

Bees and Sustainable Food Production

Rufus Isaacs

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Berry Crops Entomology Program @ MSU

- Pest management & pollination.
- Research & extension.
- Blueberry, grape, raspberry, strawberry...and biofuels.
- 3 postdocs, 3 graduate students, two technicians, and a small army of undergraduate students!

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Write something...

Berry Crops Entomology at MSU
March 6 near East Lansing

Welcome to Dr. Jason Gibbs, our new postdoc who arrived this week to lead aspects of the new USDA Integrated Crop Pollination

Recent Posts by Others on Berry Crops Entomology at MSU See All

Isaacs Lab
Berry Crops Entomology
Michigan State University

We study the biology and management of insects in berry crops. Members of our lab are currently working on pest phenology, pheromone mating disruption, pollination, biological control, and selective insecticide evaluations, all with insects found in berry crops. Our extension program provides growers with practical information to make decisions about insect management, to improve their productivity, profit, and environmental safety.

Pollination is critical for production of most berry crops, and we are investigating the ecology and management of pollinators and their economic value. We are also exploring the interactions between landscape structure and beneficial insects, both natural enemies and pollinators, in Michigan farmland. This research is underway in fruit, field crops, and biofuel cropping systems. For more on our native plants and pollinators work, click here

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Our 2011 team at the summer barbecue

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Information for fruit growers
New! Spotted Wing *Drosophila* information is available here

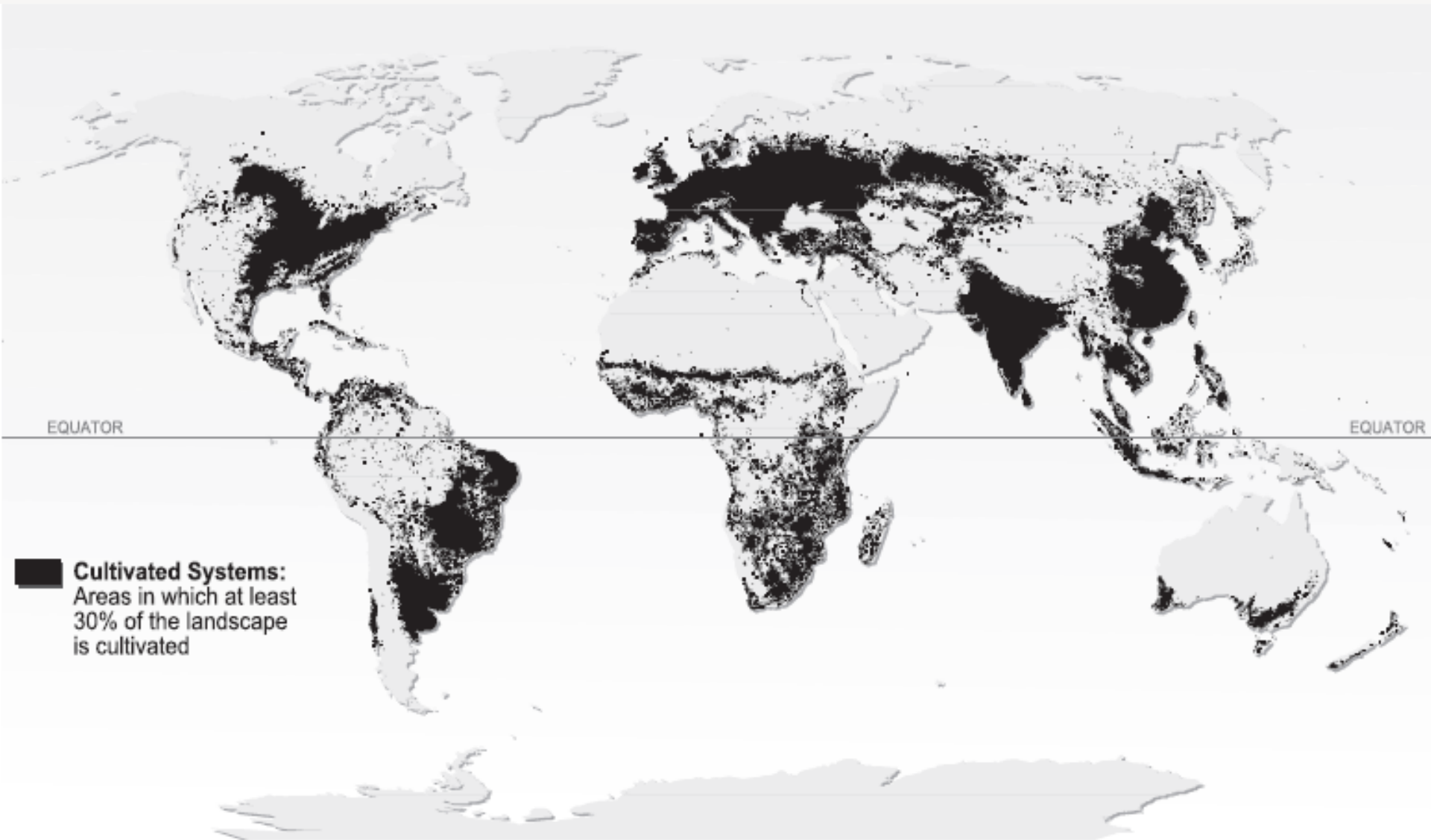


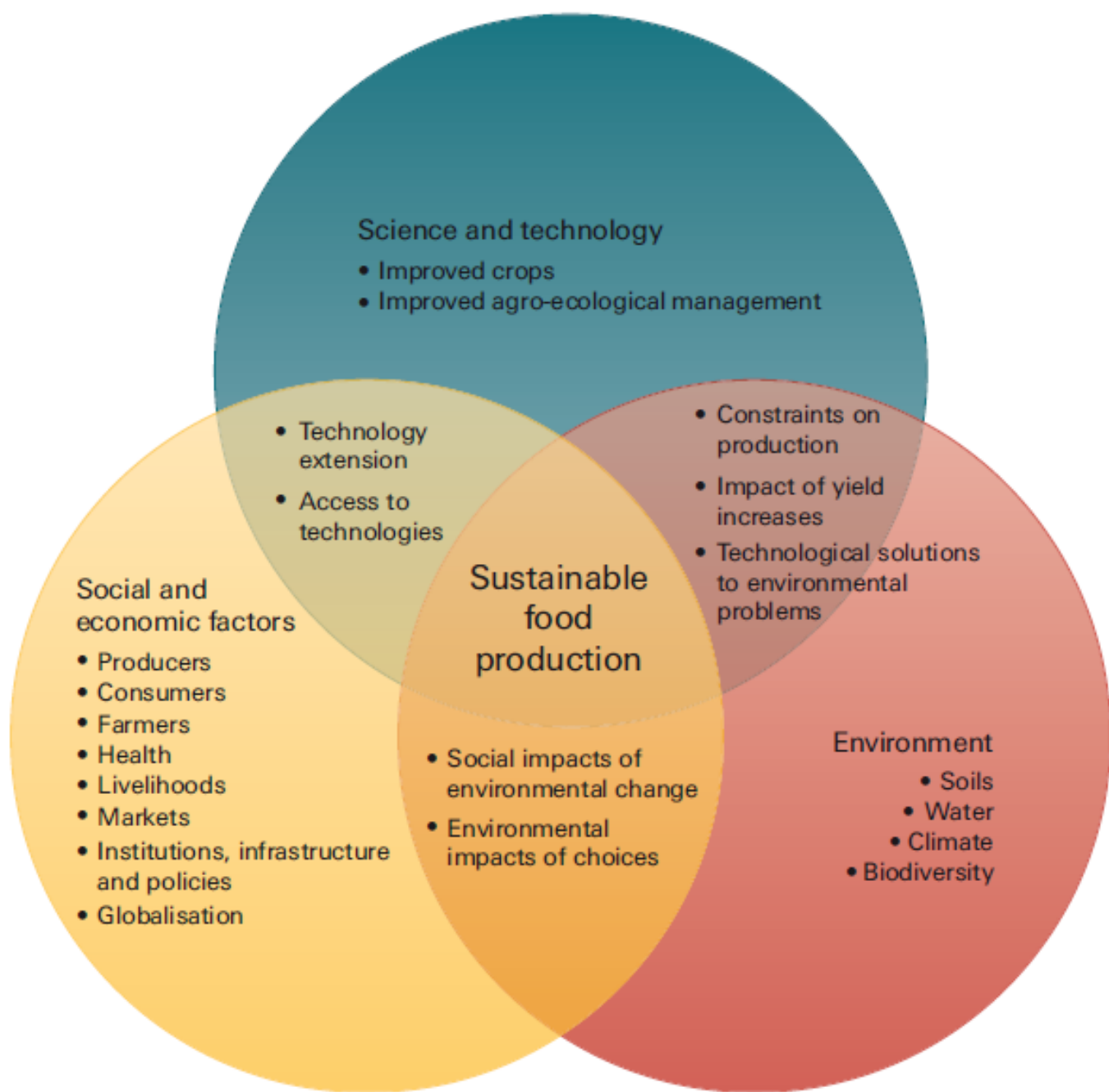
USDA NIFA and Specialty Crop Research Initiative Great Lakes Bioenergy Research Center
 US EPA MDARD: Specialty Crop Block Grant Program and Grape & Wine Council
 MBG Marketing National Grape Cooperative Michigan State Horticultural Society
 MSU AgBio Research MSU Extension Project GREEN
 AgChem Industries Operation Pollinator





Agriculture's global extent





Baulcombe et al. (2009) Science and the Sustainable Intensification of Global Agriculture. The Royal Society.



Pollination reduces the risk of low yields and poor quality



Michigan fruits and vegetables

Blueberry	\$120 million
Cherry	\$80 million
Apple	\$105 million
Strawberry	\$6 million
Peach	\$10 million
Pickling cucumbers	\$35 million

Honey production

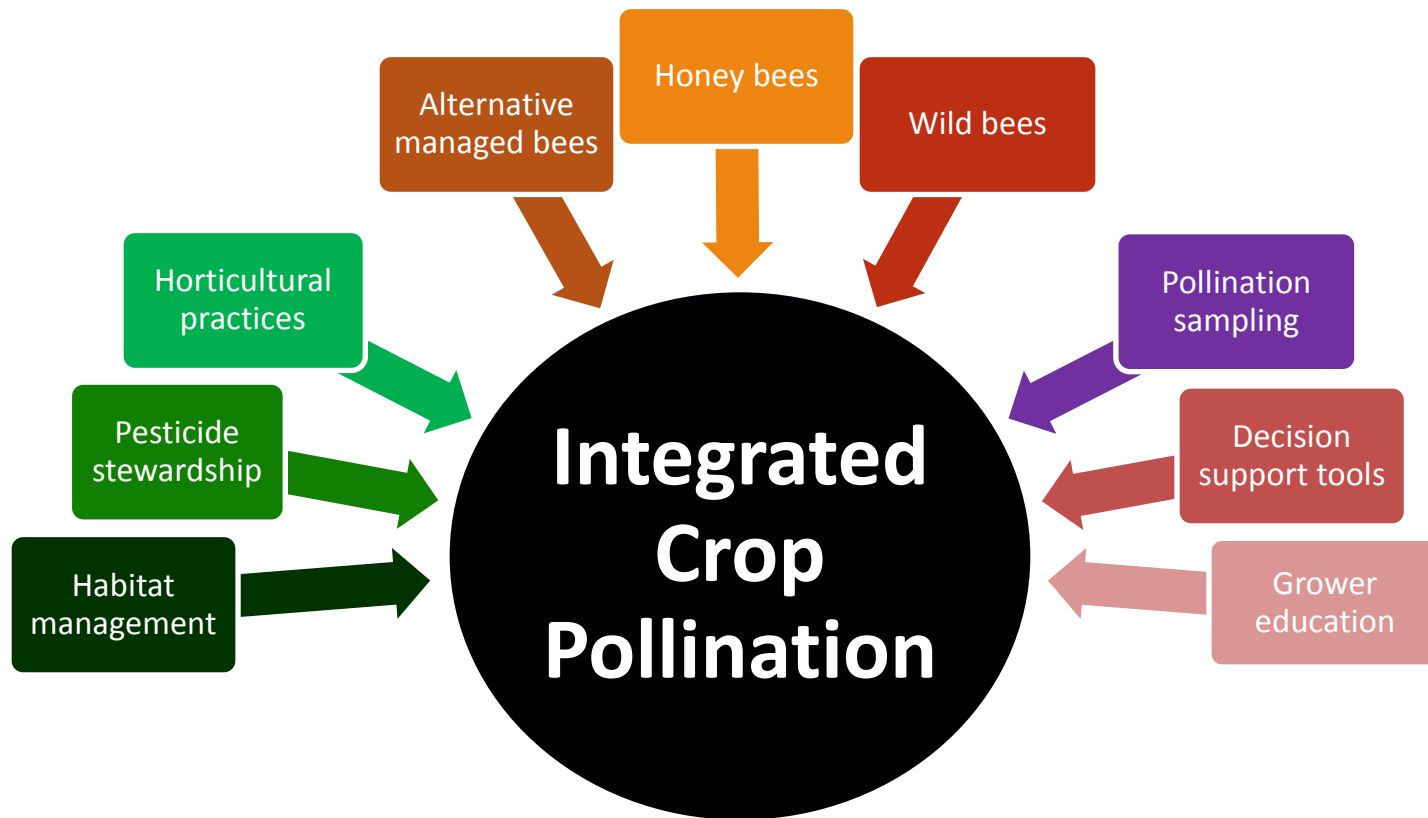
4 million pounds \$7 million





Integrated Crop Pollination

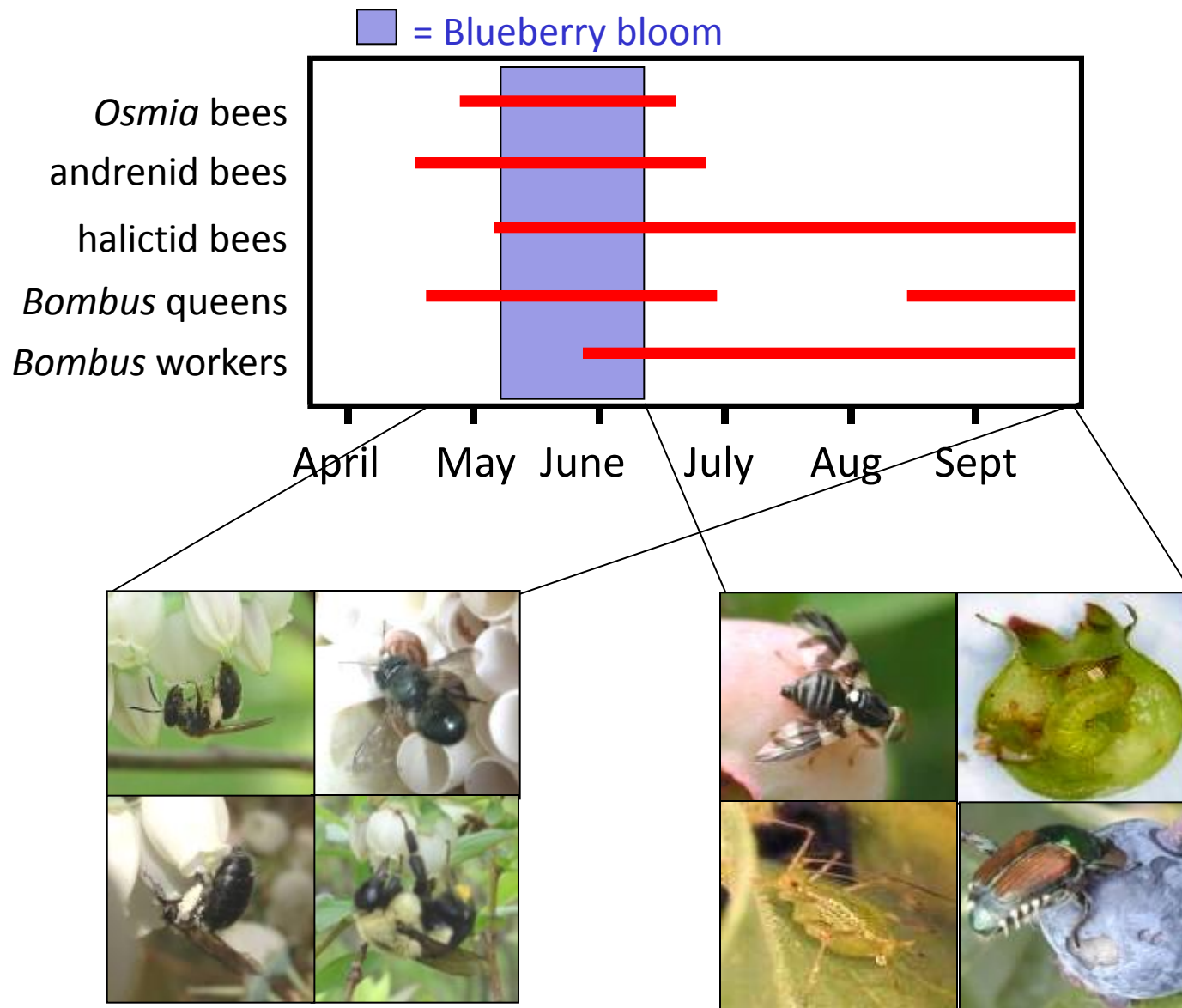
The combined use of different pollinator species, habitat augmentation, and management practices to provide reliable and economical pollination of crops



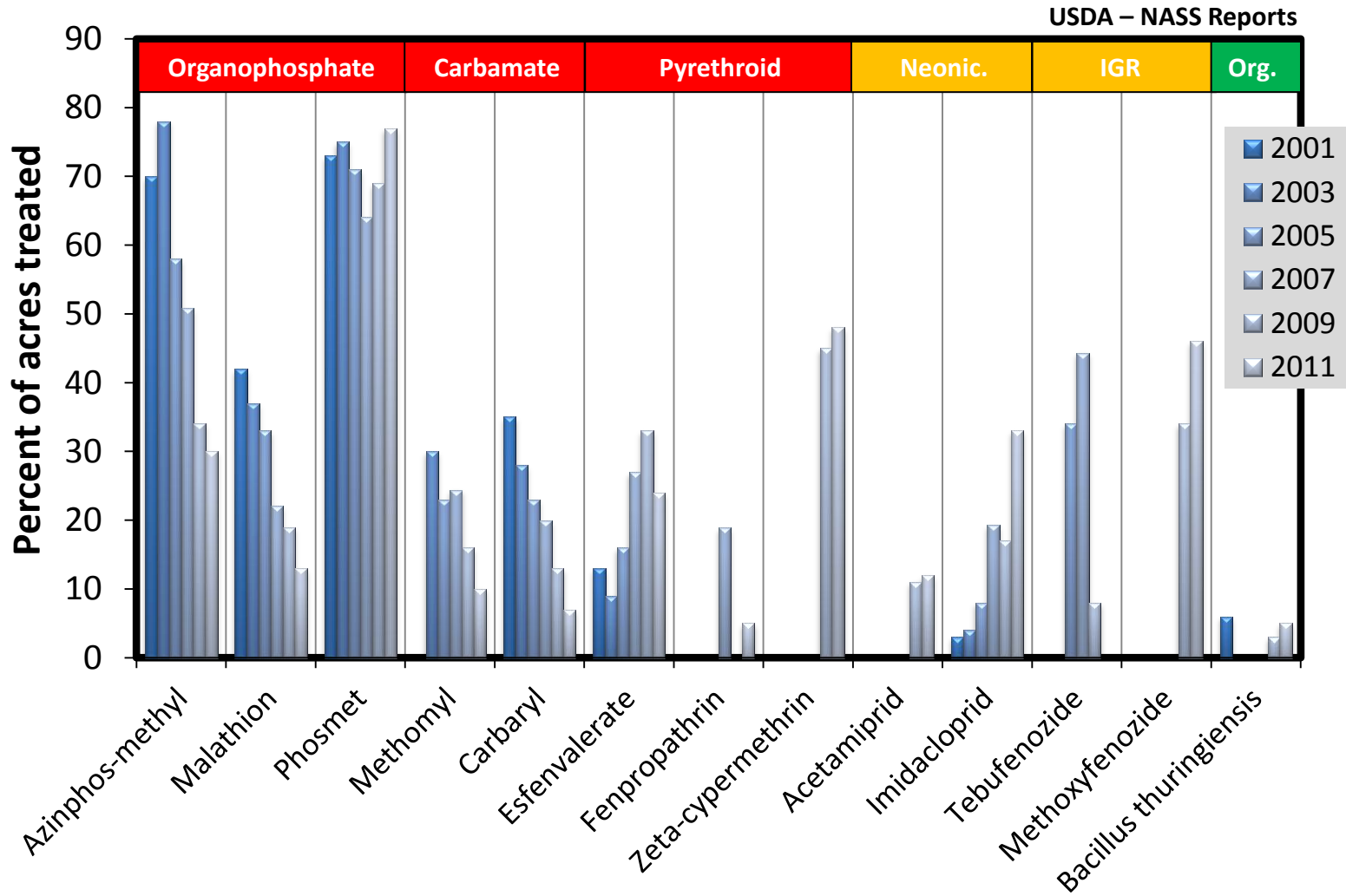
- Do farm management practices affect wild bee communities?
- Can pollinator habitat support wild bees and pollination?



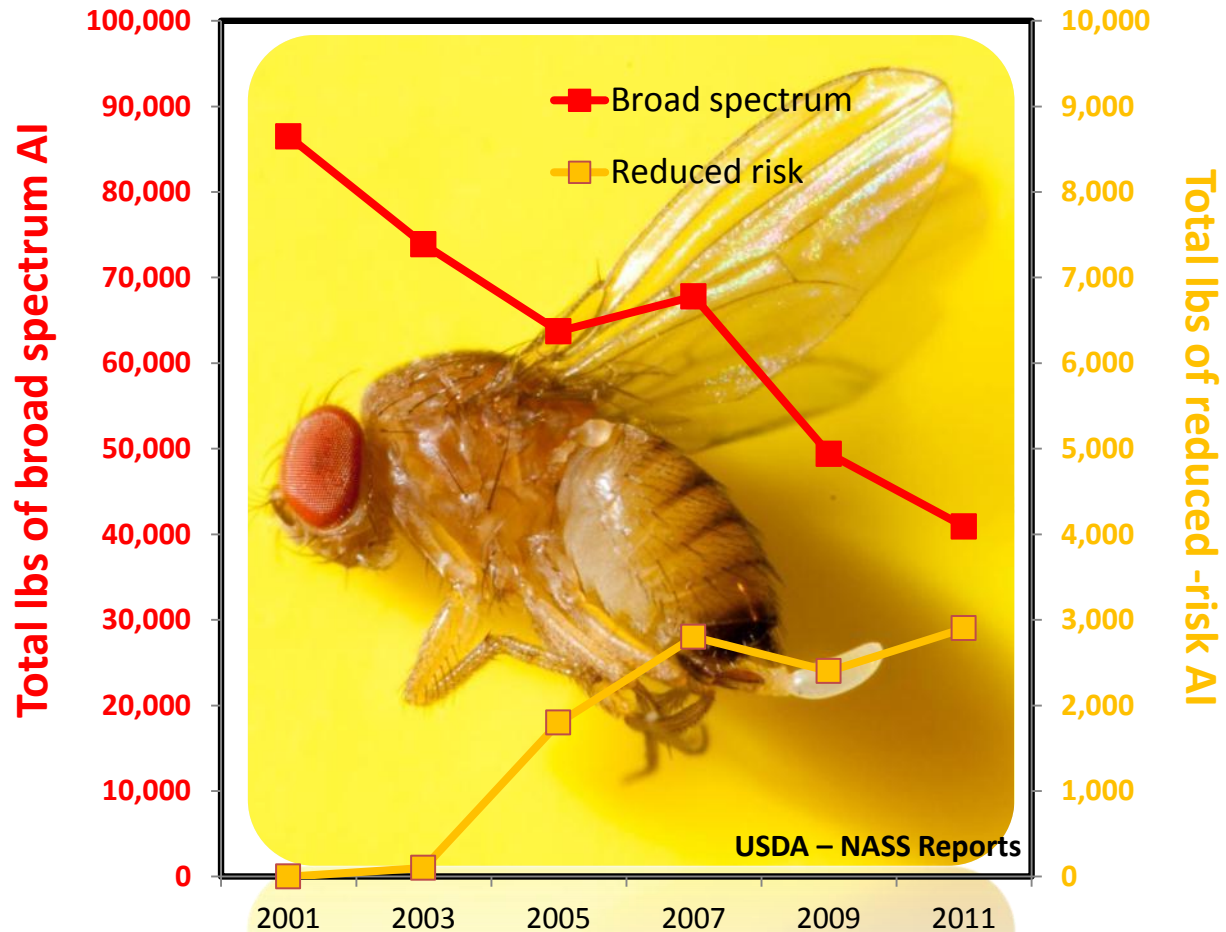
Temporal overlap of pollinator and pest activity



Insecticide use in Michigan blueberries, 2001-2011



Trends in insecticide use





Topics

Agriculture

Green Industry

Community and Home

Pesticide Education & Safety

What's Hot?

The growing season is finishing – good time to explore **Enviro-weather**. Our weather in 2012 was worse than challenging. **MSU's Enviro-weather** has information and tools to help you manage pests whatever the current conditions. Now is a good time to visit the website and explore what it has to offer for you. [Read an example from July 2012](#).

Home > Invasive Species > Spotted Wing Drosophila

Spotted Wing Drosophila

Welcome to MSU's Spotted Wing Drosophila site

This site contains information and links for growers and homeowners about a new invasive pest in Michigan, the Spotted Wing Drosophila.

- [Factsheets](#)
- [Monitoring](#)
- [Crop recommendations](#)
- [Educational meetings](#)
- [Contacts](#)
- [Response Team](#)

2012 Update

For weekly updates on the status of this pest, stay informed through the [MSU Extension](#) pages focusing on fruit crop management.

Some key articles from MSU Extension New:

- [End of season spotted wing Drosophila management in raspberries](#) (Oct. 29, 2012)
- [Fall-harvesting berry growers need to monitor and manage SWD](#) (Sept. 4, 2012)
- [Post-harvest spraying for SWD pros, cons, and a list of issues](#) (Aug. 22, 2012)
- [Trapping, fruit sampling and fruit protection methods](#) (July 2, 2012)
- [SWD detections are increasing in fruit crops](#) (June 19, 2012)
- [Monitoring for SWD to detect early activity](#) (May 29, 2012)

Spotted Wing Drosophila

A new invasive pest of Michigan fruit crops

Rufus Isaacs and Noel Hahn, Department of Entomology | MSU Extension Bulletin E-1140
Bob Trnka and Carlos Garcia, MSU Extension
New • October 2010

Introduction

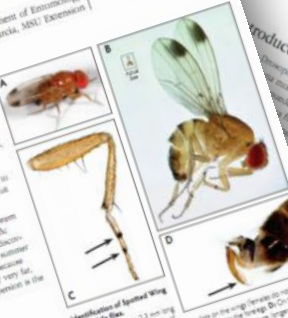
The Spotted Wing Drosophila (SWD) is a small vinegar fly with the potential to damage many fruit crops. It was first detected in Michigan in late September 2010. Unlike most other vinegar flies, the female flies are a bit larger and lay eggs in healthy fruit. The insect is a pest of many berry crops, citrus, grapes and other soft fruits. It is a pest of a preference for soft-bodied fruit. SWD is a pest of a preference for soft-bodied fruit. SWD is a pest of a preference for soft-bodied fruit. SWD is a pest of a preference for soft-bodied fruit.

SWD or Drosophila sp. was first detected in the western United States in 2008 and moved quickly through the Pacific Northwest into Canada. In the spring of 2010, SWD was detected in Florida on sweet cherries and detected later in the summer in the Carolinas. It has also been detected in Europe. Because the flies are only a few millimeters long and control is very difficult, management recommendations rather than control are the most likely case of the recent rapid spread.

Damage

Female SWD can cut into fruit using their serrated ovipositor to inject egg under the skin. They being able to insert eggs into fruit that is not yet ripe. The eggs hatch and the larvae feed on the fruit, leading to a loss of fruit quality. There is a greater risk of fruit rot if the fruit is damaged. SWD can also be a pest of stored fruit. SWD can also be a pest of stored fruit. SWD can also be a pest of stored fruit. SWD can also be a pest of stored fruit.

SWD Management
There are three separate components to effective SWD management: Monitoring, Identification, and Control.



Identification of Spotted Wing Drosophila Fly

Monitoring: The first adult stone fruit growers may wish to determine whether SWD are present. This can be done using a simple monitoring trap, consisting of a plastic 52 oz. cup with several 1/4" x 1/4" holes around the sides of the cup, leaving a 3" x 4" section without holes to facilitate pouring out liquid. The holes can be sealed in tightly containers or sealed with a hot wax or wood glue. Hang the trap in fruit. To help attract flies, place a piece of ripe fruit in the trap or bait. To help attract flies, place a piece of ripe fruit in the trap or bait. To help attract flies, place a piece of ripe fruit in the trap or bait.

La Drosophila de las alas manchadas

Una nueva plaga invasora en los frutales de Michigan

Rufus Isaacs and Noel Hahn, Department of Entomology | MSU Extension Bulletin E-1140
Bob Trnka and Carlos Garcia, MSU Extension
New • November 2010



Identificación de la Drosophila de las alas manchadas

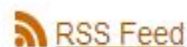
Michigan Blueberry Facts


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Michigan is the number one state in highbush blueberry production with growers producing over 100 million pounds of blueberries every year. This website was developed by Michigan State University's [Blueberry Team](#) to communicate information about blueberry production and pest management for the blueberry industry.

Search for MSUE Blueberry News past articles at [MSUE Fruit](#).

MSUE Blueberry News



[📅 Brown marmorated stink bug in Michigan 2013 update](#)

An invasive pest, the brown marmorated stink bug has now been found in 12 of 68 Lower Peninsula counties. MSU will continue to trap and monitor in 2013.

Posted on March 6, 2013 4:53pm by Michael Haas

[📅 2013 Michigan Fruit Management Guide available at MSU](#)

Events

There are currently no events to display.

Ask an Expert



Give your question a title

Question

Location and County

Michigan

Ingham County



Season-long pollinator plant mix options

Native plant	Approximate Bloom Period						
	Apr	May	Jun	Jul	Aug	Sep	Oct
willow, <i>Salix</i> spp.							
black chokecherry, <i>Aronia melanocarpa</i>							
wild cherry, <i>Prunus</i> spp.							
American elder, <i>Sambucus canadensis</i>							
silky dogwood, <i>Cornus amomum</i>							
golden Alexanders, <i>Zizia aurea</i>							
common ninebark, <i>Physocarpus opulifolius</i>							
beardtongue, <i>Penstemon hirsutus</i>							
late figwort, <i>Scrophularia marilandica</i>							
swamp milkweed, <i>Asclepias incarnata</i>							
Culver's root, <i>Veronicastrum virginicum</i>							
yellow coneflower, <i>Ratibida pinnata</i>							
nodding wild onion, <i>Allium cernuum</i>							
meadowsweet, <i>Spiraea alba</i>							
yellow giant hyssop, <i>Agastache nepetoides</i>							
horsemint/spotted beebalm, <i>Monarda punctata</i>							
Missouri ironweed, <i>Vernonia missurica</i>							
cup plant, <i>Silphium perfoliatum</i>							
pale Indian plantain, <i>Cacalia atriplicifolia</i>							
boneset, <i>Eupatorium perfoliatum</i>							
blue lobelia, <i>Lobelia siphilitica</i>							
pale-leaved sunflower, <i>Helianthus strumosus</i>							
Riddell's goldenrod, <i>Solidago riddellii</i>							
New England aster, <i>Aster novae-angliae</i>							
smooth aster, <i>Aster laevis</i>							

Programs for pollinators on farms

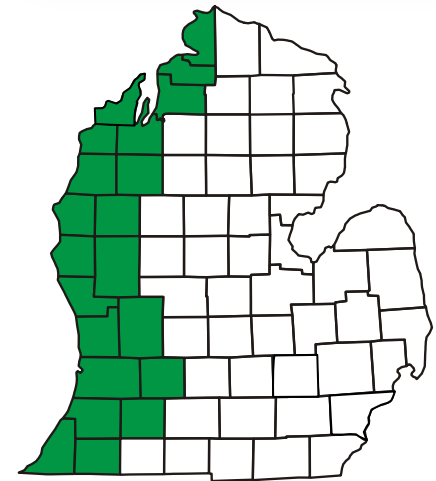
Government programs provide cost-sharing.

- Available nationwide with continuous signup
- 2 acre minimum, in areas > 0.2 hectare



Michigan's CRP-SAFE Program.

- 2009-2013, target of 2500 acres in productive lands
- Pays 90% of establishment costs (~\$600 per acre) and rental
- Currently 1700 hectares enrolled



May 2009



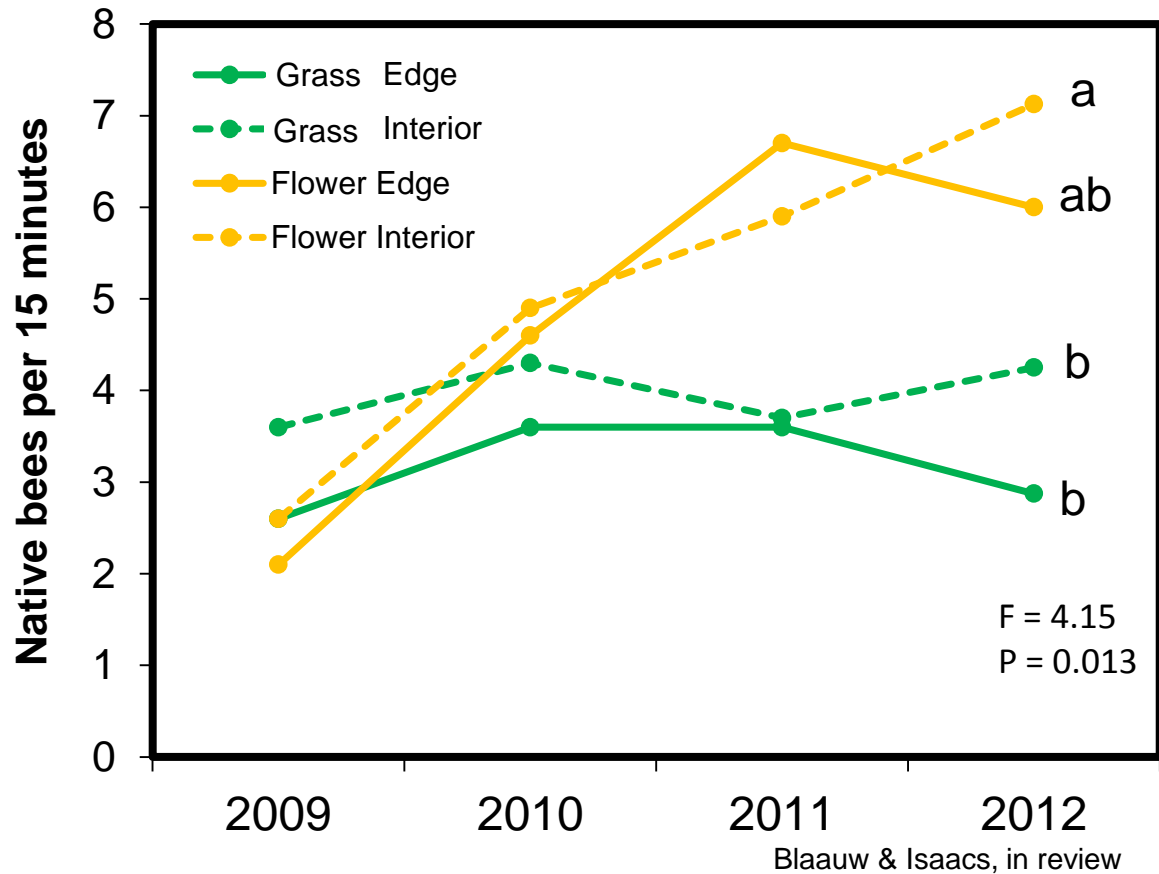
June 2010



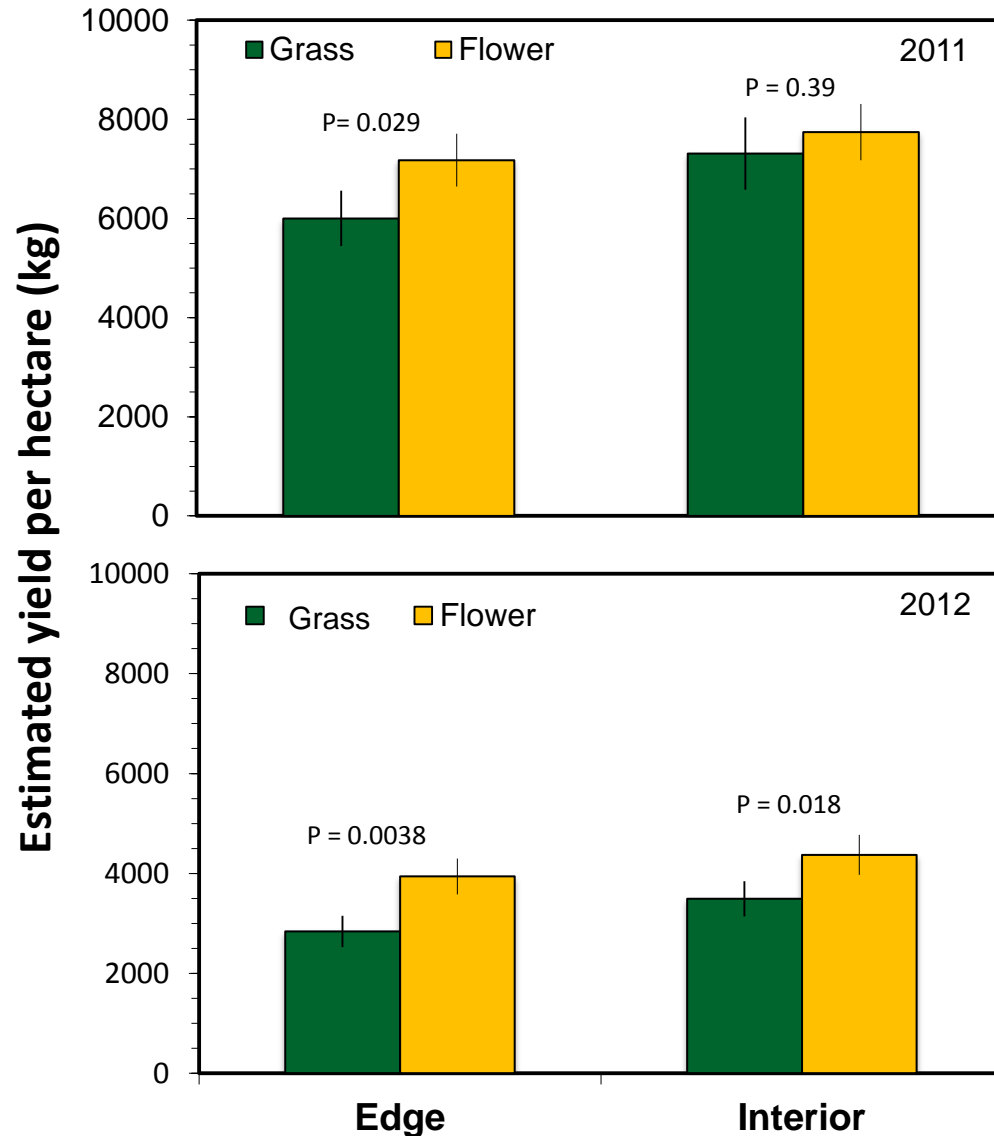
June 2011



More native bees on blueberry flowers next to flowering habitat



Pollinator habitat supports increased blueberry yield



Awareness, education, demonstration

Extension Bulletin E-2988 • New • May 2007

Conserving Native Bees on Farmland

Rufus Isaacs and Julianna Tuell
Department of Entomology, Michigan State University

This fact sheet has been developed to provide information for growers of insect-pollinated crops about farm practices that can support native bees. We provide background on the biology of these bees and give practical advice to guide growers who want to increase native bee abundance on their farms. This bulletin is based on our experience with Michigan fruit farms, but the information should be relevant to growers across the eastern United States interested in managing their farms to improve sustainable pollination of their crops.




Introduction
Bees are essential pollinators of many crops. Pollination occurs when pollen is transferred from male to female parts of flowers, resulting in seed set and good crop development. Some plants have light-weight pollen that can be transferred by wind, but many crops have heavier pollen that must be transferred by animals. Insects, birds and bats can move pollen between plants and help in achieving pollination. Bees are highly dependent on pollination to achieve flowers, but bees are most important for pollinating many crops that are highly dependent on pollination to achieve commercial yields (include almond, apple, cherry, pear, cranberry, blueberry, blackberry, grape, tomato, squash, melon and squash). For most of these crops, bees provide most of the pollination activity as they move from flower to flower to collect nectar. Some crop plants with lighter pollen grains, such as alfalfa, require less bee activity with the addition of honey bees. Without bees to move pollen, some crops would not open because of improved pollination. Without complete pollination, plants produce fewer and lower quality fruits and vegetables that are not marketable. Estimates suggest that a third of our food is from crops pollinated by bees, so it is important that growers consider strategies to pollinate their crops effectively.

Why? Europe is experiencing a decline in bee populations since their introduction from Europe. This is due to the loss of their natural habitat and the use of pesticides. Each year, the number of bees is declining.

helps ensure that yields will reach growers' expectations. Honey bees are becoming more difficult to manage, however, because of parasites and diseases. In addition, recent crop loss for honey bees are increasing. As a result, more attention has been given to conserving wild native pollinators, which are adapted to the local conditions and can help pollinate many local crops. Diversifying the pollinators that are active on a farm makes good economic sense because it reduces the chance of crop loss across many bee species. This can reduce the chance of crop loss in poor weather conditions will reduce pollination, in some cases happens in colder springs. Another benefit of having more kinds of bees pollinating is that, for some crops, native bees are much more efficient at shaking the flower to release pollen. For example, a bumblebee is six times more efficient than a honey bee at pollinating blueberry flowers.




Many farmers already have populations of native bees living on their farms. Our recent survey of Michigan blueberry and almond fields found that in addition to honey bees, bumblebees and other native bees such as halictids and sweat bees were seen on flowers when blueberry was blooming. In some cases, native bees were seen on flowers when blueberry was blooming, but during cool weather, the honey bees were not flying and pollinating the crop, helping to ensure that yields will reach growers' expectations.

Most species of native bees are not dependent on honey bees for their survival. Taking some simple steps to enhance these beneficial insects will increase their abundance and can lead to more consistent yields for growers.

Extension Bulletin E-2973 • New • January 2007

Attracting Beneficial Insects with Native Flowering Plants

Anna Fiedler, Julianna Tuell, Rufus Isaacs, and Doug Landis
Department of Entomology, Michigan State University

MICHIGAN STATE UNIVERSITY

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www.nativeplants.msu.edu

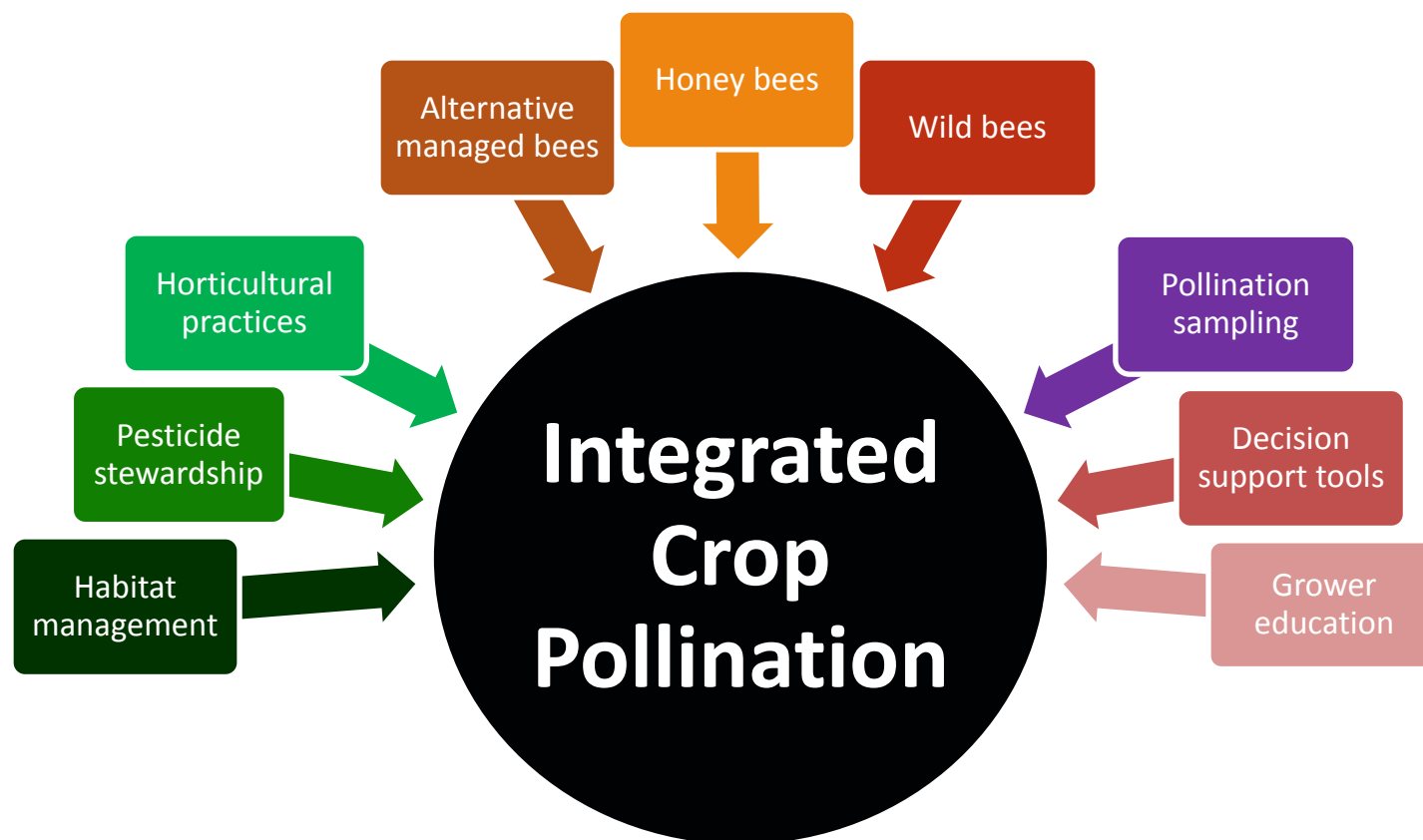
Home About Getting Started Plant Facts Restoration Resources Local Info

Using Michigan native plants to produce win-win situations for agriculture, communities and the environment.

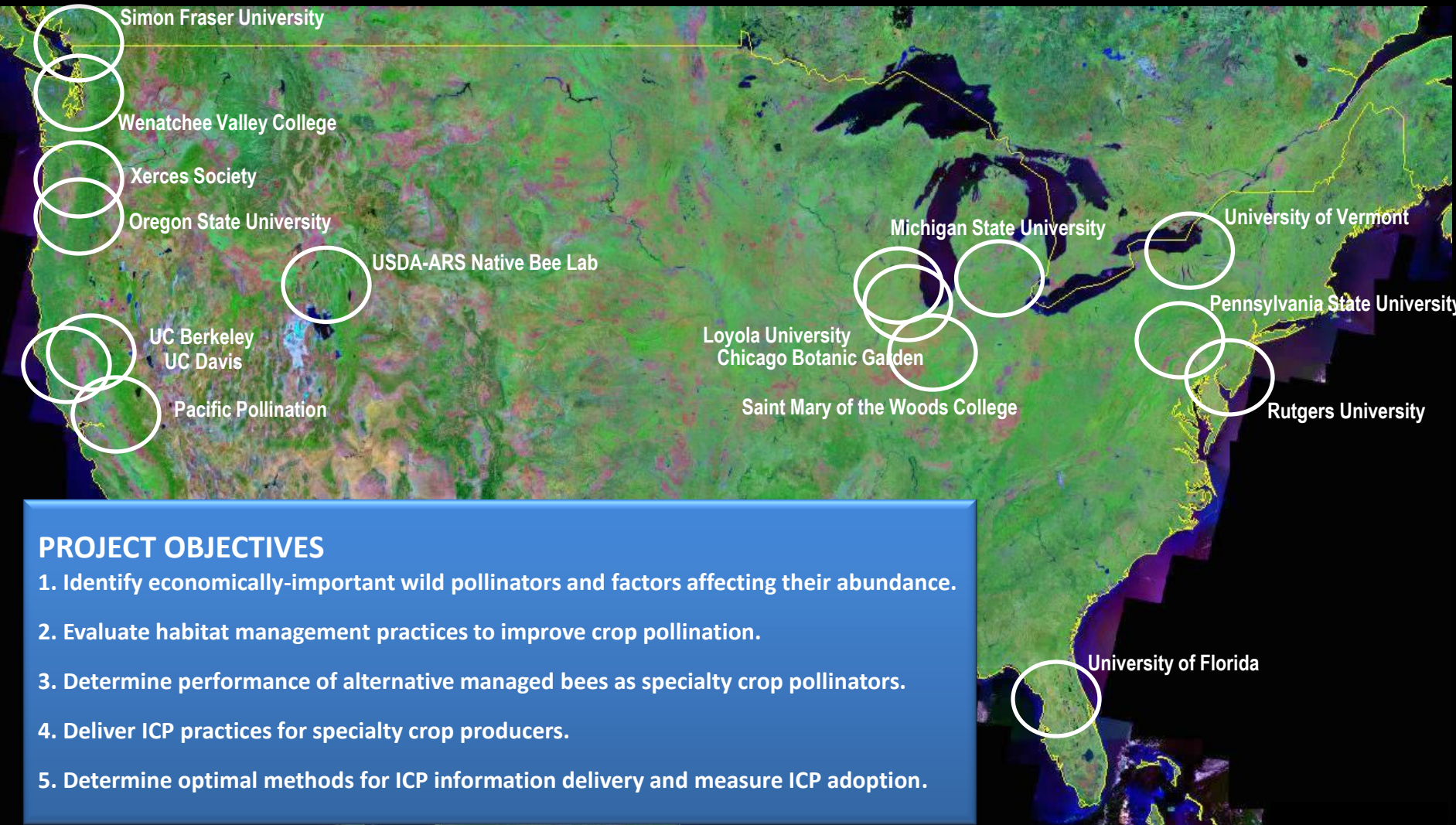


Integrated Crop Pollination

The combined use of different pollinator species, habitat augmentation, and management practices to provide reliable and economical pollination of crops



Integrated Crop Pollination project: 2012-2017



PROJECT OBJECTIVES

1. Identify economically-important wild pollinators and factors affecting their abundance.
2. Evaluate habitat management practices to improve crop pollination.
3. Determine performance of alternative managed bees as specialty crop pollinators.
4. Deliver ICP practices for specialty crop producers.
5. Determine optimal methods for ICP information delivery and measure ICP adoption.

