

Final Report to the Organic Farming Research Foundation  
From the Xerces Society for Invertebrate Conservation

**POLLINATOR CONSERVATION STRATEGIES FOR ORGANIC SEED PRODUCERS**

*An education and outreach proposal to the Organic Farming Research Foundation from the Xerces Society for Invertebrate Conservation*

March 1, 2013

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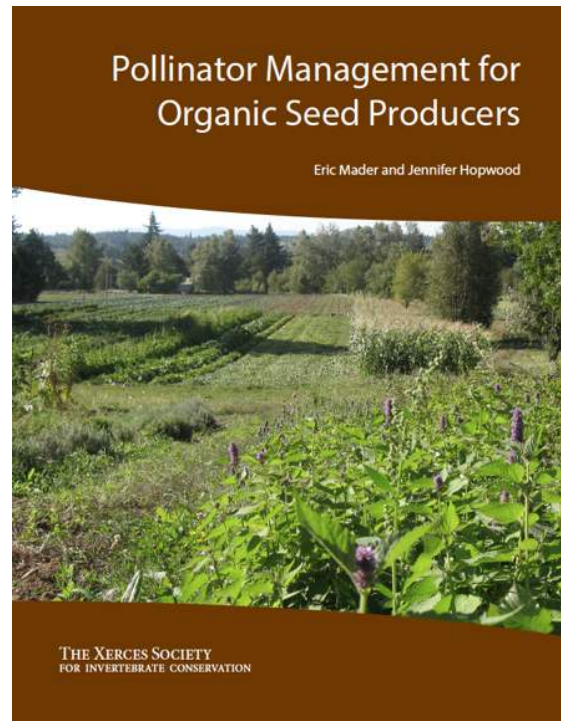
**Project Summary**

Organic seed producers are facing new challenges. In recent years, several bee-pollinated seed crops such as alfalfa, canola, and cotton have been at the center of a global debate around issues of crop sovereignty and seed security. Indeed, the organic production of these and other seed crops is increasingly compromised by the threat of undesirable outcrossing from GMO and non-organic crop varieties.

This situation is further complicated by the biology of honey bees, which forage over wide areas and are transported long distances where they pollinate countless crops. In contrast, native bees, which forage over shorter distances, offer a functional alternative for seed producers to reduce the need for managed pollinators and to exercise greater control over their pollination needs.

Similarly, the tremendous diversity of organic crop varieties necessitates a wide range of pollinator species. Honey bees are valuable generalist pollinators that can be supplied in large numbers. On a bee-

for-bee basis however, specialist native bees, such as squash bees in cucurbits and bumble bees in heirloom tomatoes, have been documented to significantly increase seed yield.



This project developed pollinator conservation training materials specifically tailored to the needs of organic seed producers. The training is being delivered through web, print, classroom, and partner organization channels.

**Background**

In early 2010, the Center for Food Safety asked us to interpret research findings related to the pollination of alfalfa seed and the potential for contamination of organic alfalfa by Roundup Ready alfalfa seed crops. Based upon a review of that research, it was our conclusion that the findings of the GMO seed industry were flawed and that several fundamental issues of crop pollination were mischaracterized.

This request was followed directly by additional questions posed to us by organic seed producers in Washington, Wyoming, Minnesota, and elsewhere about the expansion of GMO crops, the security of organic foundation seed sources, and the foraging distances of various bee species. Based upon these requests, we identified a critical need to provide organic seed producers with more information about how to most effectively encourage pollinator populations in a way that is compatible with their needs.

Indeed, the extent to which viable GMO pollen is transferred via managed pollinators is uncertain. However, differences between managed honey bees (and alfalfa leafcutter bees) in contrast to wild native bees may play a role in determining the level of this risk.

For example, the foraging distances of honey bees make them likely to encounter significant populations of plants beyond a farm's boundaries. In one study, honey bees were placed at a distance of 250m from a field of GMO corn surrounded by a 3m buffer zone of non-GMO corn. Of the pollen sampled from the hives, 52% contained the transgene (Reiche et al. 1998).

In contrast, wild bees typically forage over much shorter distances, often less than a mile away from their nest site (Greenleaf et al. 2007). This shorter foraging range could provide a natural limitation against crop pollen from off-farm sources.

The cross-country movement of managed bees represents another potential pathway for pollen contamination to occur. For example, researchers know that viable stray pollen exists within honey bee hives and that such stray pollen routinely adheres to the bodies of departing foragers (DeGrandi-Hoffman et al. 1984). In one study, newly emerged honey bees (that had not yet flown) were coated with enough 'second-hand' pollen that researchers were able to successfully hand pollinate apples with the bees' bodies (DeGrandi-Hoffman et al. 1986). Based upon this scenario, the cross-country movement of honey bee hives may have the potential to introduce pollen from far beyond a farm's boundaries.

Similarly, industry studies of Roundup Ready alfalfa have failed to examine the potential for transgenic pollen to spread within alfalfa leafcutter bee cocoons and nesting equipment. Alfalfa leafcutter bee (*Megachile rotundata*) cocoons are sold in bulk quantities within the seed trade and are routinely shipped across national boundaries (Mader et al. 2010). Such bulk cocoons are typically coated with stray pollen that may adhere to emerging bees during their release in the field. Little published information exists on the ex situ longevity of alfalfa pollen, however, even fairly old research has demonstrated the viability of alfalfa pollen for several years under optimal storage conditions (Hanson and Campbell 1972).

In contrast, wild bees by nature are not transported by humans, reducing the likelihood of them introducing non-local pollen sources. Such native bees are also widely recognized as extremely effective pollinators of crops, such as squash and heirloom tomatoes, increasing seed set in comparison with honey bees (Tepedino 1981, Greenleaf and Kremen 2006).

Native pollinator conservation also provides a number of secondary benefits to farmers. For example, the same habitat features that support native bees also enhance populations of other beneficial insects (Isaacs et al. 2009). Pollinators also serve as a tangible representation of on-farm biodiversity, with the same habitat features that support them providing benefits to other wildlife, water quality, and soil health (Vaughan and Skinner 2008). Native pollinator conservation is a win-win scenario—providing

direct economic benefits to organic producers, and creating a role for beneficial wildlife in agro-ecosystems.

### **Project Objectives**

This project is a direct outgrowth of requests we have received by partner organizations and agencies.

In early 2011, the Organic Seed Alliance approached us with a request to conduct several pollinator conservation trainings specifically for organic seed producers. These trainings included a course offered at the 2012 *Organic Seed Producers Conference*.

Following this request, in November 2011, the USDA Natural Resources Conservation Service (NRCS) asked us to create a joint staff position at the agency's Eastern Region Technology Support Center in Greensboro, North Carolina. The NRCS asked that this position specifically support the pollinator and beneficial insect conservation needs of organic producers (a priority demographic for the agency).

Based upon these requests, we identified the need for a specific educational program that would support organic seed producers in four critical ways:

#### 1. Developing new information that directly supports organic seed production

To accomplish this goal, we have worked to develop a comprehensive training package for organic seed producers including: (1) a 2-hour classroom training program, and (2) a handbook titled *Pollinator Management for Organic Seed Producers*.

#### 2. Empowering organic seed producers with greater knowledge to manage their pollination needs

To support this goal, we delivered the training program and handbook to organic producers and farm educators at a number of major organic farming conferences. Ongoing follow-up with those workshop participants confirms that many are implementing the pollination management principles highlighted into their own seed production efforts.

#### 3. Reducing the risk of contamination to organic foundation seed from GMO and non-organic varieties

Both the classroom training developed through this project, as well as the handbook specifically address risk mitigation strategies for pollinator-mediated gene flow between GMO and organic seed crops. Specifically, isolation distances are addressed from a comprehensive understanding of pollinator species foraging distances, crop susceptibility to outcrossing, pollen contamination from beekeeping equipment, and the function of natural gene flow buffers. To help facilitate widespread dissemination of these strategies, we are working to provide copies of the handbook to the Organic Seed Alliance for distribution to their national audiences.

#### 4. Improving on-farm biodiversity and fostering secondary benefits to adjacent ecosystems

The curriculum developed through this project is being used in tandem with an existing comprehensive pollinator conservation training program (developed by Xerces) that is currently being conducted on a nationwide basis. This complimentary conservation-oriented outreach program supports the needs of organic seed producers by fostering healthy native pollinator numbers, increasing populations of beneficial insects (for pest control), and helps organic producers meet the biodiversity conservation requirements for organic certification (biodiversity conservation is an explicit metric used in the legal NOP definition of an organic farm system).

## **Educational Approach**

This project supports organic seed producers with the latest science-based information on maximizing crop yields through the conservation of native pollinators, while at the same time helping them to reduce the risk of outcrossing with non-organic crop varieties.

To accomplish this goal, we have worked to develop a comprehensive training package for organic seed producers including:

- A 2-hour classroom training program
- A handbook titled *Pollinator Management for Organic Seed Producers*
- Delivery of the training program and bulletin to organic producers and farm educators at a number of major organic farming conferences

These educational tools are evaluated on an ongoing basis through review by partner agencies and scientists (particularly Agronomists and Biologists with the USDA Natural Resources Conservation Service) and through targeted solicitations for feedback from subject matter experts who attend our events.

In addition, our overall educational methodology is quantitatively measured on an ongoing basis through post-event questionnaires administered at our Pollinator Conservation Short Courses (where some specific seed production content developed through this project is now also being integrated). To date, these post-event evaluation systems have provided overwhelmingly positive feedback, with 97% of participants reporting that they would modify their farm practices to support pollinators. We know that these responses were accurate based upon nationwide enrollment in USDA-administered pollinator conservation programs, which reached over 60,000 acres during the same time periods that we were conducting the Short Course.

Through this project, we are confident that our same teaching methodology will produce equally measurable and valuable benefits to organic seed producers. As with all Xerces educational programs, staff scientists remain available to provide direct one-on-one conservation support to farmers beyond the project completion date.

## **Project Results & Outreach**

To date, the classroom-training curriculum has been developed and delivered at the [2012 National Organic Seed Conference](#) in Port Townsend, WA and the [2013 New Mexico Organic Farming Conference](#) in Albuquerque, NM. Nearly 150 farmers attended the sessions, which received overwhelmingly positive feedback such as the following:

*"Your presentation was the highlight of the conference for us."*

Doug and Anna Crabtree  
Helena, MT

*"I attended your presentation that snowy weekend in Jan. at Port Townsend (OSA Conference). You did a great job, and I've told people it has totally changed how I will be looking at farming..."*

Becky Stinson  
Bellingham, WA

*"I just wanted to say thanks again for the great seminar today at the seed conference. You probably hear this all time but you are doing very important work and your ability to convey your knowledge is both enthralling and informative."*

Hillary Jensen-Bergren  
Gig Harbor, WA

Ongoing follow-up with other workshop participants confirms that many are implementing the pollination management principles highlighted in our program into their own seed production efforts. The seed producers who we have maintained an ongoing dialogue with as a result of these conferences include a diverse cross-section of small vegetable seed producers, a major organic alfalfa and clover seed producer, and a dry-land organic seed producer of dry beans, lentils, flax, and other specialty crops.

To support these classroom trainings, our *Pollinator Management for Organic Seed Producers* handbook has also been developed (and is attached to this report). The handbook highlights primary pollinator groups and describes strategies for managing their habitat needs in the production of the following seed crop systems: alfalfa, cucurbits, cotton, sunflower, alliums, brassicas, carrots, and herbs, as well as guidelines for pollination management of typically self-fertile or wind-pollinated crops such as corn, solanaceous species, and common beans (insect pollinators are known to occasionally visit each of these).

Distribution of the handbook began in February 2013 at the [MOSES Organic Farming Conference](#) (in LaCrosse, WI) and the 2013 New Mexico Organic Farm Conference, where several hundred handbooks were distributed to conference participants (distribution at the MOSES conference coincided with multiple workshop sessions on organic seed production and policy issues). Reception of the handbook was overwhelmingly positive and resulted in us running out of copies within the first day of the MOSES conference.

Complimenting the seed production handbook, in July 2012, a request was made to us by the Organic Seed Alliance to contribute a book chapter for a new publication on organic seed production and seed saving. That chapter was completed in September 2012 and includes descriptive information on eight major groups of seed crop pollinators, as well as a discussion of conservation strategies and crop-specific notes on the pollination requirements of more than 30 seed crops. Publication of the full book (in partnership with Seed Savers Exchange) is anticipated for early 2013.

To date, all major milestones in delivering the workshop curriculum at other organic farming conferences have been achieved. The possibility of additional workshops is being explored for 2013-14, including a national webinar for mid-2013 and an additional session at the [2014 Organic Seed Alliance Conference](#) in Corvallis, OR. In addition, we will continue to explore opportunities to make the workshop available at other major organic farming conferences on an ongoing basis.



PHOTO: Xerces Society's Eric Mader (center), with organic farmer Doug Crabtree (left), and USDA-NRCS Agronomist Terrance Kelly (right), at the 2013 MOSES Organic Farming Conference in LaCrosse, WI. More than 200 copies of *Pollinator Management for Organic Seed Producers* were distributed at the conference.

### **Conclusions and Discussion**

The support of OFRF has expanded our previous nationwide outreach to organic farmers and made it possible for us to reach new audiences. Our outreach model specifically depends upon delivering engaging workshop curriculum in farm communities across the country and through cultivating local organic farming leaders. In implementing that model, we have had an exceptionally successful year.

For example, a review of our workshop feedback over the last year reveals that 97% of our workshop participants said that they will manage their farmland differently to support pollinators. Those participants collectively manage more than 63,000 acres of land.

What is more meaningful to us are the stories of the people actually taking action. For example, after attending our workshop at the 2012 Organic Seed Conference, Doug and Anna Crabtree who farm several hundred acres of organic small grains, beans, flax, and other crops in Havre, Montana, began restoring strips of wildflowers and native shrubs around their crop fields (and are planning to establish even more in the year ahead). In November 2012, the Crabtrees borrowed a set of our workshop slides—many of the same slides they saw when they attended our original *Organic Seed Producers Workshop*—and presented those slides themselves to more than 100 other farmers at the Montana Organic Association's annual conference.

Another significant impact of OFRF's support for our work has been an expanded relationship with other organic farming stakeholders like the Organic Seed Alliance and our collaboration with them on a new national book for organic seed producers (scheduled for publication in 2013 through Seed Savers Exchange).

The single challenge associated with all of these achievements has been working to balance the many requests for our support with our capacity. For example, the request by Organic Seed Alliance to develop a pollinator conservation chapter for their new book caused a slight delay in the development of our own handbook. In the end, we were able to accomplish both goals. The central lesson being that the need for our support among organic producers is larger than we ever anticipated. In the year ahead, we will be working to identify ways of continuing to meet those needs.

**Financial Accounting**

<b>The Xerces Society for Invertebrate Conservation                      Organic Farming Research Foundation                      Pollinator Conservation Strategies for Organic Seed Producers                      Financial Report                      January 2012 - January 2013</b>			
<b>Expenses</b>	<b>OFRF</b>	<b>Other Funding</b>	<b>Total Project</b>
Salaries & Wages	8,655	4,676	13,331
Benefits & Taxes	803	2,987	3,789
Contract Services	-	-	-
Professional Services	-	140	140
Travel	1,537	897	2,434
Telephone	-	192	192
Postage	-	138	138
Supplies	-	133	133
Printing/Copying	1,506	1,522	3,027
Dues & Filing Fees	-	991	991
Occupancy	-	769	769
Equipment	-	241	241
<b>Total</b>	<b>12,500</b>	<b>12,685</b>	<b>25,185</b>

**Leveraged Resources**

The Xerces Society was able to secure additional funding for this project from the Clif Bar Family Foundation and from Organic Valley FAFO. Additionally, Xerces secured a \$1 million grant from the USDA NRCS Conservation Innovation Grant (CIG) in the fall of 2012. This grant includes the development and testing of pollinator habitat restoration practices specifically for organic producers.

Using these leveraged resources, we will continue to distribute the *Pollinator Management for Organic Seed Producers* handbook through partner organizations, the USDA Natural Resources Conservation Service, and through multiple organic farming organizations. Specifically, discussions are now going on with the Organic Seed Alliance about coordinating distribution of the handbook to their audiences.

We are also currently exploring the possibility of delivering the workshop content at additional venues in 2013-2014, including through a national webinar and as a session at the 2014 Organic Seed Alliance Conference in Corvallis, OR.

We will support these efforts into the foreseeable future as an ongoing commitment to the organic farming community.

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