



**ORGANIC FARMING**  
RESEARCH FOUNDATION



**IMPACTS OF  
OFRF BERRY RESEARCH**



Photo: USDA

Published October 2017  
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## ABSTRACT

This report offers a detailed review and impact assessment of OFRF-funded research on organic berry production, with a focus on strawberries. These research projects address the most pressing issues in the industry and this evaluation clearly indicates that OFRF investments have resulted in important advances in organic berry production knowledge and practices, especially in California. Overall, OFRF grant funding has advanced scientific knowledge and improved the practices, ecological sustainability, and economic prosperity of organic berry farming. This report recommends continued research support for organic insect, disease, and weed management research efforts in berry production.

## INTRODUCTION

The Organic Farming Research Foundation (OFRF) is a non-profit organization founded in 1990 with the goal of advancing organic agriculture through scientific research. OFRF provides grants for organic farming research and education, with a particular focus on practical solutions to organic farming challenges. This report reviews the impact from OFRF's grant making program on berry production with the goal of strengthening and expanding our research on organic berry production in the future.

California is the top strawberry producing state in the country, with a share of over 91% of the production (NASS, 2015). Strawberries are the sixth most important crop economically in California, with a value of \$1.86B (CDFA, 2016). The organic strawberry industry has grown tremendously over the years, with production of over 6,000 acres and a value of \$241,620,880 in 2016 (NASS, 2017). In California, organic production echoes the national increasing trend, and was valued at \$231,304,956, making up 1.2% of the market share of total strawberry production (NASS, 2017). The demand for organic berries is growing, and research is integral to helping organic berry farmers meet the demand and for conventional growers to adopt more sustainable practices.



Photo: USDA

## BACKGROUND ON OFRF GRANTS

Organic farming and organic farming research have grown tremendously in recent years. When OFRF was founded in 1990, organic farming research was not a well-studied field of inquiry, and the US Department of Agriculture was more than a decade away from certifying organically grown products. Today there are more than 15,000 certified organic producers in the US, a growth of 250% since 2002, and organic farming research is now being conducted at universities around the world (USDA, 2015).

OFRF has awarded 14 grants specific to berry crop production, investing a total of \$260,176 (see Table 1). Results from these projects are freely available on the foundation's online research database, and have added substantially to the body of scientific knowledge guiding berry production in the US.

The impact of these projects has influenced how berry producers control insect pests, manage disease, and choose varieties. For example, OFRF-funded research has advanced the methodology and knowledge surrounding how to best solve the problem of soilborne disease in strawberry production, how to utilize beneficial organisms to reduce pests, and how growing new crops like goji berries can be economically advantageous.

Techniques and findings from OFRF-funded research have been widely implemented by organic farmers over the years, with information disseminated online, in sponsored publications, and at farming conferences and field days.



Photo: Liz Birnbaum, OFRF

Grant recipients have used initial OFRF awards to leverage significant additional funding from state and federal agencies. For example, a research project led by Dr. Carol Shennan and Dr. Joji Muramoto at UC Santa Cruz to examine organic management of soilborne diseases in strawberry production, initiated with \$28,000 in OFRF grants, eventually led to two additional USDA grants totaling \$5.3M. Funding innovative work at the early stages becomes enhanced and very impactful when researchers are able to grow their programs and continue the work at a larger scale.

Researcher Diego Nieto stated, “The grants from OFRF were an important way to start a project and collect preliminary data needed for a project to get momentum and attract collaborators. It has helped develop the ideas and practices that we investigate in our research at Driscoll's.” The history of small OFRF grants leading to

high matching investments and robust organic research programs is a major success related to the impact of the OFRF grant making program.

One unique facet of OFRF grant projects is close collaboration with organic farmers as research participants. All projects on berry production funded by OFRF were conducted on certified organic farms with the participation of organic farmers and farm operators. Several of the strawberry research trials were carried out on organic farms on the Central Coast of California, allowing research results to be directly applied to crop management protocols.



## IMPACTS FROM OFRF RESEARCH PROJECTS ON BERRY PRODUCTION

### *Impacts on Insect Pest Management*

OFRF has funded several studies that have greatly helped California berry growers cope with insect pests. For example, the control of western tarnished plant bug, lygus bug (*Lygus hesperus*) is an ongoing challenge in both organic and conventional strawberry production. Lygus bugs puncture individual strawberry seeds causing irregularly shaped berries (UC IPM, 2012). This pest is a major problem for strawberry growers throughout California, and research into different control methods is critical to reducing losses caused by insect damage. The damage caused by lygus bug feeding is often the most costly pest problem in organic strawberries. The lack of effective and compliant spray materials for lygus bug makes this pest particularly challenging to organic strawberry growers.



Photo: USDA

OFRF awarded three grants to Sean Swezey at the Center for Agroecology and Sustainable Food Systems in Santa Cruz. His research helped establish a relatively unique systems management approach through physical suppression (tractor mounted vacuums), integrated parasitism, and resources for sustained biological control.

One study, “Control of the western tarnished plant bug, *Lygus hesperus* (Knight) in an organic strawberry production system using trap crops, mass-released parasitoids, and tractor-mounted vacuums” has led to lasting changes and widespread adoption of new techniques to control lygus bug.

#### *Trap crops*

This project found that trap crops, in particular alfalfa, strongly attracted and retained lygus bugs and reduced their presence in adjacent strawberry rows (Swezey et al., 2007). The study also found that vacuuming the trap crop was an effective way to reduce lygus bugs in the field, and vacuuming the trap crop instead of the entire field reduced grower costs by 78% (Swezey et al., 2007). The findings from this research have led to the adoption of trap crops by over ¼ of organic strawberry acres in California, including adoption by the largest organic strawberry farm in California growing berries for Driscoll’s (Nieto, 2017). The practice of using trap crops in conjunction with careful pest monitoring is promoted by UC Integrated Pest Management and the California Strawberry Commission (UC IPM, 2012; Zalom et al., 2011). The adoption of trap crops has been predominantly seen on organic farms, yet conventional farms are realizing the benefits. For example, some of the largest and most prominent organic and conventional Driscoll’s farms in Baja, California have adopted trap crops. Some of the barriers to trap crop adoption include the misperception that planting alfalfa, which attracts lygus bug, will result in increased damage to the strawberry crop. Although alfalfa attracts lygus bug, this attraction to the trap crop reduces the presence of lygus bug in the strawberry crop. Some farmers also do not want to sacrifice land for strawberry production by planting a trap crop. However, there have

been innovations, such as planting alfalfa in the edge row, which have allowed farmers to adopt the practice without sacrificing crop acreage.

### *Lygus bug control by parasitoids*



Photos: Rodney Cooper, USDA-ARS and Surendra Dara

Additional research by Swezey et al., examined the impact of the parasitoid *Peristenus relictus* on lygus bug control. *P. relictus* is a small parasitoid that is specific to lygus bug. It was released in the Sacramento area in the 1990s, and along the Central Coast of California from 2002-2006. The parasitoid has established in all of Santa Cruz, Monterey, and San Luis Obispo counties to the great benefit of strawberry growers. The research found that this parasitoid is effective at reducing lygus bug density. The research, which involved long-term monitoring, found that peak annual parasitism for lygus bug ranged from 45-71% (Pickett et al., 2017). In addition, researchers found lygus reduction by as much as 90% by 2012, demonstrating the very important impact the release of this parasitoid has had on controlling lygus bug (Pickett et al., 2017). Control of lygus via *P. relictus* is especially beneficial in conjunction with the use of trap crops because the lygus bugs are concentrated in the trap crops and the parasitoid can capitalize on this high prey density (Swezey et al., 2014).

The benefits of the release of *P. relictus* are ongoing and benefit all Central Coast strawberry growers. Growers in California continue to experience reduced lygus bug populations as a benefit of this research, a service that is free of costs or additional management practices. Research on the topic of parasitoid control of lygus bug continues, with Driscoll's research team examining the efficacy of the use of alfalfa trap crops in conjunction with *P. relictus*, as well as investigation into the potential of other parasitoids that can be used as biocontrol agents (Nieto, 2017). For example, researcher Diego Nieto stated, "The stream of research on *P. relictus* funded by OFRF helped start this work, which has continued today."

### ***Impacts on Soil Health and Disease Management***

Continued growth of organic strawberries in California faces a major challenge: soil-borne disease management without chemical fumigants. For example, the soil borne disease Verticillium wilt, is very difficult to control in organic strawberry systems due to the pathogen's wide range of host crops, its overwintering structure, and current strawberry cultivars' high sensitivity to the disease.

Some of the most significant scientific advancements in soil health research have been made in California by Dr. Joji Muramoto and Dr. Carol Shennan at UC Santa Cruz, who have pioneered alternatives to methyl bromide in commercial strawberry production. OFRF provided grants in 1997 (organic fertility management), 2003 (diverse organic strawberry/vegetable rotations and integrated ecological practices on agroecosystem health), and 2010 (anaerobic soil disinfestation

to reduce strawberry disease levels in the soil). OFRF's investment of \$62,644 eventually led to an additional \$5.3M in USDA funding to expand their research nationally.

### *Anaerobic Soil Disinfestation*

There have been tremendous impacts for organic growers from the soil health focused on anaerobic soil disinfestation (ASD). ASD is an alternative to soil fumigation for the control of soil pathogens and nematodes. In California, ASD was primarily developed with the goals of controlling *Verticillium dahlia*, a pathogen that caused verticillium wilt and reduced yields in strawberry fields. Studies from Shennan et al., have shown that ASD practices are able to control *Verticillium dahlia* in the soil by 85-100% (Shennan et al., 2014). In addition, this research has shown that marketable yields from ASD treated plots are equal or higher than fumigated plots (Shennan et al., 2013).

Today, the practices of ASD have been widely adopted among organic strawberry growers in California, and most commonly utilized in the areas of Ventura, Watsonville, and Santa Maria. Although 80% of farms that use ASD are organic, conventional farmers are exploring the use of ASD and make up 20% of the sites where ASD is used (Zavatta, 2017). From 2016-2017, 1,400 strawberry acres employed ASD to control soil borne pathogens (Zavatta, 2017). This represents an 11 fold increase from 2012 to 2013, when there were only 130 acres using ASD (Zavatta, 2017). The use of ASD is employed on approximately 20% of organic strawberry acreage in California, and 2.5% of California total strawberry acreage (Zavatta, 2017). The increasing rates of adoption demonstrate the importance of this research on the agronomic practices of strawberry growers in California (Nieto, 2017). The adoption of ASD is expected to increase, especially as the fumigant methyl bromide is phased out and if the price of fumigants is increased.

According to Dr. Joji Muramoto of UC Santa Cruz, ASD is a key practice for growers to use to control soil borne disease, especially for large scale operations. Traditionally, growers have relied on long strawberry and vegetable rotations of three to four years in order to control soilborne disease. However, these long rotations have become more difficult for large scale growers, and ASD reduces the risks associated with *Verticillium* wilt and shorter rotations. He stated, "ASD is one of many tools for organic growers to control soilborne disease, and it is an important tool." He also emphasized the importance of using ASD in conjunction with crop rotation and resistant varieties, stating that "the integration of ASD, crop rotation, and resistant varieties is the key."

Although ASD adoption is increasing, barriers to its adoption include the inexpensive cost of fumigants, the ease of use and consistent results from fumigants, and the expertise needed to implement ASD with correct timing and practices (Nieto, 2017). However, large strawberry producers, like Driscoll's, promote the use of ASD among their growers (Nieto, 2017). The adoption of ASD by conventional growers has been most prolific among split operations (part organic and part conventional operations) where the growers already have the materials and expertise to employ ASD based on their experience with implementing ASD on their organic fields.

Future research on ASD by the Shennan lab will explore the relationship between ASD, crop rotations, and different varieties in several major strawberry producing states: California, Florida, North Carolina, and Tennessee. This research will examine how regionally specific pathogens and climate influence the success of these practices for controlling soilborne diseases. This future research has the potential to greatly increase the adoption of ASD and organic berry production in states like Florida, where there has historically been little adoption of organic strawberry production (Muramoto, 2017).

The development of this research project from a small OFRF grant into a robust research program demonstrates the value of OFRF grants in supporting the initial stages of berry research. Muramoto stated, “For strawberry research, OFRF funding was one of the key pieces of seed funding needed to start our rotation study. It was very important for us to have initial research and data to develop the long term rotation studies that led to Western SARE and OREI funding, larger funding that allowed us to develop more studies. I am so appreciative to OFRF for my career and organic research.”

### *Root rot in raspberries*

Root rot (*Phytophthora fragariae* var. *rubi*) is of primary concern to all raspberry growers in Washington, and is of particular concern to organic growers who have fewer options for disease control. Research from Dr. Carol Miles at the Washington State University Research & Extension Unit led a project to compare the effectiveness of organic disease control treatments to the standard chemical control treatment for root rot in raspberries. The study analyzed and compared performance of organic methods to control raspberry root rot and observed and compared growth and fruit production of raspberry under conventional and organic farming systems. The researchers found differences in yields and disease prevalence depending on the soil treatments. This research lays important groundwork for ongoing and future research examining the relationship between nutrient sources, soil microbial activity and dynamics, and plant disease.



Photo: Driscolls

### ***Impacts on practices to promote biodiversity***

#### *Strawberries and pollinators in Florida*

In 2016, OFRF funded Justin Renkema at the University of Florida, whose objective is to manage for both predators and pollinators in Florida organic strawberries through intentional use of flowering plant. Strawberries are a major crop in Florida with 11,000 acres and a production value of over \$300 million (USDA 2014). Florida is the primary winter supplier of strawberries in the US, yet lags behind other production regions in certified organic acreage.

Strawberries can significantly benefit from insect pollination despite having self-pollinating flowers (Renkema, 2017). For the flower to develop into a perfect fruit, every pistil must be pollinated, and insufficient pollination can result in malformations of the fruit (Renkema, 2017). Open pollination by insects has the potential to increase fruit set, yield, and the overall crop profitability (Renkema, 2017). The study found positive effects due to flowers on known and potential pollinator abundance. The project has been beneficial for Florida area growers in that it showed to the research and strawberry farming community that adding floral diversity can improve pest management and pollination in Florida strawberries.

### ***Impacts on adoption of organic production***

#### *Organic Strawberry Transplants*

In 2017, OFRF awarded a grant to Stephanie Bourcier at Farm Fuel, Inc. and Lisa Bunin of Organic Advocacy in Watsonville, California. The goal of the ongoing project is to compare organic bare root strawberry transplant performance with conventionally managed transplants in organic fruit fields. The researchers are collaborating with five pioneer organic growers at five sites through Santa Cruz County. These sites are designed as replicated randomized complete block trials that will look at canopy diameter, disease wilt scores, and harvest yields to compare the viability of organic bare root and conventional bare root transplants. The ultimate aim of the project is to provide organic starts and phase out starts from conventional strawberry nurseries that fumigate soils with methyl bromide and other synthetic chemicals.

#### *Economics of Berry production*

Kurt Rom at the University of Arkansas received a grant in 2008 to research the economics of extending the season of blackberries and raspberries by using high tunnels. He found that growing blackberries and raspberries in high tunnels increases yields, produces larger fruit, and prevents loss of product due to poor weather conditions—all important economic benefits. The OFRF grant had a profound and lasting impact on Rom's career and research identity. "This first initial OFRF grant has completely transformed who I am as a scientist. I was the apple and peach guy, now I am the sustainable, organic, local foods guy. It completely changed my view, who I am, direction, focus, and career." Rom's organic research has become a powerful teaching tool that he uses for his class, the Principles of Horticulture. He uses the research site as a destination for hands-on learning field trips, and he stated that hundreds of students have seen the trials and learned about the experiment.



## OFRF EDUCATION AND ADVOCACY



Photo: Liz Birnbaum, OFRF

OFRF is extensively involved with education, outreach, and advocacy related to organic farming. Through our network of organic farmers, researchers, and consumers, we have shared the results of the organic berry research projects with thousands of organic stakeholders. Through OFRF's research program and outreach, farmers across the country have received pertinent research and training information through the publications, presentations

and workshops offered by the funded projects. The practices and techniques developed by the OFRF projects offer farmers information and tools to strengthen their operation's farming and marketing performance.

OFRF has held several organic research symposiums, where researchers have gathered to present and share their results and applicable tools for organic farmers. For example, during the 2016 Organic Agriculture Research Symposium hosted by OFRF, Carol Shennan presented on her lab's research, "CAL-CORE Network: On-Farm Research to Improve Strawberry / Vegetable Rotation Systems in Coastal California." The proceedings from the symposium, including are available here: <https://eorganic.info/node/16778>. These research symposiums have provided researchers and organic farmers with important opportunities to share research results, connect with collaborators, and learn about emerging innovations in the organic sector.

OFRF has been active is surveying organic farmers regarding their biggest challenges. In 2016, OFRF completed the report, *2016 National Organic Research Agenda (NORA)*. This report, based on our online survey and listening sessions with over 1,000 organic farmers, identified that soil health, weed management, and disease control as major research priorities among organic farmers. Many berry growers participated in the survey, and expressed specific needs to address challenges related to soilborne disease and pest control (Jerkins and Ory, 2016).

An additional to directly funding research, OFRF has worked through advocacy to promote federal and state funding for organic agriculture research. OFRF led advocacy efforts resulted in the legislative establishment and subsequent growth of the USDA Organic Research and Extension Initiative (OREI), the Organic Transitions Program (ORG), and numerous organic projects within USDA's Agriculture Research Service (ARS) and Economic Research Service (ERS). Cumulatively, these programs have invested nearly \$300M in organic research, education, and data collection to date. OFRF is committed to bringing organic farming research results to the policy arena and facilitating the use of scientific information about organic agriculture by regulatory and science policy bodies. For instance, OFRF-funded research results have informed the USDA National Organic Program and the National Germplasm Research Advisory Committee. This advocacy work is essential in providing guidance for USDA research programs

and science practitioners on adopting research on organic soil ecology, natural pest and weed control, and plant breeding for organic systems.

## CONCLUSIONS

### *Future research needs and directions*

The impacts from OFRF grants on the US berry industry have been long lasting and widespread. Berry growers, especially in California, have benefited from the organic innovations brought forward through OFRF funded research, which has aided the growing economic opportunity to expand organic production.

California has the largest number of organic farms: 2,805 in 2014, as well as the highest value in organic sales, \$2.2 billion. There is the opportunity to serve the organic sector through research, with several key areas where additional research prioritization on organic production can benefit berry growers. In 2015, OFRF distributed a nationwide survey to organic farmers asking about their research needs. 173 California organic farmers completed the survey. A major area of research that was prioritized by survey respondents was disease control, including control for the berry pathogen, fusarium wilt (*Fusarium oxysporum*) (Ory, 2016). To benefit California berry producers, OFRF particularly recommends increased research on the topics of soil disease and nematode control and plant breeding for disease resistance.

Increased funding for research on critical issues related to water management, soil health and fertility, weed control, managing diseases, and controlling insect pests will provide organic farmers and ranchers in California the knowledge and tools to enhance their production and marketing. Greater extension and outreach to the organic sector will benefit organic farming from information and guidance that supports the most environmentally and economically sustainable agricultural production systems.

OFRF is committed to supporting the research needed to meet the current challenges of organic farming, and to help organic farming continue its rapid growth. Through continued organic research, we will help create a more resilient and sustainable agricultural system that values healthy environments and healthy people.

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Table 1. List of OFRF funded berry projects

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**Nutrient Analysis of Organic Strawberries: Effect of Cultivars and Mycorrhizal Inoculations**

*Principal Investigator: Dr. Joji Muramoto, University of California, Santa Cruz*

*Award Amount: \$4,710*

*Year: Fall 1997*

This early research, conducted in explicitly organic settings in Monterey, Santa Cruz, and San Benito Counties, helped organic farmers make informed choices about cultivar selection, microbial treatments, and disease management issues.

**Alternative Methods of Raspberry Production and Root Rot Control**

*Principal Investigator: Carol Miles, Washington State University Research & Extension Unit*

*Award Amount: \$4,480*

*Year: Fall 1999*

Root rot (*Phytophthora fragariae* var. *rubi*) is of primary concern to all raspberry growers in Washington, and is of particular concern to organic growers who have fewer options for disease control. This project compared the effectiveness of organic disease control treatments to the standard chemical control treatment for root rot in raspberries. production of raspberry under conventional and organic farming systems.

**Conserving and Restoring Pollination Services in Organic Farms of Yolo and Solano Counties, Northern California**

*Primary Investigator: Claire Kremen, Stanford University, Stanford, California*

*Award Amount: \$8,000*

*Year: Fall 1999*

This research focused on understanding the contributions of native bees to agriculture, and the dependence of native bees on both natural and agricultural habitat, with the goal of developing plans for managing and conserving the pollination services they provide.

**Control of the Western Tarnished Plant Bug, *Lygus hesperus* (Knight) in an Organic Strawberry Production System Using Trap Crops, Mass-released Parasitoids, and Tractor-mounted Vacuums**

*Principal Investigator: Sean L. Swezey, University of California Sustainable Agriculture Research and Education*

*Award Amount: \$9,896*

*Year: Spring 2001*

Organic strawberry growers can't use the chemical pesticides registered for conventional lygus bug control, nor can they routinely use any organically-compliant materials due to the expense and low efficacy of these products. This project helped establish a relatively unique systems management approach through physical suppression (tractor mounted vacuums), integrated parasitism, and resources for sustained biological control.



### **Maintaining Agroecosystem Health in an Organic Strawberry/Vegetable Rotation System**

*Principal Investigator: Dr. Joji Muramoto, Center for Agroecology and Sustainable Food Systems*

*Award amount: \$9,342*

*Year: Fall 2003*

Continued growth of organic strawberry and vegetable production in California faces two challenges: soil-borne disease management without use of synthetic chemical fumigants, and fertility management to optimize fertility input use while ensuring protection of vulnerable habitats. The project focused on demonstrating effects of diverse organic strawberry/vegetable rotations and integrated ecological practices on agroecosystem health.

### **Integrating Biological Control with Trap Crop Management in California Organic Strawberries**

*Principal Investigator: Sean Swezey, Center for Agroecology and Sustainable Food Systems, University of California, Santa Cruz*

*Award Amount: \$14,848 Spring 2007 and \$14,471 Spring 2008*

This project focused on controlling the western tarnished plant bug, *Lygus hesperus* in organic strawberry production systems. The research helped establish a relatively unique systems management approach through physical suppression (tractor mounted vacuums), integrated parasitism, and resources for sustained biological control).

### **Off-season Blackberry and Raspberry Production to Expand Markets and Sustain Farm Profitability**

*Primary Investigator: Curt Rom, University of Arkansas, Fayetteville, Arkansas*

*Award Amount: \$38,209*

*Year: Spring 2008*

This project investigated the economics of extending the season of blackberries and raspberries by using high tunnels. Rom found that growing blackberries and raspberries in high tunnels increases yields, produces larger fruit, and prevents loss of product due to poor weather conditions.

### **Evaluation of Day-neutral Strawberries in Organic Systems in Washington**

*Principal Investigator: Patrick Moore, Washington State University Cooperative Extension, Puyallup, WA*

*Award Amount: \$38,640*

*Year: Fall 2008 (3 years) and \$11,200 Spring 2012*

This project was a three-year breeding effort to develop strawberry varieties that produce fruit over a 4-5 month period in the Pacific Northwest. The study also evaluated which cultivars produce the most flavorful and highest-yielding fruit.

### **Integrated Soil-borne Disease and Weed management for Organic Strawberries Using Anaerobic Soil Disinfestation, Broccoli Residue Incorporation and Mustard Cake Application**

*Principal Investigator: Carol Shennan, University of California, Santa Cruz, Center for Agroecology and Sustainable Food Systems*

*Award Amount: \$49,132*

*Year: Spring 2010*

As part of an ongoing effort to improve organic strawberry production systems, this project focused on anaerobic soil disinfestation (ASD), which was found to be an effective management tool for soil-borne pathogens and a viable alternative to toxic fumigants. Shennan successfully leveraged OFRF's initial investment into millions of dollars of funding from USDA for work that continues today on a national level.

### **Flowering Plants in Organic Strawberry Fields to Enhance Natural Enemies and Pollinators and Improve Pest Control and Fruit Quality**

*Primary Investigator: Justin M. Renkema, Ph.D., University of Florida*

*Award Amount: \$14,889*

*Year: Spring 2016*

Methods to conserve and augment beneficial insects in modern horticultural production systems are needed given issues with pest resistance to insecticides, pest resurgence due to lack of natural enemies, and replacement of native with invasive species. The objective of this project is to manage for both predators and pollinators in Florida organic strawberries through intentional use of flowering plant.

### **Evaluation of Organic Strawberry Transplants for Organic Strawberry Production**

*Principal Investigator: Stefanie Bourcier, Farm Fuel Inc. and Lisa Bunin*

*Award amount: \$14,960*

*Year: Spring 2017*

Conventional strawberry nurseries that fumigate soils with methyl bromide and other synthetic chemicals prior to propagation are currently the main source of transplants for both conventional and organic production systems. In part, commercial availability of organic transplants has been limited due to a lack of tested varieties as well as a lack of supply during the traditional planting season. The goal of this project is to compare organic bare root strawberry transplant performance with conventionally managed transplants in organic fruit fields in collaboration with five pioneer organic growers in Santa Cruz County.