# Investing in Organic Knowledge

Impacts of the First 13 Years
of the
Organic Farming Research Foundation's
Grantmaking Program

**By Jane Sooby**

ORGANIC FARMING RESEARCH FOUNDATION

# About Our Programs

**OFRF** is a national public interest organization founded in 1990 by certified organic farmers.

OFRF's integrated strategy of grantmaking, policy, research and education initiatives and networking activities support organic farmers' immediate information needs while moving the public and policymakers toward greater investment in organic farming systems.

## Grantmaking

Since 1992, OFRF's grantmaking program has awarded more than $1.5 million for over 200 projects. Our grantmaking objective is to generate practical, science-based knowledge to support modern organic farming systems. OFRF-funded projects emphasize grower-researcher collaboration, studies conducted on-farm and/or in certified organic settings, and outreach of project results.

## Policy

OFRF's policy program objectives are to ensure that the public and policymakers are well-informed about organic farming issues, and to increase public institutional support for organic farming research and education.

### Organic Farmers Action Network

OFRF encourages organic farmers to participate in the policy process by joining our Organic Farmers Action Network (OFAN). OFAN subscribers will receive free policy updates and tools for communicating with representatives in Congress to advocate for increased funding for organic research, technical assistance and marketing support, organic conservation programs and maintenance and improvement of national organic standards.

## Research

OFRF conducts original research about organic farming in the U.S. OFRF research projects include:

- *National Organic Farmers' Surveys*
- *State of the States: Organic Farming Systems Research at Land Grant Institutions*
- *Searching for the 'O-Word': Analyzing the USDA Current Research Information System for Pertinence to Organic Farming.*

## Education

OFRF seeks to share new insights into organic farming systems with all farmers who use or want to adopt organic practices. The results of research projects funded by OFRF generate information useful to farmers who are working to develop and improve integrated, systems-level organic management practices. Every OFRF-funded project is required to have an outreach component that disseminates the results to the grower and research communities.

The results of OFRF-funded projects are published in our newsletter, the *Information Bulletin*, available free of charge both online and by regular mail.

## Support

OFRF is supported by donations from individuals and by grants from family foundations. We hope that you will choose to support OFRF's work to meet the information and policy needs of organic family farmers--the foundation of a healthier agriculture for the future. Please make a gift to the Organic Farming Research Foundation today.

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# Investing in Organic Knowledge

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# Background
## Chapter 1

## History & purpose of OFRF grantmaking

The Organic Farming Research Foundation (OFRF) was started by organic farmers in 1990 to privately fund the scientific research in organic agriculture that was not being conducted by the agricultural establishment as represented by the land grant system, including Cooperative Extension.

Mark Nielson, an organic farmer who was one of the founders of OFRF, recalls that, "The basic sense at the beginning was that organic farmers have to stop whining and go out and do it ourselves. Grower-initiated proposals came from that same feeling: that we need to do it ourselves, no one else will do it for us, we need to have control over the process."

In 1992, the competitive grants program was established to disburse research funds through a process of calling for proposals from the organic community, evaluating those submitted, and awarding funding for the projects the OFRF Board of Directors judged most likely to produce useful information to organic farmers. Between 1992 and 2005, OFRF funded 213 grants through the competitive grants program, totaling $1,299,635 disbursed.[1]

Funding farmer-generated research was the original idea behind the OFRF grants program. However, Nielson and others in OFRF came to realize that "It's something worth pursuing but it's not an easy thing to do. A lot of farmers are busy enough just doing what they do... Based on my experience with OFRF, I came to a position that the researcher was necessary in the process because they would pay attention to the rigorous stuff that a farmer wouldn't care about or have time to pursue."

Because the original idea was to empower organic farmers to conduct their own research, OFRF has reached out to the organic community through the farm media, by participating in grower meetings, and through its own communications to let growers know about the grants program. The application process was intentionally kept simple to make it accessible to a broad range of applicants. Farmer involvement in some way has been required of all OFRF-funded projects.

Still, the reality is that farmers are most often overworked and have little time left after growing and marketing their crops and livestock to conduct formal research. Thus, professional researchers[2] have been awarded the large majority of OFRF grants. Sixty-seven percent, or 143 of the 213 grants awarded, have gone to professional researchers, while 15%, or 32 grants, have gone to farmers. The other 18% have been awarded to non-profit-based investigators.

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[1]OFRF has disbursed an additional $2,500 to the Greenmarket Farmers Fund to help farmers with losses from the Sept. 11, 2001 attacks on New York City; $3,500 to support regional organic farming conferences in 2002; and 12 donor-directed grants since 1992, totaling $127,170. In 1991, OFRF made a journalism award of $1,000, and in 1990 OFRF managed funds for CCOF totaling $85,275.

[2]Includes professional researchers from land grant universities, other colleges, Cooperative Extension, USDA-ARS, the now-defunct Frontier Organic Research Farm, Canada's Pacific Agri-Food Research Centre, and freelance professionals.

## The grant selection process

OFRF manages two funding cycles per year, the spring cycle with a deadline in December of the previous year, and the fall cycle with a deadline in July. Applicants submit proposals to the OFRF office, where they are logged into the database and sent out to members of the Research & Education (R&E) Committee of the OFRF Board of Directors. The R&E Committee evaluates the proposals and ranks them, then convenes a telephone conference call to discuss proposals that have earned a certain ranking or higher. Members of the committee are also allowed to bring forward any proposal that interests them irregardless of its overall ranking. A final slate of candidate proposals is forwarded to the remainder of the Board, which reviews and discusses them at the next full Board meeting. Final funding decisions are made by the full Board of Directors. Staff notifies applicants of their status and provides feedback to unsuccessful applicants when requested. Successful applicants are required to submit a final report to the foundation at the end of the project. The final reports are edited and published in the organization's newsletter, the *Information Bulletin*.

Criteria that the OFRF Board uses to assess proposals include:

- Topic is a high priority problem in an organic production system;
- Project results would be of practical use to a large number of organic farmers/organic industry;
- An outreach plan designed to get results out to the farming community;
- Meaningful farmer/community involvement;
- Scientifically sound and appropriate methodology; and
- Effective team and/or networking effort.

Methodological integrity has always been a high priority for the OFRF Board in selecting projects to fund. Staff and Board members have spent many hours over the years working with applicants to improve the experimental design of their project or otherwise provide advice to the applicant to increase the project's utility to organic farmers.

## Purpose of this report

The evaluation of the OFRF grants program presented in this report is intended to identify successes, describe weaknesses, and provide information to determine what might be the most appropriate configuration of the OFRF grants program for the future.

After 15 years of existence and 13 years of competitive grantmaking, OFRF is functioning in a world very different from when $3,100 grants were the norm. The average award size in OFRF's last full year of grantmaking (2004) was $10,357. Federal organic legislation has established a set of national organic standards that now regulates the entire organic industry, from seed to shelf. The 2002 Farm Bill authorized $3 million per year over each of the subsequent five years specifically for organic farming research. In 2003, the Risk Management Agency disbursed funding to a number of groups to support organic education around the country. Many factors, including OFRF's successful policy initiatives, have resulted in a situation where more public funding is available for organic research and education than at any other time in U.S. history.

In this context, which direction is best for the OFRF grants program? Are there niches that OFRF might best fit into? In an era of increased public support for organic—as measured by a variety of indicators—does OFRF's grant program have a continuing role to play in furthering organic research and education?

OFRF's R&E Committee initiated a "technical and grant" program evaluation process in late 2003. In addition to considering how the technical and grant programs relate internally to other functions of the organization, the need to evaluate the impact of the grants program became evident.

## Methods

Two approaches were used to analyze the impact of the OFRF grants program. The first was to analyze the full set of OFRF-funded research and education projects, or the overall grant portfolio, in terms of their geographical and topical distributions, recipient type, and historical trends. A detailed, multi-page spreadsheet was constructed using codes to represent the different elements of each grant funded. The data in these spreadsheets were sorted and analyzed from a variety of perspectives. This information is presented in the first section, *Descriptive Information*.

The second approach was to interview a subset of OFRF grant recipients and directly gather information from them on what impacts the OFRF grants have had on their production practices, their careers, and, when applicable, on their institutions. Interviewees were randomly selected from grant recipients who had submitted a final report on their project and met the original project objectives. A total of 35 interviews, representing 26% of grant recipients successfully completing their projects, was conducted by staff and R&E Committee members (see Table 1). This information is presented in the section *Impacts on recipients*.

**Table 1. Interviews by grantee type.**

| Type | Total # | # ineligible* | # eligible | # interviewed | % interviewed |
|---|---|---|---|---|---|
| Non-profit | 26 | 0 | 26 | 4 | 15 |
| Farmer | 26 | 7 | 29 | 7 | 37 |
| Professional | 97 | 8 | 89 | 24 | 27 |
| **Totals** | **115** | **15** | **133**** | **35** | **26** |

* Because lacking final report or did not meet original objectives
**One person is counted twice, so total is one less than the sum

The section *Impacts on practical information* is based on media reports, follow-up conducted by OFRF staff person Erica Walz, staff analysis of project results, and other documentation of the impacts of OFRF-funded projects.

# Chapter 2 Descriptive Information

## Analysis of the overall grant portfolio

OFRF was founded in 1990 and started its competitive grants program in 1992. Between 1992-2005, OFRF made 213 grants through the competitive program, totaling $1,299,635 awarded.[3]

## Geographical distribution

OFRF served as an educational arm of the California Certified Organic Farmers (CCOF) in its first two years of existence. This connection is why OFRF in its early years of grantmaking provided multi-year support for educational efforts conducted by CCOF. In 1999, OFRF ended its formal relationship with CCOF by removing the by-law that required a seat on the OFRF Board be reserved for the CCOF Board president.

The OFRF grants program started funding projects outside of California in 1993, when research grants were made to recipients at Cornell and in New Hampshire. It has had a national scope ever since. The OFRF Board historically has been aware of the geographical distribution of its grant awards, and has tried to ensure that no one region be favored in the selection process.

The fact remains that OFRF has strong roots in the California organic movement. As a result, by far the largest number of OFRF grant awards has been made in the state of California. A full 29% of OFRF grant awards have been made in this one state. Of the 52% of OFRF grants that have been awarded to grantees in the western region[4], 56% of these have gone to grantees in California.

Despite the disproportionately large number of grants made in California, the proportion of grants made in this state has decreased over time. A full 79% of grants made to California grantees were made prior to the year 2000; only 21% of the grants made to California have been awarded in 2000-2005.

Since OFRF's competitive grants program began, significant organic research programs have become institutionalized at a number of land grant universities and at some USDA-ARS research stations. Based on organic research acres in the land grant system documented by OFRF (Sooby 2003), the southern region surprisingly has the largest number of dedicated organic research acres of any of the four SARE regions (see Table 2). The west has the fewest institutional organic research

[3]OFRF has also been the fiscal agent for 12 donor-directed grants during this time period. Donor-directed grants are not analyzed in this report.

[4]SARE regions are used for this analysis. States in the western region are Alaska, Arizona, California, Colorado, Hawaii, Idaho, Montana, Nevada, New Mexico, Oregon, Utah, Washington, and Wyoming.

acres. If one of OFRF's goals for the grant program is to encourage the institutionalization of organic farming research in the land grant system, then continuing to make grants to land grant-based researchers in the western region, and in California, is justifiable.

**Table 2. Geographical distribution of organic research acres in the U.S. land grant system.***

| SARE region | # of dedicated organic research acres | # of states with dedicated organic research acres |
|---|---|---|
| South | 504.65 | 9 |
| North central | 327.29 | 10 |
| Northeast | 189.37 | 9 |
| West | 140.04 | 9 |
| **Total** | **1,161.35** | **37** |

* Based on data from Sooby, 2003.

**Table 3. Geographical and recipient analysis of the OFRF competitive grant portfolio 1992-2005.***

| Region | # of grants | % of # grants | $ spent | % of $ spent | Recipient type | # of grants | % of # grants | $ spent | % of $ spent |
|---|---|---|---|---|---|---|---|---|---|
| Western U.S. | 110 | 52 | 663,839 | 51 | Professional researcher[5] | 143 | 67 | 933,071 | 72 |
| North central U.S. | 27 | 13 | 185,124 | 14 | Farmer | 32 | 15 | 165,789 | 13 |
| Northeastern U.S. | 33 | 15 | 238,187 | 18 | Non-profit | 18 | 18 | 200,775 | 15 |
| Southern U.S. | 27 | 13 | 143,242 | 11 | Total | 213 | 100 | 1,299,635 | 100 |
| Canada | 15 | 7 | 64,243 | 5 | | | | | |
| International | 1 | 0.5 | 5,000 | 0.4 | | | | | |
| Total | 213 | 100.5 | 1,299,635 | 99.4 | | | | | |

* Does not include donor-directed funds. Twelve donor-directed grants totaling $127,170 have been made since 1992. An additional $2,500 was donated to the Greenmarket Farmers Fund in New York for Sept. 11 relief; and $3,500 was allocated in fall 2001 to underwrite regional organic farmers' conferences.

## Western region

Grant recipients in the western region have received 52% of OFRF grants (Table 3). Standouts include the body of organic work conducted over his career by Univ. of California (UC) Santa Cruz-based entomologist Sean Swezey; the organic wheat breeding program developed by Stephen Jones at Washington State Univ.; Mark Van Horn's work at UC Davis on controlling garden symphylans; Jodi Johnson-Maynard's study at Univ. of Idaho on brassica meal in organic vegetable production; Colorado State Univ. Cooperative Extension agent Thaddeus Gourd's

[5]Includes professional researchers from land grant universities, other colleges, Cooperative Extension, USDA-ARS, the now-defunct Frontier Organic Research Farm, Canada's Pacific Agri-Food Research Centre, and freelance professional researchers and consultants.

study on flaming for weed control; Colorado fruit grower Steve Ela's[6] three-year study on weed control strategies in orchards; and Joji Muramoto's studies on organic vegetable and strawberry production.

### Northeastern region[7]

Recipients in the northeastern U.S. have been awarded 15% of OFRF grants, with most of these grants (45% of them) being awarded to researchers based at Cornell University. Cornell's organic programs, especially in horticulture, have grown significantly since 2001. (See Sooby 2003 for documentation.)

OFRF has funded other significant organic research in the northeast, including Ruth Hazzard's work at Univ. of Massachusetts to develop a system for controlling corn earworm in organic sweetcorn, which resulted in refinement of the Zealator oil applicator; Kim Stoner's organic biocontrol efforts at the Connecticut Agricultural Experiment Station; and Caragh Fitzgerald's pioneering work with cover crops in organic systems for Maryland Cooperative Extension.

### Southern region[8]

OFRF support for organic research in the south came early, with the first grant made in 1993 (for $985) to a couple of organic farmers in Alabama who wanted to experiment with a living mulch and on-farm composting. Altogether, 13% of OFRF grants have been made to recipients in the southern region. Noteworthy grantees based in the south include Mark Schonbeck, who conducted studies on cation balancing in organic soils; Nancy Creamer who received an OFRF grant early in her career at North Carolina State Univ., where she now heads one of the largest organic research programs in the country; and Ron Morse out of Virginia Tech, who has established a significant organic no-till project in the region.

### North central region[9]

Grantees in the north central region have received 13% of OFRF grants. This region has been fairly late in coming to OFRF funding: of 27 grants made there, only seven (26%) were made prior to the year 2000. Support for research in this region has increased over time. Standouts in this region include three significant organic breeding efforts: Walter Goldstein's open-pollinated corn breeding at the Michael Fields Agricultural Institute in Wisconsin; Phil Rzewnicki's on-farm, community corn breeding project in Ohio; and Patrick Carr's small grain breeding effort out of North Dakota State Univ.

Outstanding organic food quality research is also being done in this region. Ted Carey is starting to make inroads in organic horticulture at Kansas State Univ. through OFRF support to study food quality of organic lettuce. Ron and Maria Rosmann's project on the quality of grass-fed ver-

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[6]Steve Ela was originally funded in 2000. He joined the OFRF Board of Directors in 2001, and was elected President of the Board in 2004. His term is likely to continue through 2007.

[7]SARE regions are used for this analysis. States in the northeastern region are Connecticut, Delaware, Maine, Massachusetts, Maryland, New Hampshire, New Jersey, New York, Pennsylvania, Rhode Island, West Virginia, Vermont, and Washington, D.C.

[8]SARE regions are used for this analysis. States in the southern region are Alabama, Arkansas, Florida, Georgia, Kentucky, Louisiana, Mississippi, North Carolina, Oklahoma, South Carolina, Tennessee, Texas, and Virginia.

[9]SARE regions are used for this analysis. States in the north central region are Illinois, Indiana, Iowa, Kansas, Michigan, Minnesota, Missouri, Nebraska, North Dakota, Ohio, South Dakota, and Wisconsin.

sus feedlot-finished organic beef, conducted in cooperation with an Iowa State Univ. animal scientist on their Iowa farm, generated unique data that document the nutritional benefit of organic and grass-fed food.

### Canada and international grants

OFRF has made 15 grants to recipients in Canada, and one international grant to a recipient in Poland. The OFRF Board considers that North America is its primary region of interest, and in 1999 issued language clarifying this and setting forth rigorous criteria for funding international proposals. Since then, no international grants have been awarded.

Standout grants made to Canadian investigators include three years of support to Todd Kabaluk, Integrated Pest Management (IPM) research biologist with Pacific Agri-Food Research Centre in Agassiz, British Columbia, to develop a fungus as a biological control for wireworm; Janet Allen's study on alternative parasiticides in organic sheep production; and a study by veterinarian Fernando Moncayo on the use of homoeopathic preparations for treatment of mastitis in organic dairy cows.

## Recipient analysis

Grants are classified as having been made to farmers, non-profits, or professional researchers. This last category includes scientists from land grant universities, Cooperative Extension, public and private colleges, USDA's Agricultural Research Service (ARS)[10], the now-defunct Frontier Organic Research Farm, Canada's Pacific Agri-Food Research Centre, and freelance professional researchers and consultants.

The distribution of OFRF research grants (see Table 3) reflects the reality that most organic farmers simply do not have the time or the inclination to conduct formal research on their farms: only 15% of OFRF grants have been made to farmer primary investigators (PIs). Professional researchers have been awarded 67% of OFRF grants, and PIs based at non-profits have received 18% of OFRF grants.

OFRF has played a sometimes direct and often indirect role in institutionalizing on-going and self-funding organic research initiatives in a number of land grant settings. Specific entities impacted include Cornell Univ., North Carolina State Univ., Washington State Univ., Florida State Univ., Univ. of Idaho, Univ. of Arkansas, Colorado State Univ., Virginia Tech. Univ., and Kansas State Univ.

Non-profit organizations employing personnel that have been awarded OFRF research grants include Oregon Tilth, the Organic Materials Review Institute (OMRI), the Land Institute, Bat Conservation International, the Bio-Integral Resource Center, Virginia Assoc. for Biological Farming, Michael Fields Agricultural Institute, Practical Farmers of Iowa, the Organic Seed

[10]To date, two OFRF grants have been made to ARS-based researchers: David Horton in Wapato, WA, to study orchard understory management, in 1998; and to Eric Brennan in Salinas, CA, to study cover crops in organic vegetable production, funded in 2002 and renewed in 2004.

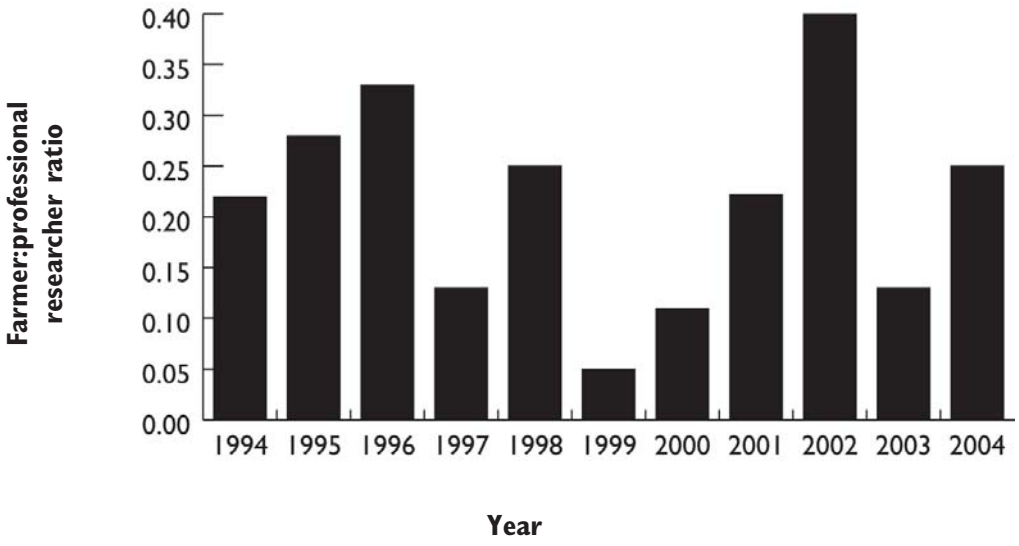
Alliance, and the Wild Farm Alliance. The majority of OFRF's grants to non-profits have been made for educational grants, including grants to Canadian Organic Growers, Appropriate Technology Transfer to Rural Areas (ATTRA), and the Alternative Energy Resources Organization (AERO) in Montana. See the section on educational grants for more details.

### Proportion of farmer grants

Because OFRF started out with the ideal of supporting farmer-led projects, one might reasonably suppose that the majority of farmer grants were made in the early years of OFRF's history. While numerically more farmer grants have been made after 1998 than during the period 1992-1998, a clearer picture emerges when the ratio of farmer:professional researcher grants is scrutinized (see Fig. 1). In the first year of the competitive grants program (1992), farmers received two of the three research grants.[11] In 1993, the farmer:professional researcher ratio was at its second highest level of 4:4. These two years are omitted from the figure so that later trends are more readily visible. While farmer PIs were awarded a large proportion of the earliest grants funded by OFRF, their numbers soon drop off. In 2002, a significant number of farmer grants were made, and OFRF had its highest contemporary farmer:professional researcher ratio of 6:15.

These patterns indicate that farmer interest in conducting formal research studies has varied over the years, with peaks in 1992 and 1993 (not shown), 1996, and 2002. Farmer grants have represented less than 30% of OFRF research grants made in 9 of 11 years.

**Figure 1. Ratio of farmer:professional researcher grants each year***



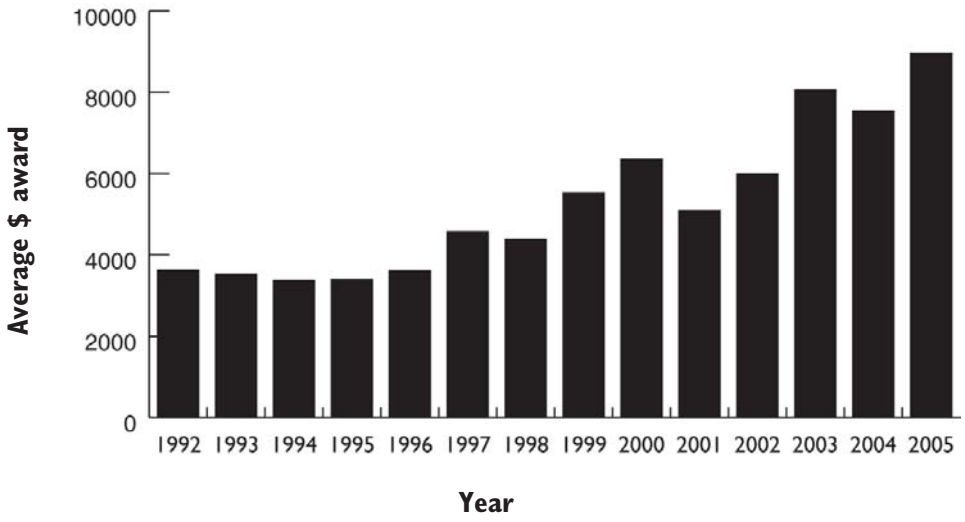

*Educational grants and non-profit grant recipients are excluded

[11]The first three research grants made by OFRF were to Alfred White of Husch Vineyards, Philo, CA, to conduct a trial of cahaba vetch tea as a nematicide (no report received); to Carl Rosato of Woodleaf Farms, Oroville, CA, to test materials for brown rot control in organic peaches; and to Sean Swezey, Center for Agroecology and Sustainable Food Systems at UC Santa Cruz, to develop temperature-based methods for codling moth management.

## Grant size

The maximum size of OFRF grant awards has changed over the years (see Fig. 2), though upper limits for funding have generally been kept flexible rather than rigid, and most grants have been made well below the upper limit. From 1992-1998, $3,000-5,000 was considered to be the upper limit for OFRF grants. In 1998, the Board approved raising the maximum grant size to $10,000 in time for the 1999 funding cycles. In 2001, the maximum grant size was increased to $15,000. Therefore we can examine three distinct eras of OFRF grantmaking in terms of grant size: 1992-1998, 1999-2001, and 2002-2005 (see Table 4).

**Figure 2. Average size (in dollars) of OFRF grant awards, per grantmaking year.**




Farmer grants are generally funded at about 80% of the amount granted to professional researchers. Staff observation is that farmers generally submit lower budgets for research projects than professional researchers. Overall, the average amount of a grant made to a professional researcher was $6,525, while the average amount of a grant made to a farmer was $5,181. Non-profits received grants averaging $5,284 (Table 4).

**Table 4. Average grant size for each type of grant recipient in three eras of OFRF funding.**

| Recipient type | Maximum grant size per funding era | | | Overall |
|---|---|---|---|---|
| | 1992-1998 | 1999-2001 | 2002-2005 | |
| | $3,000-5,000 | $10,000 | $15,000 | |
| Farmer | $3,171 | $5,574 | $7,489 | $5,181 |
| Non-profit | $3,731 | $6,388 | $8,515 | $5,284 |
| Professional | $3,923 | $6,153 | $9,183 | $6,525 |

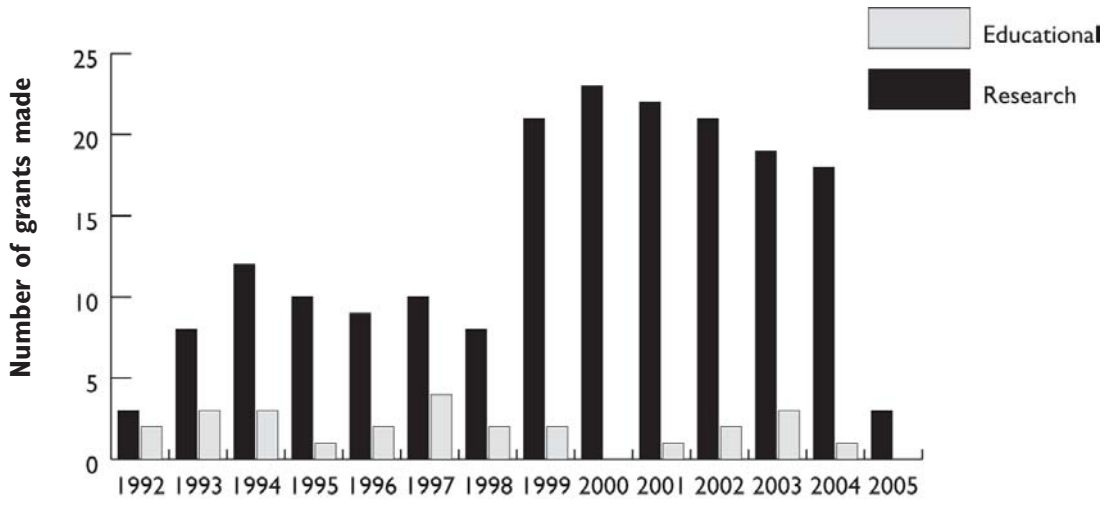
## Historical distribution

OFRF makes two kinds of grants through its competitive program: educational grants and research grants. Educational grants are focused on developing educational materials or convening educational events, while research grants are focused on conducting production or economic research.

Between 1992-1998, no more than 12 research grants were made in any given year (Fig. 3). In 1999, the grants program expanded significantly, making 21 research grants that year. In this year, OFRF hired a "technical program coordinator" to manage the grants program and advise the Board of Directors on technical and scientific issues related to research. The Board also increased the line item for grants in its budget in this and subsequent years. The growth trend in grantmaking continued in 2000-2004. This trend did not extend to educational grants. Their numbers dwindled during this period (see Fig. 3).

OFRF held only a single funding cycle in 2005, and took the opportunity to spend the other half of the year investing OFRF Board and staff time into evaluating the grants program as part of the technical and grants program assessment. A total of three grants were made in 2005.

**Figure 3. Number of research and education grants made each year.**




## Topical analysis

Table 5 presents the breakdown of OFRF grants by topic and by crop. Projects fit into one of 12 topical categories. Insects, weeds, and disease projects refer to work that has been done to control these pests. Educational grants are broken out as a distinct topical group; all the others are considered to be research grants. "Systems" describes projects that investigated more than one aspect of production of a particular crop. For example, a no-till project that focused on weed control was classified as a weeds project, while a no-till project more generally aimed at developing no-till practices was classified as a systems project. "Food quality" describes projects that analyze the nutrient composition or other quality parameters of organic foods.

**Table 5. Topical analysis of the OFRF competitive grants portfolio 1992-2005.**

| Topic | # funded | % of # funded | $ spent | % of $ spent | Crop | # funded | % of # funded | $ spent | % of $ spent |
|---|---|---|---|---|---|---|---|---|---|
| Insects | 50 | 23 | 252,488 | 19 | Vegetables | 82 | 47 | 526,402 | 47 |
| Weeds | 28 | 13 | 165,742 | 13 | Grain | 21 | 12 | 190,669 | 17 |
| Disease | 27 | 13 | 164,531 | 13 | Apples | 18 | 10 | 95,454 | 9 |
| Educational | 26 | 12 | 119,662 | 9 | Fruit | 18 | 10 | 82,052 | 7 |
| Systems | 25 | 12 | 155,411 | 12 | Tomatoes | 9 | 5 | 48,529 | 4 |
| Fertility mgm't. | 17 | 8 | 105,921 | 8 | Livestock | 7 | 4 | 67,169 | 6 |
| Breeding | 12 | 6 | 116,958 | 9 | Herbs | 7 | 4 | 41,248 | 4 |
| Cover crops | 10 | 5 | 89,052 | 7 | Grapes | 5 | 3 | 19,819 | 2 |
| Food quality | 9 | 4 | 84,094 | 6 | Strawberries | 3 | 2 | 23,991 | 2 |
| Livestock | 5 | 2 | 23,521 | 2 | Citrus | 2 | 1 | 10,497 | 1 |
| Economics | 3 | 1 | 15,980 | 1 | Cotton | 2 | 1 | 5,717 | 0.5 |
| Bees | 1 | 0.5 | 6,275 | 0.5 | Mushrooms | 1 | 0.6 | 5,000 | 0.4 |
| Total | 213 | 99.5 | 1,299,635 | 99.5 | Total | 175 | 99.6 | 1,116,547 | 99.9 |
| | | | | | Not crop specific | | | 183,088 | |

The crop categories refer to the specific organic product for which practices are being tested or refined in each project. "Fruit" and "vegetables" are general categories used to classify crops that aren't counted separately. Apples, grapes, strawberries, tomato, citrus, and cotton were counted separately because they are such significant crops in organic production. "Grain" refers to corn, soybeans, wheat, other small grains, and hay studies.

There are three types of livestock projects: those related to livestock production, those related to the quality of organic livestock products, and educational projects on livestock. Livestock production studies are listed under "livestock" as the topic, with an additional two of these studies categorized as "systems" studies because of their broader scope. Projects related to quality of livestock products are classified as "food quality" projects with "livestock" as the crop, and livestock educational efforts are listed under the "educational" topic area with "livestock" as the crop.

Economics is a distinct topic area for three OFRF-funded projects, which focused primarily on analyzing market aspects of organic agriculture. Economic analyses are also presented in many of the research reports submitted on production-related topics.

The top five topic areas of OFRF-funded research are, in descending order, insects, weeds, disease, educational, and systems. The topics where the portfolio is weakest are in economics and livestock.

# Chapter 3 Impacts of OFRF Grants

## Impacts on recipients

Initiative, hard work, creative thinking, and collaborative effort made by OFRF grant recipients is the basis for the strong impact OFRF grants have had on organic theory and practice. It is the people who conduct high quality organic research and share their findings with the larger community who help improve organic farming practices, spur growth in the organic movement, and make the study of organic agriculture an increasingly viable career path for professional researchers. This in turn contributes to the growth of the organic canon of published research, which is becoming an increasingly important source of scientific information. Nothing would be accomplished without the hard work of the farmers, Extension personnel, professional researchers, and non-profit-based investigators willing to take on this challenging work. Often isolated in conventional settings, OFRF grant recipients found allies and built community while pursuing organic knowledge.

## Farmer recipients

OFRF has made a total of 32 grants to farmer primary investigators (PIs). Of these, 26 are unique projects, while four of them are multi-year projects that were renewed at least once.

The most common topic area that farmers studied was insect control, with 7/26 (27%) such projects funded. Farmers are responsible for conducting 4/12 (33%) of all livestock projects funded by OFRF, including one project that looked at the nutritional value of grass-finished compared with feedlot-finished organic beef. A recently-awarded "systems" grant was made to a farmer investigator examining the integration of annual vegetable crops with pastured livestock.

Farmer grants have a relatively high rate of being "unsuccessful," earning that distinction for 7 of the 26 unique grants made (27%). Four of these are failures due to a final report never being submitted. The 27% failure rate is higher than the foundation's overall rate of 8% unsuccessful projects funded, and deserves further investigation. (Please see section on risk assessment for more detail.)

Farmer grant recipient Katherine Kelly places this statistic into perspective: "In doing this project, I've gained greater clarity about the benefit of funding farmers for research. The data won't be collected as rigorously as in university research, but it will have a greater effect on the farming community. It's a higher risk to fund someone like me, and there will be a higher failure rate, but the payoff will be that, even when the research doesn't work, if the farmer is someone who talks with other growers, they'll have a greater impact on the growers' community."

### Impacts on practices

Interviews conducted with seven farmers who received OFRF grants showed that valuable information was generated by these research projects that continues to inform the growers' practices even today. Some of the farmers interviewed had received grants as early as 1993.

All of the farmer grantees interviewed said that the research findings were of practical use to them in making management decisions, and all had changed their production practices as a result.

Examples of kinds of practices that were changed as a result of OFRF-funded research include:

- While guinea fowl were not adequate to completely control plum curculio in apple orchards, they did decrease pest numbers. The grower has constructed a guinea fowl shelter in another orchard.
- Learned what kind of crops would grow under the specific lighting conditions found under high tunnels and has constructed five high tunnels for summer vegetable production on the farm.
- Discovered that any program to produce organic lamb would have to rely on grazing management rather than treating animals with natural products to control internal parasites. This grower is no longer producing organic lamb.
- Learned mechanics of using mulch clippings to make compost and how labor-intensive it is. These farmers are now doing in-bed composting.
- Discovered a method of managing cover crop residues to discourage Colorado potato beetle and has been able to expand potato acreage and apply the system to other crops.
- Formalizing disease nurseries using replications and adequate sample size enabled differences between crop varieties to be seen right away, and gave insight into a different plant spacing for making better selections.
- Found a disease-resistant tomato variety that would grow under tropical conditions.

### Impacts on other farmers

While none reported that their results specifically inspired other farmers to transition to organic production, OFRF farmer recipients described other impacts that their projects had on the community:

- *People who wanted to grow tomatoes organically and just couldn't do it, could. … It became the favored variety of tomato locally.* [This grower found a disease-resistant tomato variety and shared the seeds with her community.]
- [The project encouraged people...] *to adopt the high tunnel and to use shade cloth. … Because we're centrally located, next summer we'll have four different models of high tunnels on the property. This is definitely a place that people come to for information on that kind of stuff.*
- *I think that it made organic growers more interested in organic seed.*
- *I definitely run into growers who've seen talks I've given about this technique, and they've told me that they've tried it themselves. Some have not had good results, others have incorporated it into their farms. The ones who haven't had a good result, I think they haven't waited until the biology changes in the soil.*

### Other impacts

Five of seven, or 71% of farmer grantees, reported that the results of the project helped with farm profitability. Only three of seven, or 43%, reported that the project had changed the farm's ecology. None reported that their project had led to the certification of any land. All reported

that the OFRF-funded work inspired other research questions, and most of them were continuing to study them, though informally.

## Professional researcher recipients

OFRF has made a total of 143 grants to professional researcher primary investigators (PIs), 110 of which are unique projects. Twenty-four of them are multi-year projects that were renewed at least once.

The most common topic area that professional researchers studied was insect management, with 29 of 110 (26%) such projects funded. Weed management research tied with systems projects as the second most common topic area for professional researchers, with 17 of 110 (15%) projects funded in each of these categories.

Professional researcher grants have a low "failure" rate, earning that distinction for only 8 of the 110 unique grants made (7%). Three-quarters of these (6/8) are due to never submitting a final report. More on this in the risk assessment section.

### Impacts on research programs and/or career direction

Twenty-four of OFRF's professional researcher grant recipients were interviewed to assess the impact the OFRF grant had on the individuals, their careers, and their institutions. All but one of those interviewed are university-based researchers. Three non-profit-based grantees were also interviewed, and their responses pooled with the responses from "professional" researchers in the following discussion.

A slight majority of professional researcher grant recipients reported that the OFRF grant changed their research program and/or career direction. For many of them, the OFRF grant allowed them to do work that was difficult if not impossible to fund using other sources. Two grant recipients from this sample have gone on to pursue Ph.D.'s as a consequence of the positive experience they had with OFRF-funded research[12]. At least five other graduate students were identified from this sample who completed their theses or dissertations with OFRF funding. One grant recipient, Don Lotter, states that OFRF funding "enabled" his career as an organic educator and helped to make it happen.

Of the 12 university-based grant recipients who reported that OFRF funding did not materially change their research program and/or career direction, six were already interested in or conducting organic research when they received the OFRF grant. Many of these grantees report that the OFRF funding allowed them to do organic work that otherwise wouldn't have been funded.

### Impacts on scientific publications and outreach

All professional researcher grantees reported that their OFRF-funded work has either resulted in or is about to result in at least one publication or presentation. The 27 grantees report at least 54 articles or other materials published, and 24 presentations made to grower or to academic audiences. Appendix B presents a partial list of citations resulting from OFRF-funded work.

[12]Renée Prasad and Linda Tikofsky

### Impacts on teaching or farmer advising

Eighteen of 27 (67%) professional researcher grant recipients report that the OFRF-funded project changed their teaching or farmer advising. Eight of these reported that their recommendations to farmers or students have been directly impacted:

- *We could speak more confidently about nitrogen availability in vegetable systems because we had good data from those plots.*
- *It opened the door and we are now doing presentations on organic dairy to the vet students.*
- *We used the data to reach conventional growers with methods to incorporate mustards into larger-scale systems.*
- *I incorporated the use of summer cover crops into farmer talks and encouraged farmers to use them.*
- *We did a small project on tomato disease management and now have information to offer that we didn't have before.*
- *This information helped farmers to select the best implement for their operations.*
- *It changed our recommendations. We now urge caution with the use of soybean meal as fertilizer. We know it can cause burn on the plants.*
- *We have modified and expanded the use of intercropping and resistant varieties as part of our grower education.*

### Experience with farmer cooperators

Of the 22 professional researchers who worked with farmer cooperators, 100% of them reported having a satisfactory experience with their cooperators, though a few glitches were also reported such as late planting or tilling in a beetle bank. Some of the researchers' comments about their farmer cooperators were:

- *The experience at all levels was excellent. We occasionally used his equipment and of course his advice played an important role in the success of the project.*
- *Almost exclusively, a good experience with farmer cooperators was essential to the success of the research funded by OFRF. … With few exceptions, the goals of the experiments and the economic implications are all discussed beforehand, and we met regularly with the farmer cooperators after each field season.*
- *We picked a good group of growers. I was astounded because they stuck with the project. Three years is a long time to stick with it. I feel they are friends and colleagues now.*
- *Cornell had a bad reputation in the organic community. People were kind of hesitant. But the project helped build bonds and now it's easy for me to approach the organic community for support. They've volunteered to help and have written letters of support for other organic work.*
- *The farmers are very interested in the results to demonstrate that their produce is nutritionally superior.*
- *Getting a good cooperator is everything. I have worked with all kinds of cooperators over the past 20 years. You get so much feedback from them about what's going on. It helps you to ask better questions and have a better feel for what's going on out there. Also, having someone experienced and knowledgeable to take care of the plots—even on the research station you don't get that.*

Some researchers credit their OFRF-funded project with shedding more light on the farmer-cooperator relationship:

- *It taught me about the importance of the dynamic of working closely with growers.*
- *It influenced how I approach the reality of collaboration and expectation of on-farm research.*
- *It forced me to think of how to explain things in ecological terms. Organic farmers think this way: think of it as a system.*

### Difference between organic and conventional research

Seventy percent of professional researcher grantees believe that organic research is fundamentally different from conventional research. The most prevalent reasons for this were the systems nature of organic research, and the necessity for doing on-farm work. Cooperating with organic farmers or conducting research on certified research ground leads to additional issues of using only compliant materials, and at times having less flexibility to deal with weeds and other pest problems. Organic materials also tend to be more costly than chemicals. Others noted that the re-entry interval for sprayed fields or orchards is not an issue in organic research as it can be in conventional.

Some researchers think that organic research should be conducted over the long term, and observed that locating plots for long-term trials can be difficult. Grantees also pointed out the difficulty of finding funding for organic research as being another distinction between organic and conventional research.

Two researchers stated that organic research is simply more fun than conventional research, largely because the systems aspect of it is challenging, and the required collaborations of on-farm and interdisciplinary research lead to more interaction with others.

### OFRF-funded work leading to on-going organic research

Twelve of the professional researcher grantees (44%) reported that the OFRF-funded work contributed or led to on-going organic research at their institution, while nine grantees (33%) reported that it did not lead to on-going organic work. Four grantees (15%) reported that organic research was already being conducted at their institutions. Two non-profit-based respondents answered this question with "not applicable" (7%).

Projects initiated as a consequence of an OFRF grant include:

- A major organic research project at Univ. of Idaho, focusing on using mustards in rotations, and on using brassica meal for disease control and as a fertility amendment in vegetables. Organic plots are now a regular stop at the annual field day.
- Karen Klonsky has continued to analyze registration data from the California Dept. of Food and Agriculture Organic Program. The funding has been assumed by the Agricultural Issues Center at the Univ. of California Davis.
- On-going organic herb research at New Mexico State Univ.'s Sustainable Agriculture Science Center at Alcalde.
- Nancy Creamer reports that after she received a grant from OFRF in 1995 to study summer cover crops for weed suppression, "a whole group started getting together to talk and think about organic," which ultimately led to the significant organic research effort being undertaken at North Carolina State Univ.

- Follow-up work in California vineyards on the phylloxera-disease complex as affected by compost applications and organic management.

### OFRF-funded work leading to certification of research ground

Four OFRF professional researcher grantees (15%) reported that the OFRF grant led to organic certification of public research ground, totaling 5.75 certified organic research acres in Kansas, California, Idaho, and Washington. Three other university-based grantees (11%) reported that the OFRF funding was one of the factors in getting research land certified. Eighteen grantees, or 67%, reported that the OFRF grant did not lead to certification of research land either on-farm or on-station. Twenty-two respondents (81%) reported having a "satisfactory experience" with their farmer/cooperator(s), suggesting that a large majority of OFRF-funded work is conducted on-farm. Two grantees (7%) answered that this question was "not applicable."

### Follow-up on OFRF-funded research

Eighty-nine percent of professional researcher grantees reported that the OFRF-funded work led to other research questions, and 79% of them have investigated the follow-up topics, which include:

- European corn borer management in organic corn
- Soybean meal and seeds, fish emulsion and seaweed extracts as organic fertility inputs
- Trying to understand the movement of predatory insects between cover floor and canopy in organic orchards
- Developing a soluble organic fertilizer mixture
- Interaction of rainfall and retention of beneficial microorganisms on leaf surfaces
- Applying different types of organic fertilizers, composts, and green manure crops, including application rates and timing
- Long-term conversion studies in apples and cotton
- Disease control in tomato with intercropped cover crops, compost, and varietal resistance
- Weed control close to the rows
- Distinguishing types of *E. coli* based on their virulence and risk
- Organic production of lovage, lavender, and Chinese herbs
- Using a summer cover crop as a hay cash crop
- Mechanically killing cover crops
- What are the exit and entry patterns of organic farmers? What percentage of organic farmers are certified?
- What creates the difference in antimicrobial resistance between *Staphylococcus aureus* in conventional and organic dairy cows? Is it a change in the type of bacteria, is some mechanism turned off, is there a genetic change?

### Matching funds and leveraging resources

Seventy-eight percent of professional researcher grantees interviewed either matched OFRF funding with other resources or leveraged additional resources to continue follow-up work. The most commonly cited source of leveraged resources was departmental funds for primary investigator and grad student salaries, and lab access. Other leveraged resources included grower contributions, which one researcher estimated to equal $2,500-3,000 per season in time and energy; donation of materials; equipment; and other grant funds.

Appendix A presents a list of other sources cited by OFRF grantees as having provided support for organic research.

Even some who didn't receive matching funds for the OFRF-funded work were able to leverage other sources to fund organic research. Carol Miles at Washington State Univ. Extension explains: "I applied for a Washington State Commission for Pesticide Registration matching grant, but they said OFRF funds were not a legitimate match. So I complained and now the commission has 'new' funds for organic/non-pesticide research of more than $200,000 annually."

Six of the 27 professional researcher grant recipients leveraged additional funding of over $3.5 million to conduct research and education on related topics. Major research and outreach programs that were formed as a follow-up to OFRF-funded work include:

- $1 million in funds from various sources to document the transition from conventional to organic dairy in New York. Grantee: Linda Tikofsky
- $800,000 for a three-state project on the use of high tunnels for organic vegetable production in the Midwest. Grantee: Edward Carey
- $600,000 for a large-scale rotation study on the production and use of brassica meal in Idaho. Grantee: Jodi Johnson-Maynard
- $571,902 for a project investigating optimal nutrient management for organic vegetables and strawberries on the Central Coast of California. Grantee: Joji Muramoto
- $500,000 estimate for matching funds "seeded" by OFRF grants to California organic researcher Sean Swezey
- $100,000 to expand the educational effort to train ag technical service providers in Montana on organic practices. Grantee: Jonda Crosby.

## Non-profit recipients

OFRF has made a total of 38 grants to primary investigators (PIs) based at non-profit organizations, 29 of which are unique projects. Four of them are multi-year projects that were renewed at least once. One of them, an educational grant in support of the column *Science You Can Use* written by Brian Baker for the CCOF newsletter, was funded a total of six times over a period of six years (1993-1998).

The most common topic area for non-profit-based PIs was education, with 16/29 (55%) of the unique grants to non-profits going toward educational projects. Non-profit-based grantees have received a large majority of OFRF educational grants, receiving 22/26 (85%) of them (including multi-year renewals of funding). More detail on the educational grant portfolio is presented in the next section.

Non-profit-based grants have all (so far) resulted in a satisfactory report to the foundation, which makes this group of grant recipients the only one with a 0% rate of unsuccessful projects.

### Research grants to non-profit recipients

While 55% of the grants made to non-profit based recipients were educational grants, the remainder of grants made to non-profits (N = 13 distinct projects) form an intriguing mini-portfolio of research topics. Research topics studied by non-profit based investigators include 5/12 (42%) of OFRF-funded livestock projects, two significant crop breeding projects, and uptake of organochlorine pesticide residues into organic vegetable tissues.

Other outstanding research grants made to non-profit based researchers include a study by Marc Lappé of the Center for Ethics and Toxics on phytoestrogen levels in genetically modified vs. normal soy; work by Walter Goldstein with the Michael Fields Institute for Agriculture to develop open-pollinated, organic corn varieties; work by Derrick Exner with Practical Farmers of Iowa to trial numerous "natural" parasiticides for organic livestock; and a project by Mark Kiser with Bat Conservation International to construct bat houses on organic farms and monitor the effects on insect pest populations.

## Impacts on education

## Educational grants

Twenty-six, or 12%, of OFRF's grants have been for projects that are primarily educational in character, totaling $119,662 (9% of total amount disbursed). Twenty of these are unique projects, and two of them are multi-year projects that were renewed at least once. Also, 19 of the educational grants, or 73%, were made previous to the year 2000. Because most of these early grants were made to recipients in California, 58% of all educational grants awarded by OFRF have been to grant recipients in California.

### 1992-2000

The Golden Era of OFRF educational grants was between 1992-1998, when OFRF routinely provided funding for Brian Baker's *Science You Can Use* column published in the California Certified Organic Farmers (CCOF) newsletter. Baker's column was a pioneering attempt to put into "farmer language" the results of the few peer-reviewed, scientific reports on organic agriculture being produced at the time. This support totaled $20,500.

OFRF also funded other work done by Brian Baker during these years, primarily to evaluate organic materials and create the prototype of the Organic Materials Review Institute (OMRI)'s Generic Materials List and Brand Names Products List. OFRF provided crucial support to OMRI when it first became an entity independent of CCOF (B. Baker, personal communication, Sept. 7, 2005). OFRF funded three grants to OMRI or its precursor, totaling $12,500. Altogether, support for Brian Baker's work represents 28% of the educational grant total.

The work to develop materials lists for organic agriculture and establishment of OMRI has become an essential supporting mechanism for the organic industry that has been very influential in the post-Rule implementation era.

In 1992 and 1994, grants were made to a Santa Cruz County school program, Life Lab, to develop an agricultural curriculum for schoolchildren. These Life Lab grants totaled $7,500. This support facilitated developing a "Farmer for a Day" elementary-level curriculum that was piloted in Sonoma, Santa Cruz, and Yuba Counties. In 1996, Life Lab received $17,500 from the Kellogg Foundation to further develop the program. Since then, Life Lab has expanded its garden-based curricula substantially, and is a well-known national resource for science curricula for grades K-5.

Other educational grants made in California between 1993-2000 include:

- Support for the Committee for Sustainable Agriculture's conference on transitioning to organic
- Funding for a proceedings on an organic cotton production conference published by the

California Institute for Rural Studies (a non-profit organization) (this publication is available for purchase for $25 from CIRS)

- Two training manuals for the apprenticeship program at UC Santa Cruz (UCSC).

The training manuals are worthy of note. The objective for the first one was to develop an organic farming training manual encompassing the basic skills and concepts taught in UCSC's Farm & Garden Apprenticeship program. OFRF seed money attracted additional funding, leading to a more ambitious project than originally planned. The project took three years longer than expected, but a 604-page manual, *Teaching Organic Farming & Gardening: Resources for Instructors*, was completed and published in 2003. The manual is available in printed form for $45.00, or as a free download from the UCSC website. The project involved six instructional staff, seven contributing authors, more than a dozen reviewers, and almost one hundred apprentices. The OFRF seed money leveraged other resources and resulted in a useful reference able to meet the needs of many, including students, educators, Extension personnel, and farmers.

A follow-up grant was made in 2003 to develop a training manual emphasizing marketing. The manual, *Teaching Direct Marketing and Small Farm Viability: Resources for Instructors*, was published in 2005, and is similarly available as a free download or printed resource.

Educational grants made out of state during this period were:

- Support for case studies of pest control practices used by Washington state organic apple producers
- Support for a media luncheon held by the group Mothers and Others in New York City
- Support for a Canadian Organic Growers (COG) survey and publication on organic livestock production
- Support for the Northwest Coalition for Alternatives to Pesticides (NCAP) to develop a model exempting organic farmers from routine pesticide applications in Oregon.

The year 1999 was a transitional year for educational grants from OFRF. In this year, only two educational grants were made: one to the UCSC Apprenticeship program, described above, and a very important grant to George Kuepper, technical specialist with the federal information provider Appropriate Technology Transfer to Rural Areas, more commonly known as ATTRA. George proposed to develop an "Organic Matters" series of publications on organic-pertinent topics targeted primarily to experienced organic producers. With OFRF support, he and ATTRA staff produced four booklets:

1) Pursuing conservation tillage systems for organic production;
2) Considerations in organic apple production;
3) Considerations in organic hog production; and
4) Protecting water quality on organic farms

These publications are available for free in hard copy format and from the web. ATTRA promoted them through many outlets, and the publications were mailed to all state Extension Sustainable Ag Coordinators and to 49 agricultural non-profit organizations. The ATTRA webmaster reports that these reports received 18,752 "hits" on the website in 2005 ( see appendix D for specifics).

ATTRA has continued the series, producing a wide array of publications on organic production of many crop types. George has worked with USDA's National Organic Program to develop certification check sheets and other reference materials for farmers to use when applying for organic certification.

While ATTRA had already been an invaluable resource on alternative agricultural practices, OFRF funding spearheaded the organic-specific effort by ATTRA.

**2000–2005**

The year 2000 was unusual in that not one educational project was funded that year. The OFRF Research & Education (R&E) Committee, charged with evaluating proposals submitted to the competitive grants program, was becoming increasingly aware of the need to separately evaluate educational and research proposals because the educational proposals had a hard time competing with research proposals for support. By spring 2002, the R&E Committee had set specific criteria for funding educational grants and began evaluating them separately from research grants. Since then, only six educational projects have been funded in the seven funding cycles. Clearly, having separate criteria for educational projects is not resulting in larger numbers of educational grants being funded.

In 2001, Univ. of Louisiana—Lafayette assistant professor Durga Poudel's organic demonstration project attracted support from the committee, which was interested in spurring more organic research in the South. Durga's project consisted of both research and demonstration of the results. The most significant impact of this work is that it brought together 70 growers, Extension personnel, and researchers in Louisiana to discuss organic issues, and initiated a formal organic research and demonstration program there.

Durga reports that in spite of the recent hurricanes, his organic research is continuing. He hosted a conference "Can organic work for Louisiana farmers?" organized by the Independent Organic Inspectors Association (IOIA), in October 2005.


*Organic Farming Research and Demonstration Plots at UL Lafayette research farm in St. Martin Parish, Louisiana. Photo by Durga Poudel.*

Another educational grant, to train ag technical service providers in Montana on organic practices, was made in 2003 to Jonda Crosby with the Alternative Energy Resources Organization (AERO), and then successfully leveraged to bring in an additional $100,000 in grant funds to expand the educational effort.

Jonda said, "We are a sustainable ag organization, so we never thought of ourselves as an organic organization. Once we started having organic tours, this organic thing started happening. Then we got a USDA SARE grant for $32,000, then an NRCS grant for $36,000 and then there was a third grant from risk management from Washington State University. It was a snowball effect once we got the OFRF grant, opening the door for other organic grants." Jonda also reports that the new emphasis on organic farming helped the formation of a new organization, the Montana Organic Association.

The largest educational grant OFRF has made (for $12,700) was to the Wild Farm Alliance (WFA) based in Watsonville, CA, to support biodiversity education for organic farmers, certifiers, and the NRCS, in 2003. Originally funded to develop manuals on biodiversity for farmer and certifier reference, WFA director Jo Ann Baumgartner took the project one step further into the policy realm by developing suggested questions for inspectors to ask farmers to ensure compliance with the biodiversity standard found in the national rule. The National Organic Standards Board (NOSB) adopted these questions in Aug. 2005 to be included in the set of model questions that inspectors use when inspecting organic farms.

## Impact on practical information

OFRF funding has supported numerous projects over the years that have contributed to the body of knowledge about organic agricultural production. In this section, we will take a closer look at the contributions OFRF-funded projects have made in various areas of study.

### Organic plant breeding projects

OFRF has funded seven projects involving breeding crops under certified organic conditions. Five of these have been reported on at this time. While small in number, these grants have been influential, both in the nascent field of public organic crop breeding in the land grant system and in the grassroots organic farmer breeding movement.

### Breeding open-pollinated corn varieties

Walter Goldstein with the Michael Fields Agricultural Institute in Wisconsin received OFRF funding in 1999 to continue his decades-long effort to select for many different high value traits in organic, open-pollinated corn. Traits Goldstein focused on in these trials were high lysine and oil levels; colored corns that would retain their color through processing for making red, white, and blue corn chips; food-grade yellow corn with white cobs; large-seeded white flour corn; and early lines of white dent corn. Goldstein reported that only blue or red seeded corn that had white endosperms would retain their color in chips; attempts to breed food-grade yellow corn with white cobs were not very successful; and progress was made in selecting for the other traits.

The corn breeding effort at Michael Fields was started in 1989, and it continues today with Goldstein's involvement in a participatory, cooperative breeding effort between producers, Practical Farmers of Iowa, and breeders from USDA-ARS, Michael Fields Agricultural Institute, and Iowa State Univ. Goldstein presented data from his work at the Tri-Societies symposium on Organic Seed Production and Breeding for Organic Systems in Nov. 2005. Goldstein has continuously conducted outreach on the results of his breeding efforts over the years, and is a well-known speaker at organic grower conferences around the country.

### On-farm evaluation of corn varieties for organic corn production

Phil Rzewnicki was hired by Ohio State Univ. in 1998 as an on-farm research coordinator. In this position, Rzewnicki conducted a survey of organic farmers' needs, and initiated a widespread, on-farm corn breeding program. OFRF funded this work in 2000. Twelve varieties were trialed on 13 certified organic farms in Ohio, and the same varieties were grown under conventional management at four Ohio State research farms.

Rzewnicki found that plot width influences traits such as protein, starch, and lysine levels, and concluded that plots wider than 40 feet per variety are necessary to adequately evaluate grain quality to avoid measuring unintentional crossing of outer ears. He also presents valuable soils and corn nutrient data in the report. This project is an example of Extension responsiveness to farmer interests and farmer collaboration.

OFRF's grant to Phil was made in the early years of the Ohio State organic research program, Organic Food and Farming Education and Research (OFFER), based at the Ohio Agricultural Research and Development Center (OARDC) in Wooster. OFFER has since grown into one of the top organic research initiatives in the U.S. land grant system.

### Small grain and wheat cultivar selection for organic systems

In 2001, OFRF made two grants funding organic crop breeding projects. Stephen Jones from Washington State Univ. received support for his organic wheat breeding program in the Palouse region of the state, while Patrick Carr received funding to trial wheat, oats, and barley on four certified organic farms in North Dakota and Minnesota. These two grants make an interesting contrast despite their similar topic area because the investigators have differing ideas about the role of heirloom or classic germplasm in organic grain breeding programs. Jones seeks traits in historical wheat varieties that may improve contemporary varieties grown under organic conditions, while Carr thinks that "grain yield and quality may be maximized when modern rather than old commercial cultivars are grown in organic environments" (Carr 2003).


*North Dakota State University organic wheat and oat variety trials near Richardton, North Dakota. Photo courtesy of Pat Carr, NDSU.*

Both projects have developed into on-going organic breeding programs. Jones has become known as a strong advocate for public breeding programs free from industry influence and the use of genetically modified germplasm or any genetic material that is not in the public domain. He certified 11.5 acres of WSU research station land at the Spillman Farm in Pullman to be a permanent organic breeding site. Jones's program also has a strong farmer collaboration element. Jones initiated an "evolutionary participatory breeding program" that works with growers to develop varieties particularly suited for conditions on their farms.

Specific goals of Jones's winter wheat breeding program include optimizing weed competitiveness, improving nutrient use efficiency, and enhancing beneficial plant-microbe interactions (i.e. between wheat roots and vesicular-arbuscular mycorrhizae). Strong emphasis is placed on breeding for high baking and milling quality. Jones's team is making crosses to combine quality traits of older varieties with disease-resistance traits of newer varieties. OFRF felt that Jones's work was so significant that he received OFRF funding for three years. Jones received a SARE research grant in 2001 to explore perennialism in wheat, another unique aspect of his breeding program.

Carr's project, which started the year prior to OFRF funding, continued through 2004. Carr received a SARE research grant in 2002 to continue the variety trials. He has worked with the Northern Plains Sustainable Agriculture Society (NPSAS) to establish a regional network of on-farm breeding trials, and has partnered with colleagues at other land grants to broaden the geographical area where trials are done.

The results of both projects have been presented at professional scientific meetings and at many growers' conferences.

### Screening for horizontal resistance to late blight in tomato

Matthew Dillon, executive director of the Organic Seed Alliance in Port Townsend, WA, received a grant in 2004 to continue work with previously identified tomato varieties that had some degree of resistance to late blight. Field trials in 2004 were hit with early blight, so data were taken on early blight resistance as well as on late blight. Late blight came on so quickly that only two scorings were completed before the field was wiped out. Still, the two varieties identified as having highest levels of late blight resistance continued to show promise in 2005. Dillon and co-investigator John Navazio consider the project a success in that it confirmed existence of tomato germplasm that exhibited resistance to an unusually pathogenic genotype of late blight. John reports that the experience has changed his methods for assessing late blight resistance, and that he will score plants every other day in such trials in the future.

## Food quality projects

OFRF has funded nine projects related to the quality of organic food, five of which have been reported on at this time. While they are few in number, these project reports contain unique information that is difficult to find elsewhere.

### Nitrate levels in conventional and organic vegetables

Joji Muramoto, now a Research Associate with the Environmental Studies Dept. at UC Santa Cruz, was a visiting scholar from the Tokyo Univ. of Agriculture at the time he received his first OFRF grant in 1997 to compare the nitrate content in leafy vegetables from organic and conventional farms. Well-controlled studies that compare organic and conventional food quality are hard to come by, but this one qualifies. Methods were carefully designed so as to account for all possible sources of variation besides production method. Vegetable samples were purchased at retail outlets and matched for vegetable type, season, and brand. Joji found that:

1) Conventional spinach nitrate levels exceed the maximum levels specified by European Commission Regulation much more often than organic spinach.
2) Organic spinach grown using guano and Chilean nitrate tends toward higher nitrate levels than spinach grown using compost.
3) Spinach nitrate levels are affected by the rate and type of nitrogen fertilizers applied, and also by soil nitrification activity, soil texture, and harvest time.
4) Organic growers may reduce nitrate concentration in spinach using methods such as pre-plant soil nitrate testing, compost based fertility management, afternoon to evening harvest, and petiole removal.
5) California-sampled iceberg and Romaine lettuce have safe nitrate levels regardless of season and farming practice.

These results were presented at the Agronomy Society of America meeting in 1999 and in the UC Santa Cruz Center for Agroecology & Food System's newsletter, *The Cultivar*. Joji reports, "The first two grants have led me to think about developing better ways (tools) for organic nutrient management." Subsequently, he has received two additional OFRF grants, and is a co-PI on a $571,900 Integrated Organic Program grant awarded in 2004 to study *Improving Fertility and Pest Management Strategies for Organic Crop Production and Strengthening Researcher/Grower Network*. Joji credits OFRF funding with helping to leverage these funds.

### Phytoestrogen levels in conventional vs. organic soy

Renowned scientist-activist Marc Lappé received an OFRF grant in 1998 to compare the phytoestrogen[13] content of organic and conventionally-grown soybeans. This was a follow-up study to one that Marc and colleagues had conducted earlier and published in 1999 (Lappé et al. 1999) comparing phytoestrogen levels in genetically modified (GM) soy varieties and their isogenic, non-GM counterparts grown under real-life conditions. In contrast to industry studies submitted to the FDA, Lappé et al. sprayed the GM soy in their study, as would occur in real-life production. (Monsanto had submitted studies to FDA containing data from unsprayed GM beans.) Lappé et al. (1999) found "significant reduction in phytoestrogen levels of 12-14% in the genetically altered soybean strains."

[13] Phytoestrogens are estrogen-mimicking compounds manufactured by plants. They have been touted by the soybean industry as being beneficial in supporting "menopause, energy, bone and heart health," and specifically to reduce hot flashes in women going through menopause. Clinical trial data have shown mixed results. See Davis, S.R. 2001. Phytoestrogen Therapy for Menopausal Symptoms? There's No Good Evidence That It's Any Better Than Placebo. http://www.mercola.com/2001/aug/29/phytoestrogen.html

The OFRF study was done to ensure that the differences found in their original study were not due to differential herbicide use. Three food-grade soy varieties were grown in paired plots on the same farm under either conventional or organic management and tested for levels of specific biologically active isoflavones. Marc and his co-author Britt Bailey found that the beans from each system had comparable levels of phytoestrogens, with a few non-significant differences noted. While the OFRF-funded study did not compare "normal" with GM bean varieties, the results "reinforce the conclusion that the differences reported in Roundup Ready soybeans were likely a result of the genetic modification process and not differential herbicide use" (Lappé and Bailey 1999). This supported Marc's argument that genetic modification did indeed materially change the properties of the modified varieties, contrary to industry's claim of "substantial equivalence."

### Antimicrobial susceptibility of *Staphylococcus aureus* in organic and traditional dairy herds

A Cornell research team received OFRF funding in 2000 to study the susceptibility of *S. aureus* (a common bacterium that causes mastitis in dairy cows) to antibiotics in organic and conventional dairy herds. Linda Tikofsky and Ynte Schukken screened bulk milk tanks for the presence of *S. aureus*, then took milk samples directly from cows. They isolated the Staph organism found in each of the cow's milk samples and conducted an agar disk diffusion test on each to determine antibiotic susceptibility. The authors found that certified organic herds had *S. aureus* isolates that were significantly more susceptible to antimicrobials than the samples from conventional herds. The authors point out that there is little data about background levels of antimicrobial resistance in animal bacterial populations. Further investigation of this point could help determine why any resistance was found on organic dairies when the antimicrobial substances are never used there.

The results of this study were published in Microbial Drug Resistance (see appendix B for citation). The project had a profound impact on investigator Linda Tikofsky, who reports, "It really opened up a whole new avenue of research in our program at the vet school. The publication has helped me move up in the organization –probably why I'm starting a Ph.D. program in the fall." She discovered that she loves research, and rather than remain a veterinarian she now has other ambitions.

Tikofsky's goal is to get the first Ph.D. in organic dairy production. Tikofsky also reports a broader impact of this project: "It opened the door and we are now doing presentations on organic dairy to the vet students. This wasn't even in the curriculum at all—we just started the lectures last year."

Tikofsky has leveraged $1 million in funds from various sources to document the transition from conventional to organic dairy in New York, success for which she gives OFRF credit. She has also received a second grant from OFRF to study conjugated linoleic acid (CLA) levels in organic and conventional milk. The report on this project is not expected until 2006.

### Conjugated linoleic acid levels in grass-finished and grain-finished organic beef

Organic farming and on-farm research pioneers Ron and Maria Rosmann were awarded an OFRF grant in 2002 to determine quality differences between organic beef produced by cattle that are grass-finished (pastured) to those that are conventionally grain-finished (drylot). Working with Iowa State Univ. animal scientist Roberto Sonon, they found that pastured cattle required more time to attain choice grade than the drylot cattle. No difference was found in the sensory evaluation or tenderness of the different kinds of meat; but conjugated linoleic acid[14] (CLA) levels were higher in the pastured than the drylot cattle. Specifically, cis9, trans11 CLA and linolenic acid (C18:3n-3) concentrations and the ratio of omega-3 to omega-6 fatty acids in ribeye steak of pastured cattle was significantly higher than in steak of cattle fed the drylot diet.

Sonon has published reports on the study in a number of journal supplements. The reference is listed in appendix B.

### Developing sensory-based quality standards for organically-produced medicinal herbs

Univ. of Minnesota food scientist Craig Hassel received OFRF funding in 2002 to investigate quality characteristics of organically-grown herbs. While the final report de-emphasizes the role of organic management in influencing herb quality, it does reveal a significant effort invested in developing a quantitative descriptive sensory analysis (QDA) for two medicinal herbs used in Chinese medicine, Bo He (mint) and Ju Hua (chrysanthemum). Through an intensive process of formal screening and training procedures, development and use of a sensory vocabulary, and scoring products on repeated trials, Hassel and colleagues were able to obtain a complete, quantitative description of the herbs based on sensory aspects such as smell and taste. Organic herbs were used in this process. The ultimate goal of such work is to compile "a dictionary of attributes (that) might be used to convey information about medicinal herb characteristics and qualities" without resorting to chemical analyses for quality assessment.

*Ron Rosmann with spring herd, Harlan, Iowa. Photo courtesy of Ron Rosmann.*

[14]Conjugated linoleic acids (CLA) are isomers of linoleic acid, a polyunsaturated fatty acid. CLA has become a popular supplement in the health industry because of research claiming to show that CLA fights cancer, reduces body weight, and lowers cholesterol. For a popular article on the topic, supported by scientific citations, please see http://www.mercola.com/beef/cla.html

## Insect management projects

The majority of OFRF grants have been made in support of studies on insect management in organic systems. Fifty grants for insect management projects have been made altogether, with 39 of these being unique projects and nine being renewed for at least one year. The body of work that has been funded forms an impressive set of data on numerous insect management strategies. Subcategories of insect management projects funded include biological control, conservation biology, beneficial habitat plantings, life history documentation, trap crops, intercropping, and materials testing.

### Biological control

Biological control is the use of natural enemies to control pests, and has been the most prominent topic in OFRF-funded insect management projects. Nineteen of 39 unique insect management projects, or 49% of them, have studied some aspect of biological control.

### Case Study: noteworthy organic researcher

One researcher stands out in OFRF history: Sean Swezey.

Over the years he has been an entomology specialist at the Center for Agroecology & Sustainable Food Systems (CASFS) at UC Santa Cruz, Sean has created an outstanding on-farm research program that, collectively with the work of many farmers and other researchers, has worked out organic protocols for organic strawberry, cotton, apple, and artichoke production. All of Sean's research reports emphasize developing insect management systems using multiple strategies. He has a talent for finding endemic wild parasitoids and working out rearing strategies and methods to enhance populations in the field. Sean's work has been incredibly influential in organic commodity production in California, and he has been successful in leveraging other funds to continue work that OFRF funding initiated[15]. Sean states that OFRF grants "assisted as 'seed' funds to secure larger grants for commodity-specific projects in apples, artichokes, cotton and strawberries." He estimates that he has leveraged over $500,000 over the past 10-15 years with initial OFRF funding. (OFRF has invested $34,153 in Sean's work.) Sean lists eight of his many publications as having resulted from OFRF funding, including the Univ. of California Extension publication *Organic Apple Production Manual* (discussed below). These are listed in appendix B.

Sean also wins the distinction of having been awarded the largest number of OFRF competitive grants in any category: six in all, with one of these being a two-year project. All of Sean's OFRF-funded projects were focused on insect management except for a cotton transition project funded in 1993, classified as a "systems" study. Here is a summary of Sean Swezey's organic insect management research funded by OFRF.

### Temperature-based models for codling moth control in apples

Sean's very first grant in 1992—the first year of the competitive grants program—was to develop temperature-based models for codling moth management. The project included a study on the effectiveness of mating disruption with pheromones—one of the earliest studies of this prac-

[15] Sean also stated, in response to the question if he has won any awards or promotions based on his OFRF-funded work, "No. In fact, my administrative position and supporting research funds were eventually cut due to my attempts to expand organic research." Sean is referring to his removal as director of UC's Sustainable Agriculture Research and Education Program (SAREP), which he managed between 1999-2004.

tice in California. Though Sean's study showed that mating disruption treatment had higher average codling moth damage compared to conventional treatment plots (8.6% vs. 1.3%), mating disruption has since become a standard part of the organic apple grower's regime. Sean also established a hotline for growers to call to find out optimal timing for their pheromone applications based on degree-days. This hotline was operational through 2002.

### Parasitizing codling moth in apples

Sean studied the use of a parasitic wasp *Trichogramma* to parasitize codling moth in apples with a 1995 OFRF grant. Sean continued the work after the term of OFRF funding, and now both the use of mating disruption and of the *Trichogramma* wasp are standard recommendations by the Univ. of California for organic apple pest management. In 2000, Sean was lead author of the nation's first organic Extension guide, *Organic Apple Production Manual*, published by the Univ. of California, which draws from OFRF-funded work. OFRF and Bob Scowcroft, its executive director, receive an acknowledgment in the manual for supporting "additional research activities on which guidelines in this manual are based."

### Biological control of plume moth in artichokes

In 1998, Sean received the first of two years' funding to study biological control of plume moth in organic artichokes. After disappointing results the first year using mass release of a parasitoid, the second year focused on mass trapping of the plume moth. A degree-day model was used to estimate moth flight periods and was compared with capture data; however, mass trapping skewed the "normal trap patterns" and reduced the predictive ability of the model. While this project did not result in an economically feasible management program for organic artichoke growers, it provided baseline data for further work.

### Trap crops for strawberry parasitoids

Sean's most recent project, funded in 2001, was aimed at studying a variety of methods to manage *Lygus* bug in organic strawberries, including adjacent trap crops to provide parasitoid habitat; release of parasitoids; and tractor-mounted vacuuming. This project resulted in refinement of management techniques for planting an alfalfa trap crop adjacent to the strawberries and then vacuuming *Lygus* bugs out of the trap crop. These results were presented at the OFRF research panel at Eco Farm in 2006.

## Other biological control studies

### Dust impact on parasitoids in organic citrus

Phil A. Phillips has been an integrated pest management (IPM) advisor for Univ. of California Cooperative Extension and the UC IPM Project since 1980. Ventura County where Phil is based researches production of subtropical fruits such as avocadoes and citrus which are commonly grown in that part of the state. In 1995 Phil received an OFRF grant to conduct a rare type of study looking at the effect of environmental dust on beneficial parasites in transitional and organic citrus orchards. He documented an increase in parasitoid mortality corresponding with increased amounts of dust on leaves. He was also able to determine that *Aphytis melinus* (a parasite of red scale in citrus) is approximately twice as susceptible to "dust-caused mortality" as *Metaphycus helvolus* (a parasite of soft scale).

### Soil ecology of grape phylloxera

Don Lotter was a graduate student at UC Davis when he was awarded an OFRF grant in 1996 to study "Soil Ecology of Grape Phylloxera and the Potential for Biological Control." The grant helped him complete his Ph.D. His report is a noteworthy presentation of suggestive results. Don found that while organic grapevines had higher levels of phylloxera infestation on their roots than conventionally grown grapes, roots from organic grape roots had significantly less root necrosis due to secondary fungal infections than the conventional grapes. His work was continued by his professor, Jeffrey Granett, who studied the phylloxera-disease complex as affected by compost and organic methods. According to a 2001 literature review by Granett, more research is needed on cultural controls of phylloxera.

Don published a report on the work in *HortScience* in 1999, and has gone on to a career as a freelance researcher and writer, most significantly for the Rodale Institute and the *New Farm* on-line magazine. Don has also compiled a comprehensive literature review on organic agricultural research that was published in the *Journal of Sustainable Agriculture* in 2003 (see appendix B for citations).

### Fungal pathogen for microbial control of wireworm

Todd Kabaluk, an IPM biologist at the Pacific Agri-Food Research Centre in British Columbia, has received a most unusual level of on-going support from OFRF for his project to develop the use of an insect fungal pathogen as a biological control agent for wireworms. First funded in 2000, Todd's grant was renewed in 2002 and 2003. Only one other research project since Carl Rosato's materials testing work in the early 90s has been renewed three times (Stephen Jones's wheat breeding work at Washington State Univ.; please see section on crop breeding projects).

While it is too early for Todd to have submitted his final report, his interim reports have demonstrated success in using this management technique for wireworm. Todd is one of three "British Columbia organic researchers" listed on the Organic Agriculture Centre of Canada website[16]. Todd has also compiled a *Directory of Microbial Pesticides for Agricultural Crops in OECD Countries*, published in 2004 and revised in 2005 (Kabaluk and Gazdik 2005).

### Orchard floor management and biological control in Washington pears

David Horton, USDA-ARS entomologist at Wapato, WA, received an OFRF grant in 1998 to study understory management and mowing frequency on natural enemy density in organic pear orchards. When interviewed in 2005, Horton stated that the OFRF-funded project led directly to the work he is doing now, studying the effects of orchard floor management on biological control and the movement of pests and beneficials between the ground and the orchard canopy. (He also stated that the work would have been done without OFRF funding.) Horton has made numerous presentations and written many articles on this work, citations for which are in appendix B.

### Habitat manipulation for biological control in Wisconsin apples

Daniel Mahr at the Univ. Wisconsin—Madison received an OFRF grant in 1994 to study habitat manipulation for improving biological control of pests in organic apple orchards. In 2003,

[16] http://www.organicagcentre.ca/ResearchDatabase/researchers_bc.html

*The Agassiz strain of* M. anisopliae *on wireworm cadavers. Shown is the progression from infection causing death (first worm) to mycelial growth (second worm) progressing to heavy sporulation.*
*Photo by Todd Kabaluk*

Mahr reported that the work was continuing, and that he'd discovered that it's useful to have a diversity of flowering plants in orchards throughout the growing season to provide food resources for beneficial insects. A research brief on beneficial insect habitat in apple orchards based on the OFRF-initiated work was published by Univ. Wisconsin's Center for Integrated Agricultural Systems in 2004 (see appendix B for citation).

### Parasitic wasp to control Mexican bean beetle in organic snap beans

In 2000, Kimberly Stoner of the Connecticut Agricultural Experiment Station received her second grant from OFRF, this one to investigate the use of a parasitic wasp to control Mexican bean beetle (MBB) in organic snap beans. OFRF funded the last year of this three-year study. Study sites were located on 12 certified organic farms. Kimberly documented fluctuating MBB populations in each year and found that MBB larvae were not reliably controlled by the parasite in the first year. In succeeding years, control could generally be achieved at parasite release rates economically acceptable to farmers. Kimberly presented a poster on this study at the Joint Meeting of the Entomological Society of America and the Canadian Entomological Society in Montreal, and incorporated the data into numerous other presentations.

### Guinea fowl to control plum curculio in upper Midwestern apples

Organic fruit grower Jim Koan out of Flushing, Michigan, received a grant in 2003 to construct "condos" in his apple orchard to house guinea fowl to prey on "the dreaded" plum curculio. Jim found that the guinea fowl by themselves reduced plum curculio numbers by 50% compared to an adjacent orchard on which he used no control. Still, the fowl alone were not adequate to provide an economical level of protection. Later in the year, hawks moved in and preyed on the guinea fowl. Because of the fowls' modest reduction in plum curculio numbers, Jim feels that they did help and is willing to continue investing in new guinea fowl as part of a broader control strategy.

### Predatory mites to control pests of cultivated mushrooms

The single international grant that OFRF has made in its history was awarded to Polish entomologist Stanislaw Ignatowicz to investigate the use of predatory mites in organic mushroom houses. Stanislaw's main emphasis was on developing methods for raising the mites that would then prey on various species of flies that are pests in organic mushroom production. While his final report demonstrates that he did a lot of work, his conclusions are not always backed by the data that he presents. Stanislaw never replied to efforts to clarify his report, and so utility of it is ultimately limited

## Conservation biology

Here we use conservation biology in its most general sense to describe projects that investigate the use of *in situ* natural organisms to control pests in cropping systems.

### Effects of wild bird populations on insect pests

Two projects have studied wild bird populations and their effects on pests. The earlier of these was a two-year project to study wild bird predation of codling moth in organic apple orchards by Jo Ann Baumgartner that began in 1996. Jo Ann also did some experimental manipulations in the orchards and studied bird presence in abandoned versus managed orchards. The OFRF grant allowed Jo Ann to conduct master's level research and attain her master's degree. She is now director of the Wild Farm Alliance (WFA), a national organization working to promote wildlife habitat conservation in agricultural lands. In her capacity as WFA director, Jo Ann received an educational grant from OFRF in 2003 to educate farmers, certifiers, and service providers on wildlife protective practices. This project is discussed more fully in the section on educational grants.

Beginning in 2001, graduate student Gregory Jones at the Univ. of Florida received funding through a grant to his professor, Kathryn Sieving, to conduct an on-farm study of the effect of intercropped sunflowers on bird density. The project studied different strategies to attract pest-eating insects to organic fields, with a focus on the sunflower intercrop. Jones even sampled the contents of birds' stomachs (using a non-lethal technique) in order to document the kinds of pests being consumed by the birds. Jones ended up with his Ph.D. and succeeded in drawing media attention to the study. The project was publicized in a press release issued by the Univ. of Florida, which was then picked up by numerous media outlets. The *Gainesville Sun* published an article in July 2003 describing the work and how birds may help farmers manage pests. Journal articles featuring results from the study were published in *Conservation Biology* and *Florida Entomologist* in 2005 (citations are in appendix B). Jones is now an Associate Professor of Biology at Santa Fe Community College.

### Bat houses for IPM—benefits for bats and organic farmers

Mark Kiser with Bat Conservation International (BCI) was awarded a grant in 2000 to construct bat houses on organic farms in central California and to measure the impact of enhanced bat populations on numbers of insect pests. Mark brought UC Cooperative Extension specialist Rachael Long into the project as a cooperator. OFRF was only asked to support the first year of this unique, long-term study of the effect of bat houses on pest management in organic crops. OFRF funding paid for the construction of 45 bat houses on ten certified organic farms, with two bat house designs installed at each location.

This study of bat houses on organic farms was part of BCI's North American Bat House Research Project, an effort to provide alternative habitat for bats whose native habitats are vanishing.

This project resulted in the most popular OFRF research presentation ever at Eco Farm, in 2003, when Mark and his colleague (and wife) Selena, representing BCI, presented their results along with Rachael Long and "the Bat Lady," a local bat activist who travels around California with bats in her pockets talking about the benefits of bats.

In addition, BCI donated 50 copies of the videotape *Building Homes for Bats* to Rachael Long for public distribution. She gave away 38 of them and kept 12 to loan out to the public.

This project received national coverage when it was featured in an opinion piece by science columnist Lee Dye published on the ABC News website in 2002, "Underappreciated Bats to Appear on Postage Stamps" (Dye 2002). The column publicizes the U.S. Postal Service's impending release of new bat stamps and provides background information on bats and BCI's bat conservation work. Dye wrote:

> *… researchers have installed 45 "bat houses" on 10 organic farms throughout central California to see if they can make bats feel at home. Mexican free-tailed bats eat staggering amounts of cutworms and leafhoppers and other pests, so the more bats in the area, the fewer pests. And that means less dependence on pesticides, which is why the Organic Farming Research Foundation is sponsoring this project.*

### Plant diversity effects on beneficial and pest insect populations in vineyards

Miguel Altieri at UC Berkeley received a grant in 1996 to investigate whether plant diversity adjacent to a monoculture system attracts beneficial arthropods, and to quantify the biological control effect of these beneficial arthropods on vineyard pests. He measured insect populations in vineyards where a flowering cover crop had been planted compared to vineyards where no cover crop was planted, and in a vineyard adjacent to a natural vegetational corridor compared to a vineyard not adjacent to such a corridor. Miguel and his colleagues found that leafhopper and thrips populations seemed to be influenced by the presence of the flower corridor and that populations were generally lower further from the flower corridor than adjacent to it. Predaceous insects were found to exhibit a similar population gradient. Densities of adult leafhoppers were significantly lower on vines with summer cover crops than in monoculture grapes. Miguel also found that mowing the cover crops increased densities of natural enemies adjacent to the mowed cover, and in turn leafhopper densities decreased on vines where the covers had been mowed. The work resulted in two published articles, one in *Landscape Ecology* and the other in *Agricultural and Forest Entomology* (citations are in appendix B).

### Native bee and honeybee conservation biology on organic and conventional farms

Stanford-based biologist Paul Ehrlich was awarded a grant in 1999 to study a number of issues affecting pollinator populations in the farming regions of Yolo and Solano Counties, California. The work was actually conducted by Claire Kremen, who at the time was a Senior Research Scientist at Stanford's Center for Conservation Biology. Native bee and introduced (honeybee) populations were studied. Relative abundance of bees on 20 farm sites, 4 riparian sites, 4 chaparral sites, and 3 native plant hedgerows were measured using pan traps and PVC traps. Bee populations were counted on organic and on conventional farms. Claire found that conventional farms that used heavy pesticide applications had significantly less bee visitation compared to organic farms, and that conventional farms using no or only mild pesticides such as BT were not significantly different in bee visitation from the organic farms.

Claire conducted extensive analyses of landscape effects on bee populations, and calculated the value of native pollinator services in case honeybees were to disappear. She found that a total societal loss of $612/acre would be incurred from loss of honeybees, and that native bees would be worth this amount if they could replace honeybee services.

Claire meanwhile became an assistant professor at Princeton and conducted significant conservation biology research in Madagascar. In 2005 she returned to the Univ. of California at Berkeley in the Dept. of Environmental Science, Policy and Management.

## Case Studies: grants to farmer recipients

### Extending the greens growing season in the Midwest

One well-placed grant to an energetic farmer resulted in a multi-state project on using shaded structures for vegetable production in the Midwest. Katherine Kelly, whose Full Circle Farm in Kansas City, MO, has now expanded into the Kansas City Center for Urban Ag/Kansas City Community Farm, received a $5,835 grant from OFRF in spring 2001 to "test practical methods for extending the production of cool season leafy greens into the hot summer months in Kansas City." Katherine reported that she "produced higher yields of marketable quality lettuce and greens over multiple harvests throughout the summer compared to outside plots." Katherine has shared the results of her project at many grower meetings, and she has produced a video, website, and high tunnel construction guide, as well.

Katherine reports, "This project contributed significantly to the initiation of a multi-state USDA-funded project on high tunnels for the central Great Plains, which includes a significant component of research and extension related to organic vegetable production and continuing assessment of extension of cool season crop production into to the hot summer months." The $800,000 high tunnel project is being managed out of Kansas State Univ. by another OFRF-funded researcher, Edward Carey. (Please see the section on leveraging, page 17.)

### Living mulch in Alabama

Jean Mills and Carol Eichelberger were the only organic farmers that they knew in Alabama when they applied for OFRF funding in 1993. Jean reports, "Extension agents didn't have any information for us and they discouraged us. We thought, 'Hell, we're going to have to do this ourselves,' fund an experiment and pass the information along to anyone else who could use it. We thought, we farmers will have to be the ones to put the information together to do this."

Jean and Carol did an experiment on composting clippings from a clover living mulch they planted into their mixed vegetable crops. They hoped that the compost would provide sufficient nitrogen to their crops so they wouldn't have to apply off-farm sources of N. Jean says, "We learned both the good and the bad of doing it." The good was that they learned how to make a useable compost and discovered the optimal carbon sources to use in their compost; the bad was that the process was very labor-intensive. "That was a stumbling block. Our main thing is to run the farm ourselves, and not manage labor. We have to be careful about what extra labor we add," commented Jean.

They have reduced the labor requirements by doing in-bed composting, but still use the information they learned from the OFRF-funded research. Jean observed, "It helped us to eliminate off-farm materials for composting. We learned working with living mulches and cover crops how to do soil work without off-farm compost." She reports that the research results improved farm profitability by decreasing costs, and also changed the farm's ecology by cooling down their red clay soil in the summer with the living mulch.

While they don't know for certain if their results assisted other farmers to go organic, they did hear from many people who were interested in farming, living mulches, and cover crops. "I can't name a single soul for sure who took our exact model and duplicated it, but I know there were a lot of people who found us through the publicity of that research who wanted to start farming," Jean said.

Jean and Carol are presently working with researchers from Auburn Univ. to determine if the amount of organic matter they turn in from cover crops makes up for the organic matter lost from tillage. Jean reports, "We are not the record keepers that we should be to do this type of research. Some of us are more inclined to spend the time farming and not carrying notebooks with us." In fact, one thing Jean learned from this project is that she is not a good researcher. "We're not going to be the ones who are good enough record keepers to do any advanced research on our farm, without someone else leading it. We don't want to be the managers of the data."

### Natural parasiticides for organic lamb[17]

Janet Allen with Dragon Mountain Farm in British Columbia had been marketing organic lamb for a number of years when her lambs developed internal parasites. She independently researched the literature for possible solutions but was unable to find any reports on clinical trials of parasiticides in organic lamb. So in 1998 she applied for and was awarded a grant from OFRF to do just that. The study examined efficacy of an herbal mix wormer, diatomaceous earth, garlic, and pyrethrum in controlling internal parasites of sheep, and found that none of them worked.

Janet reports, "None of the commonly touted alternative parasiticides had any effectiveness at all. Any idea of developing a management strategy relying on those tools was completely impractical. It made us realize that any program to produce organic lamb would have to rely on grazing management rather than treating animals with natural products."

Janet doesn't think that these results encouraged other farmers to transition to organic, but she does believe that it "made everyone in the industry a little more realistic about strategies." She still feels that more research on grazing management and alternative parasiticides is needed, both on-farm and on-station. She commented, " I would like to see university research stations do that as well. I'd like to see them do that instead of cloning sheep and genetically engineering things."

## Additional significant grants

### Comparison of apple production systems

John Reganold at Washington State Univ. in Pullman received an OFRF grant in 1994 to compare organic, low-input, and conventional apple production systems. This $3,420 investment helped Reganold to leverage a $160,000 NRI grant in 1996 to continue the study. Ultimately, Reganold's team studied the systems for six years and reported their findings in a 2001 Letter published in the journal *Nature*. This article received a great deal of media attention for its con-

[17]OFRF has funded three projects altogether that researched the use of alternative anthelmentics for organic livestock. The other two were to Frances Zacharakis-Jutz, a high school student living on a farm in Iowa, and to Derrick Exner with Practical Farmers of Iowa. Both of these projects had data problems, but in general support Janet Allen's conclusions that "natural" anthelmentics are not effective in controlling internal parasites of organic livestock.

clusions that "the organic system produced sweeter and less tart apples, higher profitability and greater energy efficiency." Reganold has more recently helped organize the country's first "organic agriculture systems major" at Washington State, expected to be in place by the Winter 2005 semester.

### Organochlorine residues in organic vegetables

The first research grant to a non-profit based investigator was awarded in 1994 to a farmer, J.J. Haapala, who was also the on-farm research director with Oregon Tilth. J.J.'s project was in response to a problem that arose on organic farms in Oregon during this period of time in which residual pesticides such as chlordane and even DDT were being detected in organically and conventionally grown produce. J.J. conducted a study to measure plant uptake of organochlorine residues in the soil in order to determine which vegetable crops were more and less likely to sequester these residues in their tissues. This is an example of a project that is classified as a "systems" study.

The surprising result of the study is that pesticide residues at detectable levels were found in beans, beets, carrots, cucumbers, lettuce, melons, mustard, green onions, potatoes, radishes, spinach, winter squash, and summer squash grown under certified organic conditions. Those crops with levels surpassing organically allowed limits at the time were beets, beet greens, carrots, cucumber, melon, potatoes, green onions, spinach and summer and winter squash. Crops that came up free of all residues were broccoli, corn, peas and tomato.

This study is more significant than the relatively narrow distribution it received through OFRF and Oregon Tilth's newsletters would indicate. The OFRF article was cited in one scientific article authored by a prominent authority on soil contamination by pesticide residues, MaryJane Incorvia Mattina (Mattina et al. 2004).

### Hydrogen peroxide to control foliar disease in organic tomatoes

In 1995, Emily Brown Rosen, technical director with the Northeast Organic Farming Association-New Jersey (NOFA-NJ), received a grant to study effectiveness of hydrogen peroxide and other materials in controlling early blight, anthracnose, and bacterial canker in organic tomatoes. First-year results were inconclusive, but Emily has since become a prominent organic materials expert. She was a co-author of the 1999 Organic Trade Association (OTA)'s American Organic Standards, Policy Director for the Organic Materials Review Institute (OMRI), and now heads an organic consulting company, Organic Research Associates, in Titusville, New Jersey.

### Rotational grazing systems for beef finishing

Martin Bender with the Land Institute in Salina, Kansas, received a grant in 1996 to study integrating crop and livestock operations by break-feeding beef (grazing only a portion of an entire paddock) in cropped fields. While the emphasis of the project was on finishing cattle using rotational grazing, the project report supplies a vast amount of detail on the integrated system and the economics of using polywire fencing to control cattle movement. This study was one of many conducted at the Land Institute's Sunshine Farm, where long-term research has been conducted on the energetics of farming. Results of the OFRF-funded work were reported at Land Institute Field Days, the Prairie Festival, and Visitor's Day in 1996 and 1997. The project report is a contribution to the literature on grass-finishing beef cows, rotational grazing, integrating crops and livestock, and the economics of beef finishing systems.

### Assessing pathogen persistence in compost teas

Cornell graduate student Alison Hornor received OFRF funding in 2003 to study pathogen persistence in compost and vermicompost teas. The funding was renewed in 2004. Use of compost tea in organic production is still largely unregulated because of lack of information at the time the national rule was promulgated. Hornor developed assays for *E. coli* and generated new data on *E. coli* presence and persistence in compost tea. She found that even aerated teas could support *E. coli* growth when supplemented with molasses, contrary to prevailing opinion in compost tea circles. Hornor has reported her findings and related concerns in a letter to the NOSB for their Aug. 2005 meeting. An excerpt summarizes the issues she raises:

> *I strongly believe that making a distinction between non-virulent and virulent strains of* E. coli *will be of utmost importance in realistically evaluating the potential food safety threat posed by the use of compost teas in agriculture. As it currently stands, the method recommended by the Compost Tea Task Force (USEPA Method 1603) only tests for the presence of* E. coli *in general, and does not distinguish between virulent and non-virulent ubiquitous strains of* E. coli. *I also strongly question the use of the recreational water quality 126 CFU mL¯1 cut off point for* E. coli *counts since there is very little information on their ability to survive on the plant surface. It could turn out that post-harvest handling is a much more critical management point than compost tea application with respect to food safety, but we won't know until more research is done.*

### Food waste composting on a college campus

Sean Clark, at the time greenhouse manager at Berea College in Kentucky and now an assistant professor, received a $1,100 OFRF grant in 1999 to conduct a pilot food residuals composting study using waste from the college's foodservice program. An estimated 50-100 tons of pre-consumer food waste (wet weight) at Berea College were re-directed from landfill disposal to the composting system. The food waste was composted and used as a medium and nutrient source for vegetable production. In the winter, the compost was made in a greenhouse, and the heat generated realized a savings of over $900 in fuel costs compared to greenhouses where composting was not being done. According to Clark, "the program has become a fundamental part of the College's garden and greenhouse program." This project receives regular coverage in the "organics recycling" press, most recently a July 2005 article in BioCycle (Clark and Cavigelli 2005).

### CSA marketing study in the south

In 1996, OFRF funded Deborah Kane, then with Univ. of Georgia, to conduct a survey of community supported agriculture (CSA) members in the south to investigate shareholder satisfaction and help maximize shareholder retention. Her final report, *Maximizing shareholder retention in Southern CSAs: A step toward sustainability*, was co-authored by Luanne Lohr, who has become one of the most prolific agricultural economists writing on organic issues in the country. It is one of the top three OFRF final reports requested by the public[18].

[18]Based on staff observation of orders for printed reports. See appendix D for a listing of the most popular research reports accessed from the OFRF website.

### Economic analysis of the organic citrus sector in Florida

OFRF funded Univ. of Florida graduate student Kevin Athearn in 2003 to survey and characterize the organic citrus industry in Florida. Athearn's final report went beyond a statistical analysis of grower numbers and developed a typology of organic citrus growers primarily based on the level of investment they place into grove management. The authors show that, as grove care costs increase, so do organic yields. This report offers a rare glimpse into a significant sector of the organic industry. OFRF technical program coordinator Jane Sooby wrote an article based on Athearn's report that was published in the *American Vegetable Grower* magazine in Aug. 2005.

## Not up to expectations: OFRF-funded failures

OFRF has made some grants that staff considers to be "failures." The primary reason we classify a project as a failure is that no report was ever submitted on the project, so we have nothing to show for our investment into the work. Other reasons we classify a project as a failure are:

- The PI did not carry out the project objectives as originally funded by the Board;
- A final report was submitted that was not usable for some reason;
- There was a question about the project that brought the reported findings into question.

No project was considered to be a failure simply because results indicated that a promising practice did not perform as expected. The foundation considers that even a negative result from a well-managed study is a useful finding.

Overall, we count 15 distinct projects as being failures. Two of these were funded for two years each, so a total of 17 grants were made that were unsatisfactory. Of 213 grants made altogether, this is an 8% failure rate. Counting only the distinct grants, 10/15 or 67% of the failures are classified as such because no final report was ever received. Of these ten, four were farmer PIs and six were professional researchers.

It is significant to staff that grants made to professional researchers were more likely to fail due to failure to submit a final report, whereas farmer researchers were more likely to fail because they did not meet their original objectives. This point reinforces the recommendation made by a farmer grantee during an interview that farmer recipients may need more contact over the course of the project.

The total amount of OFRF funds spent on these 17 failed projects is $81,655, or 6% of grant funds disbursed.

## Suggestions for improving OFRF grantmaking

The most common response to our question about how the OFRF grants program could be improved was "More money!" Many grantees stressed how they appreciate the simple application process OFRF uses, and how much more accessible the funding is than money from many federal programs.

Other suggestions for improving the OFRF grants program included:

- Having a student assistantship program.
- Convening organic research meetings. *What if grant recipients from a region got together to present their results? Money for travel provided.*
- Find a mechanism to fund multi-year projects. This was mentioned many times for various reasons:
    1) Single year projects are difficult to publish.
    2) *I was sweating bullets when I had to apply for the second round. If I could have gotten a two-year grant that assured me I could complete the study, I would have gotten a lot more sleep.*
    3) *Your policy is to award funding one year at a time, and I should not have started the project without assurance of funding to complete it, especially if I am using it to pay a person's wages.*
- *Divide it into different topics—crops, livestock—so we wouldn't have to compete against other needs and other interests.*
- *Prioritize people who would have trouble getting funding from other institutional sources.*
- *Continue focusing on individual investigators, small problem projects… when we identify a unique opportunity, a little problem off to the side of the main project, that's where OFRF can help fill a gap.*
- Do more to promote the outcomes of the research.
- *Make site visits to find out more about what we're doing and to build more of a personal relationship. Get yourself known in other parts of the country.*
- Connect with other organic organizations to generate funds for research.
- Disappointed in limited geographical distribution of grants lately.
- *Appropriate scaling of research to benefit smaller growers with appropriately scaled technologies.*
- Implement a system of reminders to submit final reports.
- Consider an on-line format for submitting reports, and including an abstract in lay language.

# Chapter 4 Conclusions

There is considerable evidence that the original intent of the OFRF grants program—to generate scientific information on a broad array of organic agricultural practices, to disseminate this information to the organic community, and to educate growers and others on organic issues—has exceeded expectations. OFRF grantmaking has been extremely influential, low-risk, and demonstrates a high rate of leveraged return beyond the results of individual projects. The intangible side benefits, such as creating a sense of community and popularizing science, are also significant.

In addition, OFRF has played a direct and more often indirect role in institutionalizing on-going organic research initiatives at nine land grant universities around the country.

OFRF grants have been successful in funding and therefore bringing into being scientific research that no one else was even willing to consider. OFRF has circulated the results of the research it has funded to a broad audience through its newsletter and website, and the information has been spread even further by grantees themselves.

The OFRF website has become a widely used resource for organic research information, with the OFRF research reports receiving at least 6,500 hits quarterly (see appendix D for a sample of the top project reports accessed through the website). By partnering with a national information provider such as ATTRA, OFRF's virtual reach has expanded to three times this amount, as reflected in the over 18,000 hits OFRF-funded organic publications received on their site in 2005.

The accessibility of the OFRF grants program distinguishes it from most federal granting programs. Not only is the application process a simple one, there are no restrictions on who may apply.

The grants program has had a number of ancillary impacts that were not anticipated by the founders at the time it was initiated. Over the last 13 years, the grants have functioned to:

- Bring in an estimated 325 organic farms as participants in formal organic research;
- Identify leaders in the farming, research, and Extension communities who continued to educate people on organic issues after the term of the research project was completed;
- Bring thousands of organic farmers, scientists, and others together at farm tours and field days held to demonstrate OFRF-funded research results;
- Popularize presenting science-based information in the organic farmer press;

- ✦ Provide the basis for OFRF commentary to the mainstream media;
- ✦ Provide hands-on experience in proposal evaluation and grantmaking for OFRF Board members, most of them organic farmers, and most of whom continue to advocate for organic research after their term of service to OFRF;
- ✦ Stimulate over 600 people to organize their research concepts sufficiently to submit a total of 845 proposals for funding.

The grants program functions to re-distribute resources—primarily in the form of cash, secondarily in the form of information—to the organic community, using an open and transparent process of soliciting proposals from that community and evaluating them for rigor and practical application. Distributing funds for well-designed production research and education —and requiring farmer participation and community outreach in each project—has proven to be an effective strategy for furthering organic agriculture.

Despite today's increased land grant involvement in conducting organic research and the availability of more federal funds dedicated to organic research than ever before, the OFRF grants program continues to have a vital role to play in advancing organic agriculture.

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# Appendix A
## Other Sources of Organic Research Funding Reported by OFRF Grant Recipients

### Commodity groups
Winter Pear Control Commission (Washington State)
Washington Tree Fruit Research Commission
Horticultural Assoc., British Columbia
Artichoke Research Assoc., California
California Strawberry Commission

### Private foundations
Toward Sustainability Foundation (Cornell Univ.)
Z. Smith Reynolds Foundation
Columbia Foundation
Heller Foundation

### U.S. Dept. of Agriculture's Cooperative State Research, Education, and Extension Service (CSREES) programs
National Research Initiative (NRI)
Sustainable Agriculture Research and Education (SARE)—northeast, western, southern, and north central regions
CSREES Risk Avoidance and Mitigation Program (RAMP)
Initiative for Future Agriculture and Food Systems (IFAFS)
Organic Transitions Program/Integrated Organic Program
Higher Education Challenge Grant

### Other federal entities
U.S. Environmental Protection Agency (EPA)
U.S. Agency for International Development (AID)
U.S. Risk Management Agency (RMA)

### State/county groups
NY State Integrated Pest Management (IPM) program
Oregon Dept. of Agriculture/Oregon Assoc. of Nurseries
Washington State Commission on Pesticide Registration
California Energy Commission
King County [WA] Agriculture Commission
Golden Leaf Foundation
North Carolina Tobacco Trust Fund Commission
North Carolina Rural Economic Development Center
Rural Agriculture Improvement and Public Affairs project (RIPAP) (New Mexico)
Cooperative Extension

### University-based entities
Oregon State Univ. Agricultural Research Foundation
Washington State Univ. IMPACT Center (International Marketing Program for Agricultural Commodities and Trade)
Washington State Univ. Center for Sustaining Agriculture and Natural Resources (CSANR)
Univ. of California Sustainable Agriculture Research and Education program (SAREP)
Univ. of California Small Farms Center
Univ. of California Division of Agriculture and Natural Resources analytical lab
Departmental grants from various institutions

### Industry
Engelhard Corp., Iselin, NJ (donated Surround)
Monsanto (supported graduate assistantship)
Alltech, Inc., Lexington, KY

# Appendix B

## Partial List of Scientific Citations Based on OFRF-Funded Work


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# Appendix C

## Research and Education Committee Issues

This section presents an overview of issues that OFRF's Research & Education (R&E) Committee has grappled with over the years in making funding decisions.

### i. International grants

The R&E Committee was concerned that they were receiving numerous proposals from international applicants who, broadly stated, wished to develop organic demonstration projects in many countries[19]. Though these projects had merit and often requested very low sums of money, they did not clearly fall within the mandate of OFRF to fund organic farming research and education. In fall 1999, the R&E Committee issued language clarifying that the OFRF grants program is primarily to support research in North America, and setting forth specific and rigorous criteria for funding international proposals.

### ii. Materials testing vs. systems approaches

While OFRF has emphasized taking a systems approach to organic production and research, OFRF has also funded 27 distinct research projects investigating the use of various materials in organic production. Twenty of these grants have resulted in useful final reports. The materials testing supported by OFRF has generated information that is difficult to find elsewhere on the use of materials such as compost, compost tea, fish emulsions, fertility inputs, brassica meal, and kaolin clay in certified organic systems. OFRF has also funded 22 "systems" projects, which focus on management systems rather than on one particular topic such as weeds or insects.

On balance, OFRF's funding has tended to support systems approaches to organic agriculture rather than input substitution. Awareness on the part of the Board in selecting systems-oriented projects has been effective in maintaining this focus on systems.

### iii. Certification of research land

Over the years, the certification status of research lands came up over and over again. The R&E Committee has had discussions about the "definition of organic" in order to determine which projects could legitimately be considered "organic" research. In the end, they decided that organic certification was the best way to ensure a level of consistency in making organic grants. In spring 2001, the Board added language to the call for proposals indicating their primary interest in funding research relevant to and conducted in certified organic systems. In spring 2003, the Board voted to add language to the call for proposals asking about the certification status of research lands, and asking for an explanation if the land is not certified.

### iv. Comparison studies

Applicants have occasionally approached OFRF with requests to fund research that compares organic with conventional production systems. While the Board funded some comparison projects in the early 90s, by 2001 they clarified their position that they were not interested in funding studies whose primary objective was a comparison of conventional and organic systems. The R&E Committee has considered that nutrient comparison studies are in a different category than comparing conventional and organic production systems, and have funded certain projects since then that are comparing organic and conventional food quality and nutrient levels.

### v. Travel and mileage

The R&E committee had issues with funding travel to professional meetings for grantees, feeling that this expense ought to be picked up by their sponsoring institutions, and in 2001 passed a motion stating specifically that OFRF would not fund not international travel or travel to professional meetings. They also determined that the rate for mileage reimbursement would reflect the federal mileage reimbursement rate at the time the grant award was made.

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[19] OFRF has received proposals from applicants in India, Nepal, Sri Lanka, Bangladesh, Pakistan, Vietnam, Macedonia, Kenya, Costa Rica, Mexico, Cuba and Uruguay.

# Appendix D

## Internet Access to OFRF Information

**Most popular research reports on the OFRF website between Aug. 1-Oct. 30, 2005**

| Author | Title | Total hits |
|---|---|---|
| Richard Merrill, Cabrillo Community College, Aptos, CA | Organic teas from compost and manures | 1994 |
| L. Tikofsky and Y. Schukken, Cornell Univ., Ithaca, NY | A comparison of antibiotic susceptibility patterns for *Staphylococcus aureus* in organic and conventional dairy herds | 1126 |
| Jessica Davis, Colorado State Univ., Ft. Collins, CO | Long-term organic farming impacts on soil fertility | 711 |
| Terence Robinson, Cornell Univ., Geneva, NY | Insect management and fruit thinning in commercial organic apple production systems in New York | 617 |
| Renae Moran, Univ. of Maine, Monmouth, ME | The effect of weed management strategies on weed growth and fruit quality in a certified organic apple orchard | 429 |
| Fernando Moncayo, DVM, Nova Scotia, Canada | Efficacy of homeopathic preparations in the prevention of mastitis in dairy cattle | 363 |
| Mark Schonbeck, Virginia Assoc. for Biological Farming, Floyd, VA | Soil nutrient balancing in sustainable vegetable production | 361 |
| Mark and Selena Kiser, Bat Conservation Int'l, Austin, TX | Bat houses for integrated pest management—Benefits for bats and organic farmers | 336 |
| Mark Van Horn, UC Davis, Davis, CA | Organic management of garden symphylans (*Scutigerella immaculata*) in annual cropping systems | 327 |
| Gregory Jones and Katherine Sieving, Univ. of Florida, Gainesville, FL | Intercropping to create local refugia for natural enemies of arthropod pests: flowers and birds in organic agroecosystems | 295 |

**The number of times that publications in the OFRF-funded Organic Matters series were accessed through the web, 2005. (data courtesy of John English, National Center for Appropriate Technology [NCAT] webmaster) [NCAT is the parent organization of ATTRA]**

| Title | # of pdf downloads | # of HTML visits | Total |
|---|---|---|---|
| Considerations in Organic Apple Production | 3,365 | n/a | 3,365 |
| Considerations in Organic Hog Production | 3,816 | n/a | 3,816 |
| Pursuing Conservation Tillage for Organic Crop Production | 2,215 | 5,233 | 7,448 |
| Protecting Water Quality on Organic Farms | 1,908 | 2,215 | 4,123 |
| | 11,304 | 7,448 | 18,752 |