcher networks developing new cultivars (carrot, tomato, and other vegetables, cover crops, specialty corn, and naked barley), with enhanced traits for performance under organic management. The consistent attention to soil health and conservation benefits reflects the legislative priorities, indicating that projects are well-aligned with both RFA and legislative goals.

The inclusion of new priorities, such as marketing and policy research, starting in FY 2018, has stimulated additional focus on socio-economic barriers. Research in this area remains limited, however. Current low emphasis on research focused on export markets suggests a potential area for future attention by the applicant community. In 2020, the United States exported \$732 million worth of certified organic products, while organic imports exceeded \$4 billion (Koory et al., 2022). Continued research into this priority could play a pivotal role in the economic growth of the organic sector.

ORG Priorities: The ORG program has successfully addressed its priorities, particularly those related to organic practices and transition barriers. Innovative projects focusing on site-specific cover crop mixtures, microbial management, and salt-tolerant cultivars highlight the program's responsiveness to practical challenges faced by transitioning producers. The emphasis on ecosystem services, including carbon sequestration and soil health, aligns with the current research priorities and demonstrates ORG's commitment to addressing environmental and ecological impacts.

Despite these strengths, the lower number of projects addressing alternatives to NOP-allowed substances indicates a potential gap. Given the increasing scrutiny on synthetic inputs, further research in this area could contribute to the development of more sustainable practices and alternatives.

6.4. COMMODITY FOCUS AND RESEARCH GAPS

OREI and ORG have continued to receive strong applications leading to the funding of the most extensive research into vegetables and field crops. The commodity analysis highlights that while research funding has addressed major organic commodities such as fruits, vegetables, and dairy, there remains a notable gap in research on poultry and beef. Although poultry and eggs represent

a significant portion of organic sales, only a few projects have focused on this sector. Similarly, research into organic beef production and dairy production is limited, despite its market potential. This pattern likely reflects the challenges associated with livestock research, including complex issues related to animal health, pasture management, production practices, and overall expense or economic viability. Increased submission of competitive projects to OREI and ORG in organic beef, dairy, poultry, and egg production could help expand the market share and profitability of these leading organic livestock-based commodities.

The research on minor commodities reflects a strength of the programs in addressing niche markets and contributing to the diversification of organic agriculture. The research into organic rice, quinoa, and cotton, identified as priority gaps in OFRF's previous evaluation, shows a positive trend in addressing these areas. This approach supports the development of alternative crops that can play vital roles in organic farming systems.

6.5. ALIGNMENT WITH PRODUCER-IDENTIFIED PRIORITIES

The alignment of OREI and ORG projects with the National Organic Research Agenda (NORA) priorities demonstrates a commitment to addressing key challenges identified by organic producers across regions and nationally. The focus on soil health, IPM, and plant breeding aligns with NORA's producer-identified research priorities, reflecting a shared emphasis on improving organic production practices and sustainability.

The programs' investment in soil health and integrated pest management is particularly notable, given the ongoing challenges faced by organic producers. The relatively low number of grants focusing on climate mitigation and adaptation reflects a potential area for future inquiry, as understanding the impact of climate change on organic producers becomes increasingly important. It is also possible that projects investigating climate mitigation and adaptation in organic agriculture are more commonly funded by other federal grants that exclusively focus on this research area.

6.6. CONCLUSION

The evaluation of OREI and ORG programs from FY 2015 to 2021 reveals a complex landscape of organic agriculture research and Extension. Many of the funded projects have taken an integrated, whole-farm approach to addressing challenges faced by organic producers, which leads to practical solutions that enhance the economic and environmental sustainability of organic operations regionally and nationally. NIFA's Organic Programs have made significant contributions to advancing organic practices, addressing transition barriers, and supporting innovative research. The findings highlight both strengths and areas for further exploration, reflecting the dynamic nature of organic

agriculture and the ongoing need for targeted research to address emerging challenges and opportunities.

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APPENDIX A

Table A1. Total Numbers of OREI and ORG Research Projects and Funding Distributed during 2015-2021.*

OREI	2015	2016	2017	2018	2019	2020	2021	Total
Awarded	20	18	16	15	19	20	22	130
Funding Amount	\$18,397,902	\$18,225,396	\$16,490,881	\$17,055,483	\$18,886,924	\$17,809,388	\$23,903,267	\$130,819,241
ORG	2015	2016	2017	2018	2019	2020	2021	Total
Awarded	7	8	8	10	11	12	11	67
Funding Amount	\$3,483,067	\$3,777,222	\$3,915,652	\$4,354,962	\$5,320,270	\$5,698,560	\$6,145,000	\$32,694,733

*Funding amounts are payments to states, not program authorization

Table A2. Total numbers of OREI and ORG submissions, awards, and success rate, 2015-2021.*

OREI and ORG	2015	2016	2017	2018	2019	2020	2021	Total
Awarded	20	25	25	25	34	35	33	197
Not Awarded	69	123	98	120	62	76	80	628
Total Submissions	89	148	123	145	96	111	113	825
Success Rate	22%	17%	20%	17%	35%	32%	29%	24%*

*Total success rate of calculated using averages across 2015-2021

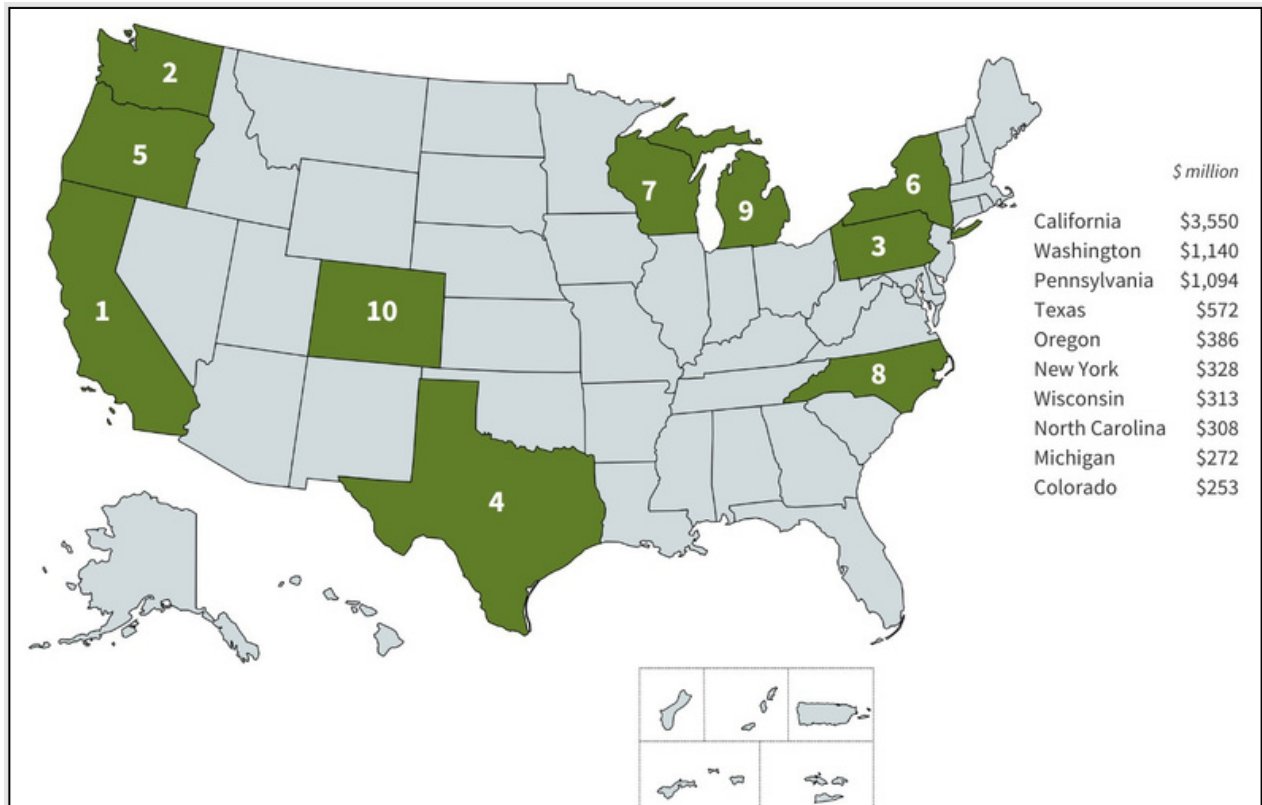


Figure A1. Top 10 states in organic sales, 2021.

Source: USDA, 2022.

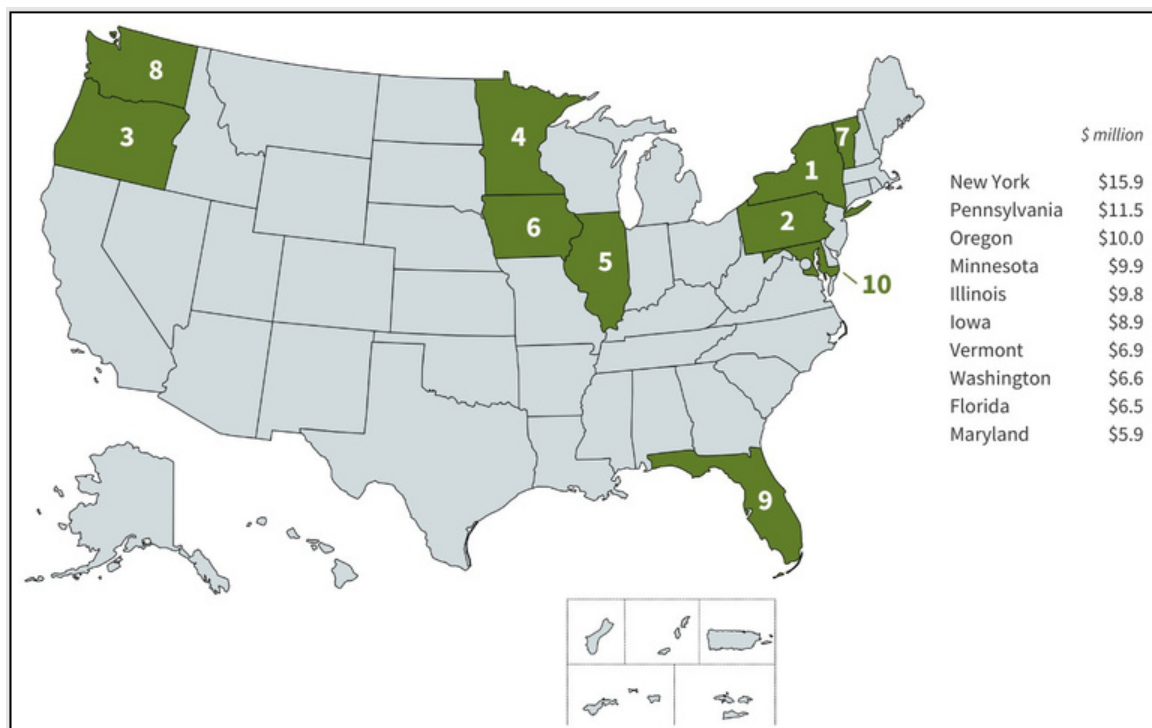


Figure A2. Top ten states that received OREI and ORG funding 2015-2021.

*For this map, funding is categorized by the state where the lead institution is located and does not capture funding allocation/distribution made to partner institutions in other states.

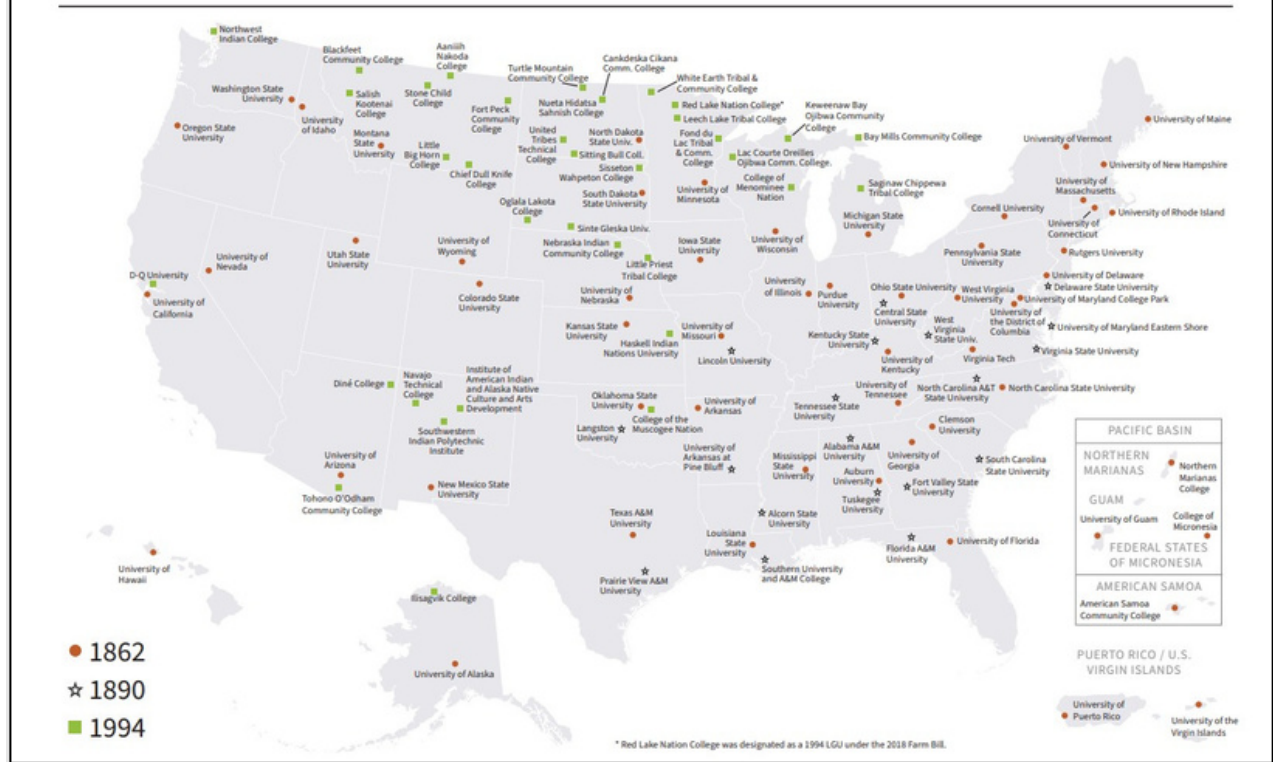


Figure A3. Map of 1862, 1890, and 1994 Land Grant Universities (LGUs).

APPENDIX B

Table B1. The annual number of OREI projects from FY 2015 to 2021 addressing each priority area listed in the RFA and total funding.

OREI RFA Priorities	2015	2016	2017	2018	2019	2020	2021	Total Funding
1A. Advanced On-Farm R&D	12	10	12	11	12	12	14	\$119,727,067
1B. Planning	3	3	1	0	4	3	4	\$862,061
1C. Conference	1	2	1	2	2	2	1	\$509,297
2. Educational Tools	5	6	7	2	6	2	6	\$46,463,845
3. Post-Harvest	1	1	1	1	3	3	3	\$12,671,575
4. Seed Systems	6	5	6	4	4	8	7	\$40,620,841
5. Organic IPM	9	5	4	5	9	4	10	\$58,253,352
6. Animal Systems	6	3	5	4	5	3	3	\$33,036,561
7. Animal Breeds	0	2	1	0	0	0	0	\$3,818,512
8. Curriculum	3	5	2	2	1	1	0	\$13,625,069
9. Marketing Policy	0	0	0	1	3	3	5	\$1,880,086

Table B2. The annual number of OREI projects from FY 2015 to 2021 addressing each priority area in the legislative authorization and funding totals.

OREI Legislative Priorities	2015	2016	2017	2018	2019	2020	2021	Total Funding
1. Production	19	18	16	15	18	19	19	\$127,231,206
2. Economic Benefit	5	5	7	4	12	5	10	\$58,346,642
3. Export	0	1	0	0	1	0	0	\$2,049,915
4. Commodity Traits	7	4	5	3	7	4	5	\$33,268,077
5. Marketing/Policy	1	2	2	4	10	5	5	\$20,747,284
6. Advanced On-Farm	12	10	12	11	12	12	14	\$119,727,067
7. Conservation Benefits	6	4	5	3	12	6	11	\$60,407,972
8. New Cultivars	5	4	6	4	5	7	6	\$40,479,293

Table B3. The annual number of ORG projects from FY 2015 to 2021 addressing each priority area listed in the RFA and total funding.

ORG RFA Priorities	2015	2016	2017	2018	2019	2020	2021	Total	Funding Total
51. Organic Practices	6		6	6	10	9	8	50	\$ 24,493,591
02. Ecosystem Services	5		0	2	6	5	2	21	\$ 10,488,617
13. Alt. National List	1		1	1	0	0	1	5	\$ 2,554,676
54. Transition Barriers	2		6	5	6	10	9	43	\$ 21,336,720

APPENDIX C

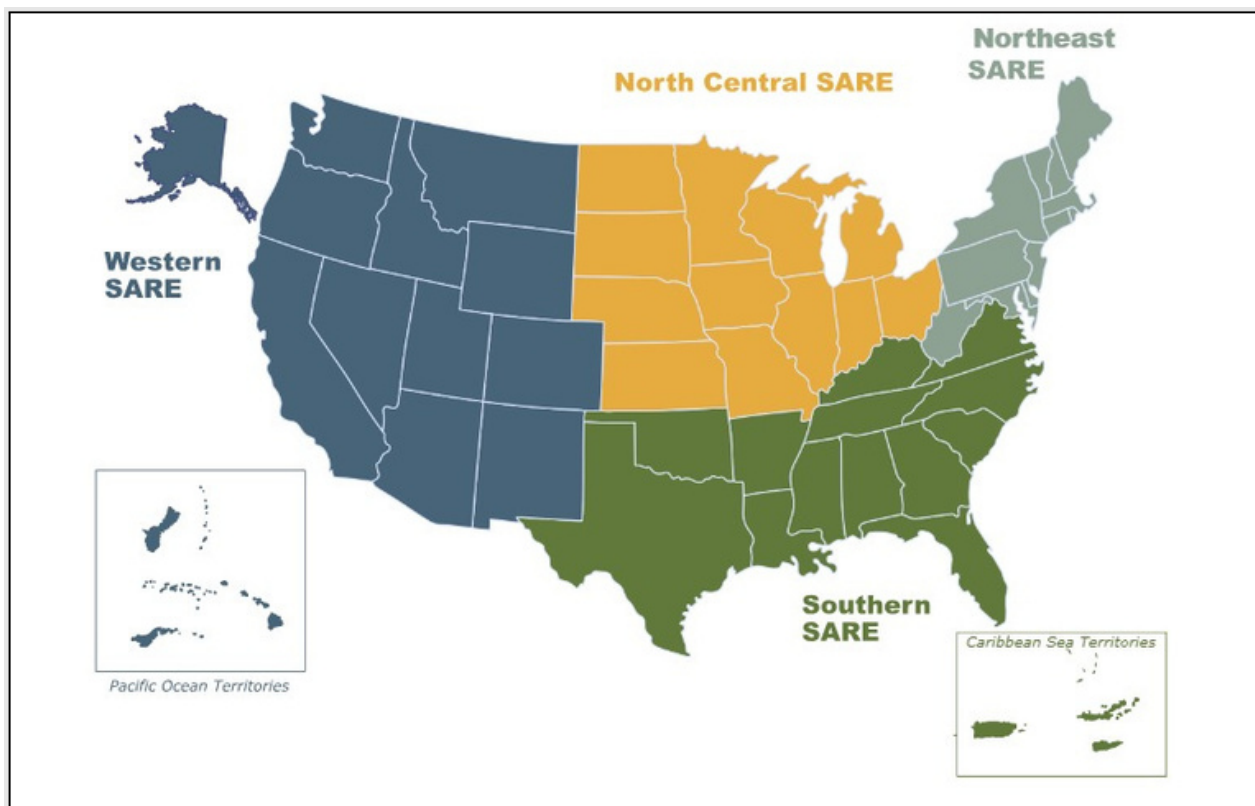


Figure C1. The four SARE regions.



*Photo: Heather Darby
Advancing grass-fed dairy: a whole systems
approach to enhancing productivity, quality,
and farm viability in the US.
OREI 2018-51300-28515*