Conserving the Three P's: Habitat Conservation Practices for Beneficial Predators, Parasites, and Pollinators

Final Report for EW07-018

Project Type: Professional Development Program
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Region: Western
State: Oregon
Principal Investigator:

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Project Information

Abstract:

The project partners provided four workshops per year, for two years, in Oregon for staff from the Natural Resources Conservation Service, Soil and Water Conservation Districts, Farm Services Administration, and Oregon State University Extension Service, as well as grower leaders. These workshops addressed how to enhance conservation buffers and other on-farm habitats to increase populations of beneficial insects, specifically populations of native bees and populations of the predators and parasites of crop pests. In concert with these workshops, we provided one-on-one technical assistance to agricultural professionals to address project-specific needs.

Project Objectives:

1. Workshops Phase 1 (2008) – Overall habitat needs and diagnostics: We will conduct four workshops in which we provide participants with an overview of the habitat requirements and conservation of these beneficial insects. Each workshop will be all-day and will include two 1-hour presentations (one on pollinator conservation and one on predators and parasites of crop pests) and a 2-hour field trip to a nearby farm to apply lessons learned in the presentations to a real habitat.

2. Workshops Phase 2 (2009) – Management for beneficial insects in the field: In year 2 of this project, we will organize four all-day workshops which will go into greater detail on site-specific needs for providing habitat for beneficial insects. For this workshop, we will prepare specifications for the implementation of beneficial insectaries, appropriate for each location, and work with participants to develop conservation plans for projects and growers they bring to the workshop.

3. On-going technical support: As a follow up to these workshops, we will provide direct technical assistance to field staff of the NRCS, SWCD, and other farm agencies. This assistance will include developing locally appropriate plant lists, tailored to provide the greatest benefit to beneficial insects. We will also conduct site visits at specific farms to determine the opportunities for providing other habitat features (e.g. nest sites, pesticide refugia, overwintering habitat, etc.) for beneficial

insects.

Introduction:

Native beneficial insects, including predators and parasites of pests, and pollinators, live in agricultural landscapes and provide valuable services to farms across the West. Research demonstrates that predatory and parasitic insects are critically important for keeping pest insects in check (Barbosa 1998) and that native bees can be significant pollinators of some crops (Kremen et al. 2004, Losey and Vaughan 2006).

Conservation biological control. The value of native predators and parasites to U.S. agriculture has been estimated to be $4.5 billion (Losey and Vaughan 2006). Providing shelterbelts and feeding areas for these insects in current conservation buffers (i.e., conservation biological control) helps farmers take advantage of these beneficial animals to help control pest populations. These strategies have been implemented effectively in many types of cropping systems by conserving and enhancing floral, alternate host, and shelter resources, and by minimizing disturbance caused by pesticides (Landis et al. 2000). Key to these efforts is understanding the life histories of these beneficial natural enemies (Jervis et al. 2004), what habitat features will benefit them, and how to fit these features and farm practices into how a farmer is already managing a specific crop system (Gurr et al. 1998, Morse 2003).

Native pollinator conservation. The value of crops pollinated by wild, native bees in the U.S. is estimated at approximately $3 billion (Losey and Vaughan 2006). At the same time, managed colonies of European honey bees have suffered a 50 percent decline in recent decades and face many immediate threats from insecticide use, invasive diseases, pests, and a lack of diverse floral resources (Ratnieks and Carreck 2010). More than ever, growers need to diversify the pollinators upon which they depend. Native bees can help to meet this need. Recent research has shown that native bees can provide sufficient pollination services for selected crops, but only under favorable environmental conditions. The presence of nearby natural areas, on-farm habitat, farm practices, and pesticide use strongly impact this vital service (Greenleaf and Kremen 2006, Greenleaf 2005, Shuler et al. 2005, Kremen et al. 2004; Kremen et al. 2002). It is important for growers and agricultural professionals to understand the habitat needs of native bees and how these needs can be met in a working landscape.

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Education & Outreach Initiatives

Objective:

Description:

Methods

Workshops Phase 1 (2008)
The first year of this project was very successful. The project partners presented day-long workshops in four regions across Oregon: Columbia Basin, Klamath Basin, Willamette Valley, and Southern Oregon. Each workshop was well attended and received.

The workshops all followed the same basic format with PowerPoint presentations and discussions during the morning, followed by a farm tour in the afternoon. The morning presentations—one on pollinators, one on predators and parasites of crop pests—gave a summary of the current research in each field, an introduction to the diversity and ecology of the insects, an overview of conservation steps that can be taken to promote these beneficial insects, and information about Farm Bill conservation programs that can support the restoration or enhancement of habitat. The farm tours allowed participants to see insects and their habitat in a farm

landscape and provided an opportunity to discuss the practicalities of integrating beneficial insect conservation plans into diverse farming operations.

Supporting this, each participant received a training folder with a number of publications on pollinator conservation and biological pest management on farms. The folder contained:
- Two comprehensive brochures (Farming for Pollinators and Farming for Pest Management),
- Information on the toxicity of various pesticides to beneficial insects (i.e., predators and parasites of pests),
- A primer on how NRCS conservation programs and practices can be used for pollinator conservation,
- A guide to research into the role of native bees for crop pollination,
- A natural enemies pocket identification guide, and
- A list of resources for pollinator conservation downloadable from the internet.

We also included a summary of farm management practices from each farm we visited (prepared by the grower) and a workshop evaluation form.

Attendees
Our target audience was two-fold: agricultural support professionals (principally NRCS and SWCD staff) and growers. The four workshops attracted more than 110 participants. Growers and NRCS and SWCD staff made up the bulk of these, but private crop consultants, staff of the Oregon Department of Agriculture and OSU Cooperative Extension, representatives of local nonprofits, and beekeepers also participated. In addition, two representatives from the United Nations Food and Agriculture Organization attended the workshop in The Dalles.

Details for each workshop

The Dalles (April 21, 2008):
- Over fifty people attended.
- The presentations were held at the Columbia Gorge Discovery Center.
- The afternoon farm visit was hosted by Mel and Mike Omeg at the Copper Orchard unit of Omeg Orchards.
- Mike Omeg shared his experience of providing habitat for beneficial insects in cherry orchards, work that resulted in acceptance of a 2007 Pollinator Advocate Award.

Klamath Falls (April 28, 2008):
- Sixteen people attended.
- The presentations were held at the Klamath Community College.
- The afternoon farm visit was hosted by staff of the Klamath Basin Research and Extension Center, where they demonstrated beneficial insect habitat in their research fields and discussed some of the constraints of farming in the area.

Lebanon (May 13, 2008):
- Nineteen people attended.
- Both the morning presentations and afternoon farm walk were held at Persephone Farm.
- Eleanor O’Brien, a farmer at Persephone, led the farm walk, sharing her experience and knowledge of providing insect habitat within the diverse vegetable crops grown on the farm.

Medford (June 3, 2008):
- Twenty-eight people attended.
- The presentations were held at the Southern Oregon Research and Extension Center.
- The afternoon farm visit was hosted by Ed Vaughn at Vaughn Farm and Orchard.

Mr. Vaughn led the farm tour, describing the practices he employs for beneficial insects in his pear orchards.

Beneficial Insect Habitat Conservation Guides
Prior to the 2009 workshops, we developed conservation guides appropriate for each of the regions or farms where we were to present workshops in 2009. These conservation guides provide details on how to implement beneficial insect habitat projects. They followed a job sheet format used by NRCS conservation planners in which we provided (1) a menu of options for site preparation, (2) a menu of options for planting, (3) lists of plants appropriate for planting adjacent to target crops in different regions of Oregon (e.g. cherries in the Columbia Gorge, blueberries and row crops in the Willamette Valley, and orchards in southern Oregon), (4) a list of suggested NRCS Conservation Practices that can be used to put these projects on the ground, and (5) suggestions for ongoing maintenance. These conservation guides helped frame the discussion and/or field tour at each of the four workshops delivered in 2009 and examples are included in the attachments to this report.

Workshops Phase 2 (2009)

Four events were presented across Oregon, in one of two formats:
- Full-day workshop: these days were split between an indoor venue, where presentations were made about beneficial insects and creating habitat for them, and a local farm, where we could see and discuss habitat and conservation strategies.
- Half-day seminar: these events included brief presentations, a walk to see habitat, and a panel discussion about habitat planning, creation, and management.
At each event, a comprehensive information packet was distributed. This packet included the newly written conservation guides to creating habitat on farms, extensive local plant lists, fact sheets, and identification guides, as well as a CD-ROM of research papers and other habitat guidance.

The engagement of growers in each of these events, whether during a farm visit or participating in a panel discussion, was an effective way to learn about both successful conservation methods and the constraints of operating a working farm. Agency staff often comment about how their eyes have been opened by grower perspectives on conservation, which is critical for the development of a supportive policy infrastructure that can get money and/or technical support to growers interested in implementing beneficial insect habitat projects.

Details for each workshop

The Dalles (June 3, 2009):
- 15 people attended, including 9 agricultural support staff representing three NRCS offices and two SWCD, three cherry growers, two native plant seed growers, and one journalist.
- The event was held at the Gorge Discovery Center and at Omeg Orchards.
- Presenters included Paul Jepson of OSU-IPPC, and Matthew Shepherd and Mace Vaughan of the Xerces Society
- The day was divided into three sections: introductions and background presentations; field visit to Omeg Orchards; and habitat creation discussions back at the Discovery Center. The focal crop was cherries.
- During the field visit, Mike Omeg led the group around his Copper Unit, showing the participants habitat creation projects currently underway and improvements that have been done in recent years. Mike Omeg is an inspiring speaker. He combines an innovative approach to conservation with a very practical sense of what can be achieved. He was able to give details on how he has prepared and planned beneficial insect projects in his orchard. He also invited native seed growers to the event. Their perspective provided very useful insights into the availability and expense of native plant materials. Native plant materials are often better for

supporting native beneficial insects (see e.g. Frankie et al 2004), however they can be considerably more expensive and it can be harder to find the variety and abundance of species and materials needed for larger habitat projects.

McMinnville (July 28, 2009):
- 17 people attended, representing 6 NRCS offices and 5 SWCD. This was the only event during the project that had an audience entirely made up of NRCS or SWCD staff.
- The presentations were held at Yamhill County Public Works Auditorium and the field portion of the event was hosted by Tim Kreder and held at Kreder Farm.
- Presenters included Paul Jepson of OSU-IPPC and Matthew Shepherd of the Xerces Society.
- As with the event at The Dalles, the day combined indoor presentation and discussions with a field visit to look at conservation plantings at Kreder Farm. Extreme temperatures the day of the event (for the Willamette Valley) of 95+F led us to change the planned order of events to visit Kreder Farm before the hottest part of the day. The focal crop was blueberries.

Corvallis (December 9, 2009):
- Sixteen people attended the half-day training at the Corvallis USDA-NRCS Plant Materials Center (PMC) including farmers, Soil and Water Conservation District staff, NRCS farm planners, PMC staff, and members of other conservation organizations.
- Notable participants included the PMC manager who discussed the plant selection and establishment process for the on-site pollinator habitat demonstration hedgerow, a major regional blueberry producer, and the northwest regional Farm Bill biologist for Pheasants Forever, who is working to incorporate pollinator and wildlife-friendly native forbs into NRCS-supported conservation efforts on farms in Oregon, Washington, and Idaho.
- The event was held in the Corvallis NRCS Plant Materials Center.
- Presenters included Paul Jepson of OSU-IPPC and Eric Mader of the Xerces Society. Joe Williams of the NRCS-PMC participated as a panelist.
- Both the training curriculum and the panel discussion (including the instructors and notable participants listed above) emphasized the plant selection, site preparation, and planting technologies needed to establish pollinator and beneficial insect habitat, the management necessary to maintain those habitat enhancements, and the need for more reliable and cost-effective sources of native wildflower seed. The latter subject was discussed at length with the PMC staff providing an overview of how the PMC develops native seed sources and propagation technology, and then transfers this to private seed producers.
- Opportunities to produce native forb seed commercially to support the creation of beneficial insect habitat or other conservation plantings were outlined for the farmer-participants at the event.

Central Point (December 17, 2009):
- 36 people attended, including five agricultural support staff (representing two NRCS offices and two SWCD), four extension service staff or other agency staff (BLM), 17 growers (pears, blueberries, cane fruit, row crops), one journalist, and 9 with no known affiliation. This event was well attended, with a wider range of interests represented, including agency and extension staff and growers.
- The event was held at the Oregon State University Southern Oregon Research & Extension Center (SOREC). SOREC offered a good combination of an auditorium and trial orchards, forage plots, and habitat features.
- Presenters included Matthew Shepherd of the Xerces Society (Paul Jepson of OSU was unable to present due to illness.)
- Panelists at this event included Tim Franklin(Yale Creek Ranch); Barbara Hughey (Silver Bough Farm); Ed Vaughn (Vaughn Orchards); and Suzy Liebenberg (NRCS

Grants Pass).
- The morning began with brief presentations on the natural history and conservation of beneficial insects, and about different approaches used by growers to create habitat. The group then toured the extension center's ground, stopping to discuss the pros and cons of cover crops between pear rows as beneficial insect habitat, how to identify existing habitat, and opportunities to enhance habitat across the landscape.
- A panel discussion featuring three local growers with experience in habitat creation and an NRCS conservationist completed the seminar. The issues discussed in particular depth included weed control prior to and after planting, plant selection, and funding support.

Technical Support to the NRCS, SWCD, and growers
Over the past two years, we have provided comprehensive technical support and follow up to our trainings. In several cases the workshops and technical support led to habitat enhancement and creation projects. These projects can now be used as demonstration sites to educate additional agricultural professionals and farmers.

North Willamette Research and Experiment Station (NWRES)
- Xerces Society and OSU IPPC staff were invited to provide technical support on creation of beneficial insect habitat throughout the grounds of the NWRES.
- NRCS and SWCD staff were also in attendance.
- In collaboration with blueberry extension specialists and the Oregon Blueberry Commission, OSU IPPC and Xerces Society created and implemented demonstration beneficial insect habitat surrounding organic blueberry plots. Demonstrations included native plant hedgerows, wildflower plantings, cover crops, and ornamental plant hedgerows. Site prep and planting was appropriate and consistent with our guidelines.

NRCS Plant Material Center
The Xerces Society and OSU IPPC are working with the NRCS state Plant Material Specialist and the manager of the NRCS PMC to develop demonstration trials of the conservation guidelines we developed. These plantings will be approximately a half-acre in size and will demonstrate site preparation using organic techniques (tillage) and techniques that require the use of herbicides. Different seed mixes will also be trialed.

Omeg Orchards
Xerces Society staff provided technical support to Mike Omeg and Omeg Orchards on the development of a 2 acre beneficial insect habitat planting in the heart of his orchard.

Vaughn Orchards
Xerces Society staff are working with the NRCS in Medford, Oregon and with Ed Vaughn of Vaughn Orchards on a demonstration planting based on the conservation guidelines we developed. The demonstration will run along the edge of his pear orchard. A twenty foot wide strip (500 feet long) will be taken out of hay production and planted with beneficial insect habitat.

Lakeview alfalfa grower
Xerces Society staff are providing technical support to the NRCS Plant Material Specialist who is working with a grower in southeastern Oregon on the development of a 30 acre pollinator planting in pivot corners and along service roads.

NRCS Practice Payment Schedule Revision
The Xerces Society is working with NRCS State and Regional Economists, the Plant Material Specialist, the State Conservation Agronomist, and other NRCS program staff to revise the NRCS Practice Payment Schedules to reflect the true cost of site

preparation and planting of native plant materials for beneficial insect habitat. These payment schedules dictate how much the NRCS is willing to pay farmers to implement beneficial insect habitat projects. In order to maintain an incentive, these payments need to accurately reflect the cost of project implementation.

Outreach and Publications

The tools we created include new Beneficial Insect Conservation Guides (Activity or Job Sheets). These materials are a vital resource for growers and agricultural professionals who want to implement habitat projects. These new guidelines include a menu of options for site preparation, planting techniques, ongoing maintenance, and plant selection to support a variety of different crops. In conjunction with other newly created Xerces Society materials such as our Pollinator Conservation Resource Center on the web, organic farmer toolkit, new resources on managing native bees and managing pollinators in natural areas, we provide everything an agricultural professional needs to meet a very specific need expressed by the agricultural community: “How do we successfully put habitat projects on the ground?”

A total of eight educational workshops were presented over the course of the project, with a total attendance of 201 agricultural professionals and growers. As a result of this outreach, these participants have gained knowledge of the importance of providing habitat for beneficial insects, including pollinators and the predators of crop pests. All of these participants now have the tools and knowledge to restore, enhance and protect habitat for beneficial insects and can assist others in habitat restoration projects. For a complete description of all outreach conducted as part of this project, please see the summaries of individual project workshops in the METHODS section above.

- Beneficial Insect Activity Sheet_with plant tables_feb10.pdf
- Workshop Presentation 1 – Xerces – Pollinators.pdf

Outcomes and impacts:

This project was very successful at reaching its target audience. Over the course of the project we educated 118 agricultural professionals and 83 growers on the importance of providing habitat for beneficial insects, including pollinators and the predators of crop pests. All of the participants now have the tools and knowledge to restore, enhance and protect habitat for beneficial insects and can assist others in habitat restoration projects.

As a result of these workshops and technical support to the NRCS and agricultural community, 18 pollinator enhancement projects were approved under the NRCS Conservation Security Program in 2009. These projects range from a two acre beneficial insect habitat planting in the heart of a cherry orchard to a 30 acre pollinator planting in pivot corners and along service roads (which is in process). Each of these sites will serve as demonstration plantings to educate even more agricultural professionals to protect and enhance habitat.

The impacts of this project will continue for some years through the continued use of guidelines and materials that were created. The Xerces Society has recently received funding from the USDA-NRCS through a national Conservation Innovation Grant that is supporting the creation of four demonstration projects spread across Oregon based on the guidelines that we created as part of this project.

Project Outcomes

Project outcomes:

We have developed many new partnerships and developed new tools through this effort. To conduct the project, we worked with agricultural professionals across the state. This project specifically allowed us to reach 118 agricultural professionals. As mentioned above, these new partnerships have led to the development of 18 habitat improvement projects. A national NRCS Conservation Innovation Grant is funding staff from the Xerces Society and Oregon State University's Integrated Plant Protection Center to work with the NRCS District Conservationists and Plant Material Specialists to whom we presented workshops through this WSARE funded project.

The tools we created include new Beneficial Insect Conservation Guides (Activity or Job Sheets) which answer the question, "How do we successfully put habitat projects on the ground?" These materials are a vital resource for growers and agricultural professionals who want to implement habitat projects. These new tools, in conjunction with other newly created Xerces Society materials – such as our online Pollinator Conservation Resource Center (http://www.xerces.org/pollinator-resource-center/), organic farmer toolkit (http://www.xerces.org/organic-farms/), and new resources on managing pollinator habitat or native bee nests – provide everything an agricultural professional needs to meet the specific requirements presented by different farming systems.

Recommendations:

Potential Contributions

We evaluated what workshop participants learned at each of our events. Tables 1 and 2 (below) summarize these findings for workshops conducted in 2008 and 2009, respectively. Each table shows the average change in skills and abilities expressed by workshop attendees in their workshop evaluation forms. (Questions on the evaluation form used a scale of 1 to 7, where 1 = no ability or skill, and 7 = very able or skilled.) In general, we were very pleased by how workshop participants' perception of their own understanding changed because of the training.

- Xerces WSARE Evaluation Results Tables.doc

Future Recommendations

Reviewing our accomplishments over the course of this project we are struck, yet again, by the complexity of affecting change in grower behavior. Providing information on the economic advantages of new technologies or ideas is one effective strategy to speed their adoption by growers. This requires successful demonstration projects created by agricultural leaders, as well as effective outreach conducted around these projects.

Also necessary is an incentive and support structure that can help growers fit new ideas and projects into schedules that are already filled, often to capacity. The NRCS is the best potential source of these financial incentives. However, to be most effective in delivering these incentives, the NRCS needs to have: (1) the technical knowledge to support growers (providing this information was a central goal of this project that was achieved successfully), (2) programmatic support (which is currently in place now that pollinators are included in the ranking criteria for projects across Oregon), and (3) payment schedules that reflect the true cost of

implementing projects (in development).

Last, however, and perhaps most important, NRCS field staff need experience implementing conservation projects. The workshops delivered as part of this project have set the stage across much of Oregon for NRCS conservation staff to implement beneficial insect habitat projects. However, conservation field staff will continue to need technical support as these projects are planned and then go into the ground. With this additional technical support, they will develop the confidence they need to work with other landowners, facilitating the creation of patches of habitat all across the state.

We believe that it is important for Western SARE to continue to fund technical support to the NRCS and to growers interested in implementing projects. In addition, we feel that it is important to provide the workshops presented here to farm educators and resource conservation professionals in other Western states in continued collaboration with multiple partners including academic institutions, Extension, the NRCS and others. This will continue to build awareness of beneficial insects as well as knowledge of habitat projects throughout the region served by Western SARE.