

**Environment and Natural Resources Trust Fund
2010 Request for Proposals (RFP)**

LCCMR ID: 221-G

Project Title:

Mitigating Pollinator Decline in Minnesota

LCCMR 2010 Funding Priority:

G. Creative Ideas

Total Project Budget: \$ \$297,463

Proposed Project Time Period for the Funding Requested: 3 years, 2010 - 2013

Other Non-State Funds: \$ \$0

Summary:

Pollinators offer valuable ecosystem services in the production of seeds and fruits. The role of insecticides and lack of quality nectar plants will be studied to mitigate pollinator decline.

Name: Vera Krischik

Sponsoring Organization: U of MN

Address: 1980 Folwell Ave, #219
St. Paul MN 55108

Telephone Number: (612) 625-7044

Email: krisc001@umn.edu

Fax: (612) 625-5299

Web Address: www.entomology.umn.edu/cues

Location:

Region: Statewide

County Name: Statewide

City / Township:

_____ Knowledge Base	_____ Broad App.	_____ Innovation
_____ Leverage	_____ Outcomes	
_____ Partnerships	_____ Urgency	_____ TOTAL

I. PROJECT STATEMENT: Native plants used in restoration for wildlife and food plants from apples to zucchini require pollinators. Bees and other pollinators offer valuable ecosystem services in both natural and managed agriculture ecosystems, so it is essential to protect them. Pollinators are experiencing serious decline due to insecticide use, lack of nutritionally rich native plants for pollen and nectar, and lack of habitat. Continued loss of pollinators will have an impact on the natural resources and the economy of Minnesota.

This issue has been addressed by the Xerces Society, National Research Council Report, the Congressional Research Report, testimony by the National Academy of Sciences to the US Congress, and the media in newspapers and television programs. For the first time a group at Pennsylvania State University are investigating Colony Collapse Disorder (CCD) and what weakens bees, such as the interaction of *Varroa* mites, insecticides, fungus, and virus in the hive. However, systemic neonicotinyl insecticides used on landscape plants and crops are considered as a major factor in pollinator decline. After the 1998 ban in France of the systemic seed treatment Gaucho (active ingredient, imidacloprid), French researchers found that imidacloprid is translocated from coated seeds at planting thru the growing plant to nectar and pollen in flowers. In May 2008 a large number of bees died in Germany and the government banned the use of 5 neonicotinyl insecticides, including imidacloprid.

However, in the US use of these 5 neonicotinyl insecticides is very common in greenhouse, landscape, and crops. Native plants grown in greenhouses and transplanted outside may contain high levels of imidacloprid which may kill pollinators. Our research demonstrated that nectar and pollen from plants treated with soil applications of imidacloprid contained 10 to 40 times more imidacloprid than from a Gaucho-seed treatment. The amount of imidacloprid found in nectar of 2 flowering plants was 20 ppb to 41ppb from a single soil application compared to 1.9 ppb imidacloprid in sunflower nectar and 0.6 to 0.8 ppb in canola nectar from a seed treatment. These levels of imidacloprid caused high mortality of beneficial insects that are pollinators, such as lady beetles, lacewings, and small parasitic wasps (females feed on nectar and lay eggs in pest insects). These publications can be viewed at the CUES website at (<http://www.entomology.umn.edu/cues/krischiklab/krischik.htm>) However, the effect of these higher levels of imidacloprid on bees has not been investigated.

This project will address and mitigate pollinator decline with research and outreach programs on pollinator friendly landscape management. Through research based-demonstration projects, it will be determined if two widely used neonicotinyl insecticides, imidacloprid and thiamethoxam, cause mortality and alteration in behavior that can reduce seed and fruit production. The amount of neonicotinyl insecticides translocated to nectar and pollen will be measured through residue analysis. We will discuss the project with an advisory committee composed of state agencies, conservation groups, and professional organizations. Workshops and an online website will disseminate the research and offer ways to mitigate pollinator decline through use of pollinator friendly insecticides and use of native plants that provide nutritionally valuable pollen and nectar. Most plant recommendations are derived from published lists that were not based on research. When you study these recommended plants in the field, many are not visited by bees or beneficial insects. However, proper bee plants in crop borders, roadsides, and in urban landscapes would supplement the diet of bees and beneficial insects, luring them out of insecticide treated and often less nutritionally rewarding agricultural crops. My UMN-DNR Extension publication and poster on plants suggested for restorations can be viewed at the CUES website (http://www.entomology.umn.edu/cues/gervais/gv_links.htm). The results of this project will have national interest, as we contribute data on factors that may be responsible for pollinator decline and can be mitigated through altered management tactics.

II. DESCRIPTION OF PROJECT RESULTS

Result 1. Research-based demonstration projects. Research the amount of neonicotinyl insecticides in nectar and pollen and their effects on pollinator health and behavior. Research which native plants provide the best nectar and pollen for bee pollinators.

Budget: \$219,000; Completion date: 3 yrs, June 2013

Deliverable 1. Determine if insecticides commonly used in urban areas and agricultural fields are killing pollinators. Develop management plans to reduce the use of systemic insecticides where bees are foraging. Work with MDA and EPA to put warning information on insecticide labels. Develop management plans to use pollinator-friendly plants in conservation plantings, roadsides, rain gardens, and shoreland re-vegetation to lure bees out of treated areas. Publish results in peer reviewed journals and commodity and state newsletters.

Result 2. Outreach projects. Develop management plans to reduce the use of systemic insecticides where bees are foraging and instead use recently registered EPA low risk insecticides. Mitigate pollinator loss through the use of pollinator-friendly insecticides and plants that provide good nutrition in pollen and nectar.

Budget: \$78,463; Completion date: 3 yrs, June 2013

Deliverable 2. Develop web resources, field days, workshops, and outreach materials. Provide 4 workshops per year, a total of 12 for the grant to professionals, state agencies, commodity groups, and homeowners on conserving pollinators. Provide articles and talks in state and commodity group newsletters and meetings. Use the popular landscape management website CUES (www.entomology.umn.edu/cues) to disseminate the information. **Total Budget for 3 yr: \$297,463**

III. PROJECT STRATEGY

A. Project Team/Partners: Create advisory panel with stakeholders and meet every 4 mo to discuss research and outreach projects. Letters of support are available.

MN Honey Producers, MN Hobby Bee Keepers, Xerces Society, MN Landscape and Nursery Association, MNTGF, MN Turf and Grounds Foundation Watershed districts, MDA, DNR

B. Timeline Requirements

Three years are needed to perform experiments and deliver research-based recommendations to stakeholders around Minnesota.

July 1, 2010 Initiate outreach and research

Collaborations: Convene advisory committee every 4 months, 9 times over the 3 year grant

Research: Initiate summer research on insecticide residues and effects on 6 species of pollinators; in second year repeat with modifications; use third summer for additional experiments. Perform research in greenhouse in fall and spring. At the same time, perform research on pollinator friendly plants and pest management information.

Outreach: Convene 4 workshops, 12 times over the 3 year grant a year around the state to discuss issue and present data.

May 2013 all grant products, website, workshops, and outreach materials finished

June 30, 2013 Project completed

C. Long-Term Strategy

Use research-based demonstration projects to provide data to justify the development of pest management programs for landscapes that use insecticides that do not harm pollinators.

Develop outreach materials that promote pollinator-friendly plants for use in land management, such as roadsides, restorations, conservation plantings, and urban areas.

Deliver these recommendations to state agencies, landscape industry and commodity groups.

Project Budget

Mitigating Pollinator Decline in Minnesota, Vera Krischik, Dept Entomology, University of Minnesota

IV. TOTAL PROJECT REQUEST BUDGET

BUDGET ITEM	AMOUNT	% FTE
Personnel: Graduate Student \$35,000+17.14%fring=\$34,304 x 3yrs	\$108,143	50%
Undergraduate student \$12,000+ x 3yrs	\$36,000	100%
Research supplies: Chemical analysis, bee rearing supplies, cages, plants, publishing \$77,880/yrx 3yrs=	\$116,820	
Workshops and field days for professionals and landscape managers	\$12,000	
Travel to scientific meetings, meet w/ advisory committee, talks	\$9,500	
Website with pollinator friendly plants and information on compatible pesticides for landscape	\$6,000	
Publications	\$9,000	
Equipment/Tools:	NA	
Acquisition (Including Easements):	NA	
Restoration:	NA	
Other:	NA	
TOTAL PROJECT BUDGET REQUEST TO LCCMR	\$297,463	

V. OTHER FUNDS

SOURCE OF FUNDS	AMOUNT	Status
Remaining \$ From Previous Trust Fund Appropriation (if applicable):	NA	
Other Non-State \$ Being Leveraged During Project Period:	NA	
Other State \$ Being Spent During Project Period:	NA	
In-kind Services During Project Period: Krischik inkind 30%/year for 3 yr	\$89,022	
Past Spending: Research funds 2004-2009, 5 published papers on issue, extension bulletin on pollinator-friendly plants for restorations, UM-DNR poster on plants for restorations, and CUES website	\$100,000	

PROJECT TITLE: Mitigating Pollinator Decline in Minnesota

Project Manager Qualifications and Organization Description

The PI is a tenured Faculty in the Entomology Department of the College of Food, Agricultural and Natural Resource Sciences at the University of Minnesota. One of the goals of the College is to develop viable food and agricultural systems, while maintaining healthy natural resources. Bees and other pollinators provide ecosystem services in both natural and managed agriculture ecosystems, so it is essentially to protect them. Determining ways to prevent pollinator loss and promote functioning sustainable ecosystems are a goal of my research and outreach programs. The PI has over 30 years of research expertise and publications in this area. Equipment and facilities are available for this research.

Dr. Vera Krischik, Assoc. Professor and Ext. Specialist Urban Landscapes, Department of Entomology, University of Minnesota, St. Paul Campus

Vera obtained her PhD from the University of Maryland in 1984, was a researcher at the New York Botanical Garden (NSF sponsored Visiting Professor for Women, 1991-1993), and was an IPM coordinator at USDA, Washington DC from 1988-1994. At the St. Paul campus of UM she teaches a Pesticide Use Course and Ornamental and Turf IPM Course. She has published papers on the non target effects of imidacloprid on beneficial insects and the proper use of imidacloprid for landscape plants. She has two books: one published by John Wiley entitled "Microbial Mediation of Plant Insect Interactions" and another published by the MN Agricultural Experiment Station on "IPM of Midwest Landscapes": She is director of CUES: Center for sustainable urban ecosystems, that promotes natural resource management, online at www.entomology.umn.edu/cues. She has partnered with MDA, DNR, MNLA, MNTGF, and watershed districts for her outreach and research programs and publications.

Letter of Resolution

Not applicable

