

Rural Leavenworth, Inc., Meeting

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Tonganoxie, KS

Beneficial Insects For Plant Protection And Integrated Pest Management (IPM)

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Overview Of Presentation

- * Beneficial Insects
- * Parasitoids
- * Predators
- * Conservation Biological Control
- * Questions And Discussion





Landscapes And Gardens Are Ecosystems That Contain A Wide-Diversity Of Interactions Related To Insects And Mites (Both Good And Bad)



Increasing Beneficial Insects in Row Crops and Gardens

Ben C. Arnold

Beneficial insects can be used to manage pest populations in row crops and gardens. They can reduce the need for chemical pesticides, which can harm the environment and beneficial insects. Beneficial insects are also used in biological control programs to manage pest populations in row crops and gardens.

There are many different types of beneficial insects, including predators, parasitoids, and decomposers. Each type has its own unique characteristics and uses in pest management.





Some of the most common beneficial insects used in row crops and gardens are ladybugs, praying mantises, and lacewings. These insects are effective at controlling a wide range of pest species.

There are many different ways to attract beneficial insects to your garden or row crops. Some of the most effective methods include planting flowers that attract beneficial insects, using insect hotels, and releasing beneficial insects into the garden.

By using beneficial insects, you can protect your garden and row crops from pests in a natural and sustainable way.

Beneficial Insects

- Consumers
- Pollinators
- Decomposers
- Natural Enemies: parasitoids (=parasitic wasps) and predators

Meet the Beneficials: Natural Enemies of Garden Pests









University of California Agriculture and Natural Resources

Beneficial insects are natural enemies of garden pests. They can help control pest populations in your garden and protect your plants from damage. There are many different types of beneficial insects, each with its own unique characteristics and uses.

Some of the most common beneficial insects used in gardens are ladybugs, praying mantises, and lacewings. These insects are effective at controlling a wide range of pest species.

There are many different ways to attract beneficial insects to your garden. Some of the most effective methods include planting flowers that attract beneficial insects, using insect hotels, and releasing beneficial insects into the garden.

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GOOD BUGS (Beneficials)			
			
			

Beneficial Insects And Mites (Biological Control Agents=Natural Enemies)



• **Parasitoids**
(=Parasitic Wasps)



• **Predators**



Beneficial Insects

Parasitoid

Predator



Parasitoids Or Parasitic Wasps



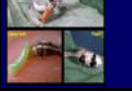
• **Braconid wasps**



• **Ichneumon wasps**



• **Chalcid wasps**



• **Trichogramma spp.**

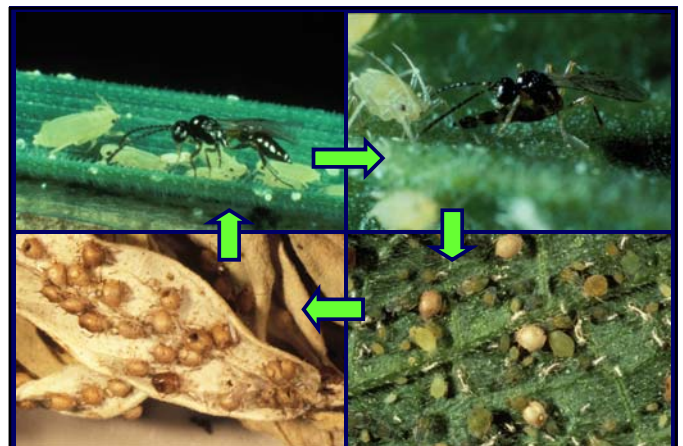


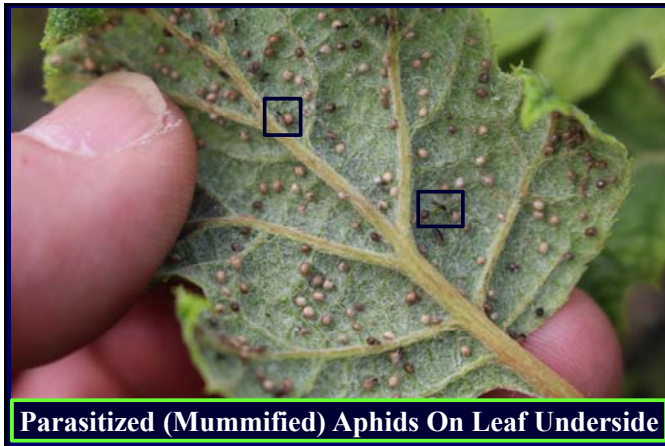
• **Aphidius spp.**

Parasitoid Female Searching For Hosts (Aphids) To Lay Eggs



Female Parasitoid Laying An Egg Inside An Aphid





Parasitized (Mummified) Aphids On Leaf Underside

Parasitized Caterpillar: Cocoons Attached To The Body Of A Tobacco Hornworm



Parasitoid Cocoons Associated With Imported Cabbageworm Larva On Leaf Underside



CONTROL

CATERPILLARS

Including Tomato Horn Worms

with **Trichogramma**

- Safe And Effective
- Kills 200 Kinds Of Caterpillars

Inside this package is everything you'll need to receive live and healthy beneficial insects sent to your door.

Receive in one order: 12,000 Tricho-Grammas, use 3-5 per square foot

DELIVERED LIVE TO YOUR DOOR

PAY ONE PRICE NO ADDITIONAL PURCHASE REQUIRED

Orcon
Organic Control Inc.

Trichogramma

Trichogramma attack 200 kinds of leaf chewing caterpillars - including Horn Worms, Cut Worms, Codling Moth, Army Worms and many boring insects.

The Trichogramma is the most widely beneficial insect in the world because it is so effective on a wide variety of pests.

Caterpillars, after hatching, usually live from 2 to 10 weeks, and spend almost all of that time eating - biting off and chewing plant material. They usually eat holes in leaves or consume an entire leaf. If enough leaves on a plant have been attacked, the plant may die.

Adult Trichogramma have an amazing ability to seek out and find moth and caterpillar eggs. They fight caterpillar by laying their eggs inside the eggs of their prey. The Trichogramma eggs hatch first then feed on the pest egg - killing before they hatch.

Predators

Beetles: Ladybird beetles, rove beetles, ground beetles, and soldier beetles.

True Bugs: Ambush bugs, assassin bugs, bigeyed bugs, damsel bugs, minute pirate/flower bugs, and predatory stink bugs.

Flies: Robber flies, syrphid/hover flies, and tachinid flies.

Lacewings: Green and brown lacewings.

Other: Praying mantids, predatory mites, and spiders.

Ground Beetle Adult



Ladybird Beetle Adults (Left) And Larva (Right)



Ladybird Beetle Adults Can Be Purchased



Green Lacewing Adult (Left) And Larva (Right)



Green Lacewing Eggs



Hover Or Syrphid Fly

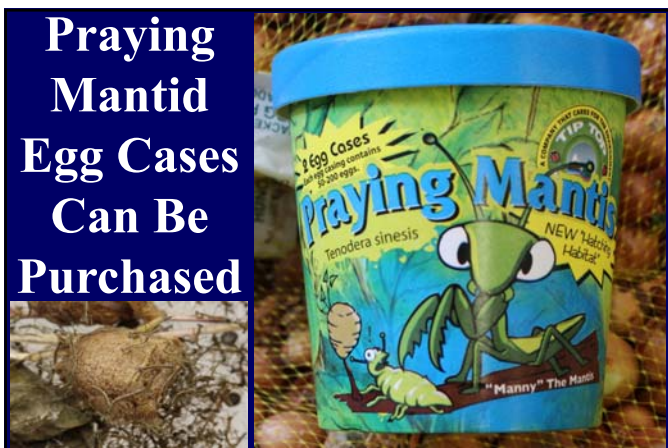
Larva

Adult





Wheel Bug Adults Mating (Left) And Wheel Bug Adult About To Attack A Tomato Hornworm (Right)



Extension Publication **Praying Mantids.** **2021** **(MF3593)**

<https://bookstore.ksre.ksu.edu/pubs/MF3593.pdf>

Conservation Biological Control

- A biological control practice that includes any activity designed to protect, attract, or maintain existing populations of beneficial insects.
- Use plants that attract beneficial insects and provide a food source, such as nectar and pollen for adults.



Plants That Attract Beneficial Insects

- Queen Anne's Lace (*Daucus carota*)



- Yarrow (*Achillea* sp.)



- Sweet Clover (*Melilotus* sp.)

- Sweet Alyssum (*Lobularia maritima*)

- Buckwheat (*Fagopyrum sagittatum*)



- Dill (*Anethum graveolens*)



- Fennel (*Foeniculum vulgare*)

- Coneflower (*Echinacea* sp.)

- Coreopsis (*Coreopsis* sp.)



Wild Onion (*Allium* spp.) In Bloom Attracts Many Different Biological Control Agents



Soldier Beetle Adults Feeding And Mating On Goldenrod Flowers



Scolia dubia

Soldier Beetles
Mating



Sweet Alyssum Attracts Parasitoids Of Aphids



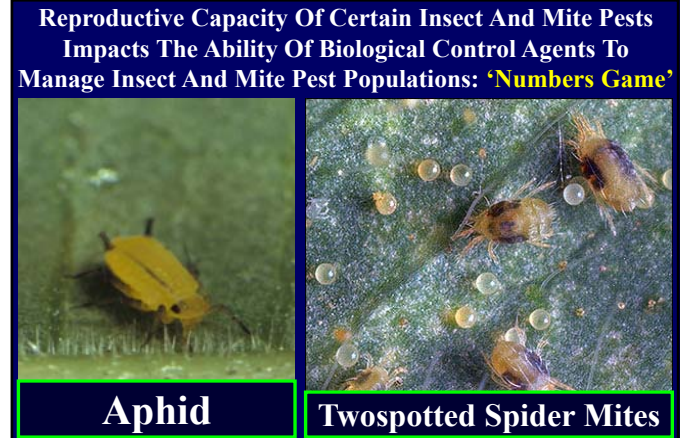
Honey Bee Feeding On Goldenrod Flower



Monarch Butterfly Feeding On Butterfly Bush Flower

insects		MDPI	
How Effective Is Conservation Biological Control in Regulating Insect Pest Populations in Organic Crop Production Systems?			
Raymond A. Croft Department of Entomology, Kansas State University, Manhattan, KS 66506, USA; rcroft@ksu.edu Tel.: +1-785-532-4790; Fax: +1-785-532-4252 Received: 9 October 2020; Accepted: 27 October 2020; Published: 29 October 2020			
Simple Summary: Organic crop production systems typically rely on conservation biological control to increase and sustain natural enemies including parasitoids and predators that will regulate insect pest populations below damaging levels. The use of flowering plants or floral resources to attract and retain natural enemies in organic crop production systems has not been consistent, based on the scientific literature, and most importantly, many studies do not correlate an increase in natural enemies with a reduction in plant damage. This may be associated with the effects of intercropping and the associated effects of plant architecture on the abundance of natural enemies. Consequently, although incorporating flowering plants into organic crop production systems may increase the natural enemy assemblages, more robust scientific studies are warranted to determine the actual effects of natural enemies in reducing plant damage associated with insect pest populations.			
Abstract: Organic crop production systems are designed to enhance or preserve the presence of natural enemies, including parasitoids and predators, by means of conservation biological control, which involves providing environments and habitats that sustain natural enemy assemblages. Conservation biological control can be accomplished by providing flowering plants (floral resources) that will attract and retain natural enemies. Natural enemies, in turn, will regulate existing insect pest populations to levels that minimize plant damage. However, evidence is not consistent, based on the scientific literature, that providing natural enemies with flowering plants will result in an abundance of natural enemies sufficient to regulate insect pest populations below economically damaging levels. The notion that conservation biological control has not been found to sufficiently regulate insect pest populations in organic crop production systems across the scientific literature is associated with complex interactions related to intercropping, the omission of plant varieties, weed diversity, and climate and ecosystem resources across locations where studies have been conducted.			
Flowering Plants	Natural Enemies		
Sweet alysum (<i>Leptina maritima</i>)	Syrphids (Diptera) [7,43]		
	Oris spp. [7]		
	Coccinellids (ladybird beetles) [7]		
Buckwheat (<i>Elymus esculentus</i>)	<i>Trichogramma caryae</i> (Hymenoptera: Braconidae)		
	Trichogrammatidae [34]		
Cimicifuga racemosa	Syrphids (Diptera) [42,50]		
	<i>Trichogramma evanescens</i> (Hymenoptera: Braconidae) [17]		
	<i>Microplitis mediator</i> (Hymenoptera: Braconidae) [54]		
Cimicifuga racemosa	<i>Microplitis mediator</i> (Hymenoptera: Braconidae) [54]		
Common vetch (<i>Vicia sativa</i>)	<i>Microplitis mediator</i> (Hymenoptera: Braconidae) [54]		
Candytuft (<i>Iberis amara</i>)	<i>Microplitis mediator</i> (Hymenoptera: Braconidae) [54]		
Ground elder (<i>Aegopodium podagraria</i>)	<i>Heterospilus prosopidis</i> (Hymenoptera: Braconidae) [24]		
Wild marjoram (<i>Origanum vulgare</i>)	<i>Phaenocarpa carolinensis</i> (Hymenoptera: Ichneumonidae) [24]		
	<i>Heterospilus prosopidis</i> (Hymenoptera: Braconidae) [24]		

important. Moreover, an increase in beneficial insects does not always translate into a general decrease in pest species or an increase in yield. Each cover crop provides different



Reproductive Capacity Of Certain Insect And Mite Pests Impacts The Ability Of Biological Control Agents To Manage Insect And Mite Pest Populations: 'Numbers Game'

Aphid **Twospotted Spider Mites**

Jurassic Park (1993): If All The Dinosaurs In The Park Are Female And There Is No Unauthorized Breeding—
Then Where Did The Eggs Come From?



**Thank You For Your
Attention!**



**I Hope You All
Learned Something!**

