
This is a final project report submitted
to the Organic Farming Research Foundation.

Project Title:

Managing farm habitat for wild pollinators

Investigator:

Scott Black
Xerces Society for Invertebrate Conservation
4828 SE Hawthorne
Portland, OR 97215
sblack@xerces.org
(503) 232-6639

OFRF funding awarded: \$8,000, awarded fall 2008

Funding category: Education

Project period: 2008 - 2009

Report submitted: February 2010, 10 pages



1. PROJECT SUMMARY

With support from the Organic Farming Research Foundation (OFRF) and others, the Xerces Society has successfully completed the development of a comprehensive set of materials and instructional guidelines for native pollinator conservation on organic farms. The title of this toolkit is *Organic Farming for Bees – Conservation of Native Crop Pollinators in Organic Farming Systems*. *Organic Farming for Bees* includes materials designed to help organic farmers conserve native pollinators and take advantage of the crop pollination services they can provide. In addition, we have developed a workshop curriculum that complements these resources and provides training on native pollinator conservation on organic farms.

To effectively distribute these tools to the target audience of organic farmers and farm educators, the Xerces Society implemented a successful set of outreach activities. Xerces staff presented the workshop curriculum five times during the project, training more than 400 people. The audience at these workshops included organic fruit, vegetable, and forage seed producers from multiple states as well as personnel from agencies that provide support to growers including staff from state departments of agriculture, Cooperative Extension, and the USDA Natural Resources Conservation Service (NRCS). Venues where the curriculum was delivered included three major organic farm conference sessions: twice at MOSES 2009 (we tested the material to get feedback from the audience at both of these sessions) and at EcoFarm 2010. We have been invited back to MOSES 2010, are in the process of scheduling additional *Organic Farming for Bees* workshops, and are negotiating to present the training to farm certifiers through partner organizations such as Oregon Tilth and Washington Tilth.

In addition to distributing printed versions, we have made the *Organic Farming for Bees* resources permanently available on our website. These materials were used to create a special section on our Pollinator Conservation Resource Center, which provides specific information on pollinator conservation for ten regions of the country. Farmers in each of these areas can now find organic-specific resources alongside a plethora of information on pollinator plants, conservation measures for pollinators, and how to get Farm Bill funding for pollinator conservation.

Partner organizations have also provided distribution for *Organic Farming for Bees*. These partners have included the Midwest Organic and Sustainable Education Service (MOSES) and Wild Farm Alliance, each of which is actively distributing these resources to their members and constituents.

Feedback from partners and farmers who have used the materials has been very positive. Pollinator declines, as well as the rising price of honey bee rentals, continue to pose a major challenge to organic farmers. The work conducted through this project is addressing that challenge by promoting the conservation of native bee crop pollinators as a safeguard against further honey bee declines. These efforts are a win-win scenario, supporting both agricultural production and native wildlife.

In addition, the National Organic Standards Board voted in May 2009 in favor of full implementation of the National Organic Program (NOP) Biodiversity Rule. Under this mandate, the conservation of biodiversity should be one of the criteria measured in farm certification. Native pollinator conservation provides organic farmers with a mechanism for meeting that requirement while at the same time enhancing crop production.

2. INTRODUCTION TO TOPIC

Currently the acreage of organic horticultural crops requiring bee pollination is at an all time high. Against this backdrop, the number of managed honey bees in the U.S. has declined by 50% since World War II. With increases in parasite and disease pressure, as well as the highly publicized Colony Collapse Disorder, America is for the first time ever experiencing a honey bee shortage.

This rising demand and decreased availability have made honey bees increasingly expensive to obtain. Similarly, rising fuel costs are making the cross-country transport of honey bees for pollination services more cost-prohibitive.

Current health issues also make honey bee management difficult without the extensive use of antibiotics and tau-fluvalinate or organophosphate miticides—practices which are at odds with organic farming systems.

Finally, because the honey bee is not native to North America it is not as well adapted to some climatic conditions as native bees. Similarly, some native bees are more efficient pollinators than honey bees for native new world crops (such as tomatoes, squash, pumpkins, cranberries, and blueberries), as well as many old world orchard crops (such as apples and cherries).

Unfortunately the best available research is also documenting declining native bee numbers across the country, including the possible extinction of several species. While our native bees are not affected by the same disease and parasite problems as honey bees, they are facing unprecedented habitat loss and exposure to pesticides.

The reduced use of pesticides as well as more sustainable management practices makes organic farms an important asset in protecting our national pollinator resources. Many organic operations already have good numbers of existing wild bees. In some cases, these native bees can effectively provide all necessary crop pollination services when bee-friendly management practices are implemented.

By establishing management protocols for wild bees we provide these pollinators with new opportunities for success and a new place in our agricultural ecosystems. This is a win-win situation, providing growers with better pollination and new habitat for native species.

In addition to more secure and effective pollination, organic growers benefit from the other ecological services these protocols provide. The same habitat enhancements and management practices that support wild pollinators also support beneficial insects such as parasitoid wasps, predacious flies and beetles, ambush and assassin bugs, lacewings and others. The presence of

these insects can reduce crop pest pressure, an important consideration for organic production systems.

Finally, many of these conservation efforts can be funded through cost-sharing and incentive payments made available through various farm bill programs. Among these funding sources are Natural Resources Conservation Service (NRCS) programs such as the Environmental Quality Improvement Program (EQIP) and the Wildlife Habitat Improvement Program (WHIP), as well as the Farm Service Agency (FSA) Conservation Reserve Program (CRP) and the CRP State Acres for Wildlife Enhancement (CRP-SAFE) program.

This project was designed to develop and distribute the information necessary for organic producers to create habitat and implement other practices that build and sustain bee and beneficial insect populations. Educational materials also included information to help growers take advantage of incentive programs available to assist with pollinator habitat projects.

3. OBJECTIVES STATEMENT

The goal of this project was to provide organic growers with sustainable pollination through the creation and management of farm habitat that supports native bees. Specific project objectives were to educate organic growers about (1) recent research that increases our understanding of the role native bees play in crop pollination, (2) the specific habitat needs of native bees, (3) how to provide this habitat, and (4) how to reduce impacts of organic farming practices on these pollinators. Two deliverables were specified in the proposal, a pilot-tested workshop curriculum and an organic grower toolkit on farming for native pollinators.

Each of the major objectives was met, the project's two central deliverables were completed, and we have accomplished a great deal towards our overall goal of supporting organic farmers in their pollinator conservation efforts. With the development of *Organic Farming for Bees*, organic farmers now have a complete set of information to assist them with pollinator conservation projects. The toolkit includes information that addresses each of the project's educational objectives: the role that native bees can play in crop pollination (Objective 1), habitat needs of native bees and how to create this habitat (Objectives 2 and 3), and organic-specific information on conservation practices (Objective 4). The workshop curriculum developed alongside these materials provides an effective way to deliver this information to large audiences.

We have also been successful with our education and outreach activities to put this information into the hands of those who can use it. Our presentations of the workshop curriculum at major conferences have already reached hundreds of organic farmers and farm educators (our presentations at MOSES in 2009 and most recently at EcoFarm had capacity crowds for the sessions), and will reach many more in the near future. We have also effectively reached our target audience by working to distribute the information through partners and by providing the *Organic Farming for Bees* materials online.

4. MATERIALS AND METHODS

Development of the *Organic Farming for Bees* Toolkit and Workshop Curriculum

Prior to beginning this project, Xerces Society staff had worked with organic and conventional farmers nationwide as well as with university and federal agency staff to provide technical support for native bee conservation efforts. Based on this past experience and feedback from partners, we identified several key knowledge gaps among constituent audiences which were included in the initial design of outreach curriculum for organic farmers:

- 1). A clear understanding of native bee biology, ecology, and diversity;
- 2). An understanding of how farm practices such as tillage and the use of organic-approved pesticides affect pollinator populations;
- 3). How farmers can provide supplemental forage and nest habitat to maximize resident native pollinator populations;
- 4). How to access Farm Bill mandated programs administered through the USDA-NRCS that can assist farmers with pollinator conservation efforts.

These topics were incorporated into an electronic presentation which later served as the foundation for the development of the supporting print publications found in the toolkit. The training presentation included more than sixty image-rich slides containing information based upon the latest peer-reviewed research on how to conserve pollinators in farm landscapes. The initial workshop curriculum and the electronic presentation were then pilot-tested at two separate events during the 20th Annual Organic Farming Conference (formerly the Upper Midwest Organic Farming Conference) in La Crosse, Wisconsin.

Based on feedback from workshop participants and partners, the draft materials were then revised. Two additional topic areas were also identified based upon workshop participant feedback:

- 5). Farmers and certifiers wanted basic information about the NOP biodiversity rule and how that could mesh with pollinator conservation efforts. To meet this need, a basic overview of the NOP biodiversity rule and where to find additional information about it was added to the electronic presentation.
- 6). Workshop participants consistently asked for additional in-depth guidelines on how to manage artificial nests to attract and support native bees. Nest construction information is already widely available, but management protocols to limit parasite and disease pressure were limited. This need was filled by a multi-page nest management publication that was included as part of *Organic Farming for Bees*.

These additional topic areas were incorporated into the next set of supporting print publications, and underwent a final set of revisions based upon audience and partner feedback. Final supporting print publications for the workshop curriculum were designed to expand upon the core information provided in the electronic presentation and, when paired with existing Xerces Society materials (such as basic native bee biology guidelines), provide a comprehensive foundation for farm management and pesticide mitigation in organic operations.

These supporting publications include three new guides. The first, *Organic Farming Practices – Reducing Harm to Pollinators from Farming*, includes ranking guidelines for non-insecticide organic farming practices. This document will raise awareness of how various practices can have unintended consequences to native pollinator populations (e.g. how increased tillage in the absence of conventional herbicides can affect ground-nesting bees).

The second, *Organic-Approved Pesticides – Minimizing Risks to Pollinators*, consists of pollinator toxicity ranking guidelines for all major organic-approved insecticides. An early draft of this document was distributed at the 2009 Organic Farming Conference (“Organic University” session) and underwent a final revision to address additional audience questions that arose during the event.

The third guide, *Tunnel Nests for Native Bees – Nest Construction and Management*, provides detailed guidelines to the management of artificial nests for native bees. There are already instructions on how to construct artificial nests, but in our outreach efforts, it became clear that guidelines on the ecologically-sound long-term management of these structures were not widely available. *Tunnel Nests for Native Bees* fills that void. Such artificial nests can be of particular interest on organic farms because, unlike honey bees which currently require extensive and often chemically intensive pharmaceutical treatments to control parasites and diseases, native bees can be managed without miticides and antibiotics. These nests can also help growers fulfill the NOP biodiversity requirements by providing additional wild pollinator nest habitat.

Each of these detailed guides, along with other supporting core content, has been incorporated into the final *Organic Farming for Bees*.

Distribution of the Toolkit and other Materials

A complete set of outreach activities was used to distribute the *Organic Farming for Bees* toolkit materials. Xerces Society staff completed five workshops presenting the training curriculum (please see the **PROJECT RESULTS** section below for additional details), reaching over 400 farmers and farm educators.

In addition to print versions of the toolkit and training curriculum, the corresponding documents and PowerPoint materials were released as free downloadable PDF files through a new organic farming resource portal on the Xerces Society website (<http://www.xerces.org/organic-farms>). These materials were also provided to partner organizations (such as Wild Farm Alliance and MOSES) for free distribution through their websites. Press releases announcing the availability of the *Organic Farming for Bees* resources and the free corresponding downloadable materials were distributed to the media departments of major organic farm organizations nationwide (Oregon Tilth, MOSES, NOFA, PASA, etc.). We also handed out 30 copies of *Organic Farming for Bees* at EcoFarm 2010 on a first-come, first-served basis after our presentation there.

5. PROJECT RESULTS

Qualitative Results

The *Organic Farming for Bees* toolkit and accompanying workshop curriculum have been very well received. These materials and outreach curriculum have arrived at a crucial time when America is experiencing unprecedented declines in managed honey bee populations due to

parasite, disease, pesticide, and nutritional problems, as well as the highly-publicized Colony Collapse Disorder, a still unidentified syndrome causing significant honey bee mortality.

The work conducted through this project is addressing these challenges by promoting the conservation of native bee crop pollinators as a safeguard against further honey bee declines. The tools created will continue to have direct economic benefits to organic farmers through increased crop yields and a reduced dependence on managed honey bees. These efforts are a win-win scenario, supporting both agricultural production and native wildlife.

Quantitative Results

The completed *Organic Farming for Bees* toolkit includes comprehensive information to support pollinator conservation practices of organic growers. This includes background on the role of native pollinators in agriculture, detailed information on their habitat needs, and specific guidelines to help organic farmers provide habitat and implement other pollinator-friendly practices. Publications developed for this set of materials include *Organic Farming Practices – Reducing Harm to Pollinators from Farming*, *Organic-Approved Pesticides – Minimizing Risks to Pollinators*, and *Tunnel Nests for Native Bees – Nest Construction and Management*.

To date our organic farmer training has reached more than 400 people, including organic fruit, vegetable, and forage seed producers from multiple states as well as personnel from agencies that provide support to growers including staff from state departments of agriculture, Cooperative Extension, and the NRCS. The feedback from these workshop participants and other users of the materials has been overwhelmingly positive.

Xerces Society staff presented the following specific outreach trainings and workshops during the project:

- The first of these events consisted of a full-day “Organic University” session in February 2009, held in association with the Organic Farming Conference. The Organic University session provided in-depth training to 50 people including organic farmers from multiple states, field biologists from the NRCS, and personnel from the Wisconsin Department of Agriculture, Trade, and Consumer Protection. The longer, full-day format allowed for more in-depth discussions, and provided an opportunity to give direct one-on-one support to each workshop participant. Attendees received a comprehensive resource book that included copies of existing Xerces Society publications and new draft guidelines on reducing pollinator mortality from organic-approved pesticides.
- The second event, a two-hour general conference session at the 2009 Organic Conference, was overwhelmingly popular with attendance by over 150 people, literally resulting in standing-room-only conditions. Attendees again included both agency staff as well as organic farmers ranging from small Midwestern fruit and vegetable growers to a large-scale organic alfalfa seed producer from Wyoming. Numerous audience questions were fielded on the subjects of basic native bee biology and the safe use of organic-approved insecticides.

- In May 2009 we conducted a workshop at Blueberry Bay Farm in Stratham, New Hampshire. This event included small-scale organic fruit growers, University of New Hampshire Extension fruit specialists, and state and national-level NRCS conservationists (including the eastern region NRCS National Wildlife Biologist and the New Hampshire State Wildlife Biologist). The NRCS used the session to discuss how pollinator conservation efforts could be incorporated into the organic-transition support now offered through EQIP.
- Also in May we conducted an evening workshop at Ricker Hill Farm in Turner, Maine. The 2,500 acre operation includes transitioning organic apples, blueberries, and cranberries. The event audience included organic farmers from across southern Maine, University of Maine Cooperative Extension agents, and state and national level NRCS staff including the State Wildlife Biologist, State Resource Conservationist, and the National Wildlife Technology Development Team Leader.
- On August 18th, we conducted a full-day workshop at Gathering Together Farm in Philomath, Oregon, attended by more than thirty farmers. The attendees were primarily small-scale organic growers of a range of crops, including row crops, orchard fruit, and livestock, but also some organic-transition growers. This event was presented jointly with the farmscaping program of the Integrated Plant Protection Center of Oregon State University. It focused on the creation and management of habitat to support pollinators and other beneficial insects. We also delivered a similar workshop at Dancing Roots Farm in Troutdale, Oregon, on September 11, 2009.
- On January 21, 2010 we held a rollout of our new materials at a session at the EcoFarm conference in Pacific Grove, California, entitled *To Bee or Not to Bee: How Organic Farmers Can Protect Pollinators*. This was a short session that provided an overview of the *Organic Farming for Bees* resources and let farmers know where they could go for additional information. Claire Kremen (UC Berkeley) also presented on research into organic farming and native bees at this session. Over 40 people attended this session in a room that fit approximately 30.

In addition to formal classroom-based training, the Xerces Society has used the materials developed during this project to provide direct one-on-one support to organic farmers. For example:

- In March 2009, we met with an organic apple producer in Mineral Point, Wisconsin to provide direct planning support for the creation of a pollinator habitat enhancement through the NRCS WHIP Program. Specific challenges that arose during that process were documented and lessons learned were incorporated into our workshop guidelines to assist other producers in confronting similar implementation issues.
- In May 2009, we assisted a major organic berry producer in Lewiston, Maine with development of a comprehensive farm management plan for pollinator conservation in collaboration with the NRCS state biologist.

6. CONCLUSIONS AND DISCUSSION

This project began as an effort to provide the first nationwide systematic education program targeting wild pollinator management on organic farms. It has very successfully accomplished that goal. Now, with greater adoption of the NOP biodiversity rule and organic transition support offered by the NRCS, the materials created during this project are finding even greater utility and long-term value by helping farmers achieve and maintain organic certification.

Another recent development also makes this project particularly timely. In 2009, for the first time ever, the Environmental Quality Incentives Program (EQIP), administered by the USDA NRCS, provided financial and technical assistance for organic transition. Nationwide, \$50 million dollars in dedicated funds were allocated for the organic conversion component of the program. In some individual states, the farm practices eligible for funding (such as the NRCS cover cropping standard) included practices that can be used to support pollinator conservation efforts. The workshop curriculum developed through this project will be of huge assistance to farmers wishing to take advantage of this NRCS organic transition support.

The Xerces Society plans to work through several different avenues to further extend the impact of the materials developed during this project. Xerces staff has already scheduled several additional workshops to deliver the *Organic Farming for Bees* training. Other distribution partners for the toolkit are being solicited on an ongoing basis. In addition, the Xerces Society is exploring the possibility of distributing the electronic presentation through the new national Cooperative Extension web initiative (eXtension.org).

We are also in the process of requesting funding to expand our outreach efforts even further. Specific activities that take place under future funding will include further training workshops that will bring the workshop curriculum to a significant number of additional national conferences. Renewed funding will also be used to develop a Pollinator Habitat Evaluation Guide designed for farm inspectors, certifying agencies, and NRCS farm planners. This tool will help expand the audience for *Organic Farming for Bees* to include a greater number of organic certifiers and others. By reaching these educators, we will further increase the impact of the initial project and speed the adoption of organic pollinator management techniques. This “train the trainers” approach is a key strategy for building on the work already conducted.

7. OUTREACH

In addition to the outreach activities already completed, the Xerces Society plans to continue to distribute the *Organic Farming for Bees* toolkit and training as broadly as possible. We will continue to offer these materials through our online resource center (available at <http://www.xerces.org/organic-farms/>), and will seek other outlets for online distribution as well. We are also scheduled to deliver the *Organic Farming for Bees* training at two additional major regional organic farm conferences. These include two sessions at the MOSES Organic Farming Conference in La Crosse, Wisconsin (February 26, 2010), and the Advanced Inspector’s Training at the Annual Meeting of the International Organic Inspector’s Association (IOIA) in Tucson, Arizona (March 3, 2010).

These events (combined with previous outreach efforts) will provide the organic farming pollinator conservation curriculum to a potential audience of over a thousand farmers, farm inspectors, and organic farm consultants across most regions of the US. For example, the previous 2009 sessions at the MOSES Organic Farm Conference in Wisconsin resulted in standing room only attendance with more than 100 participants (with a number of people unable to attend due to room capacity and concurrent workshop sessions). Our follow-up sessions at the 2010 conference will allow greater dissemination of the toolkit materials and organic curriculum to that audience.

Additional workshop opportunities specifically for this content are also being explored including events with Washington Tilth and the Wyoming and New Mexico USDA Natural Resources Conservation Service (NRCS). We are also in active discussion with two organic agriculture advocacy groups (Oregon Tilth and Wild Farm Alliance) about the possibility of conducting workshops for farmers and farm certifiers in Oregon and California.

We will continue to explore conducting future workshops that target organic farm educators (i.e. Extension personnel) and organic farm certifiers. By reaching these audiences, who can incorporate pollinator information into their own outreach efforts with organic farmers, we hope to follow a “train-the-trainer” model. This will greatly expand the impact of the *Organic Farming for Bees* materials, continuing to leverage the support that OFRF and others provided for this project into additional benefits for the organic farm industry.

8. REFERENCES

The following key references have informed our understanding of the status of native pollinators, their role in agriculture, and practices for their conservation. Information from these sources and others has been used in developing the materials for this project. In addition, each of the individual publications included in the *Organic Farming for Bees* toolkit features a list of references specific to that document.

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9. ADDENDA

- *Organic Farming for Bees* workshop presentation (PowerPoint file converted to PDF)
- Photograph Supplement (PDF)
- *Organic Farming for Bees* toolkit (hard copy binder)