

# Natural Enemies



# Biological Control

The use of living natural enemies to control pests.

Includes:

- Predators
- Parasitoids
- Pathogens

# Predators



- Insect, mite or spider that attacks & feeds on its prey
- Kill & consume more than one victim to complete development

# Modes of Predation

- Active Search
- Ambush
- Lures
- Traps

# Parasitoid



**Parasitized  
aphids**

**Healthy  
aphids**

- An organism that lives in or on the body of its host, at least during a part of its lifecycle
- Kill & consume less than or equal to one victim in order to complete development

# Pathogens



- Process:
  - Adhesion of spore to host cuticle
  - Spore germination
  - Penetration of the cuticle
  - Growth in hemocoel
  - Insect death
- Examples:
  - *Beauveria bassiana*
  - *Metarhizium anisopliae*

# Predators and Parasitoids





# Ants



- Social insects
- Predators
- May tend aphids or other honeydew producing insects
- Feed on sugars, fats, proteins and honeydew



# Earwigs



- $\frac{1}{4}$ " to 1" long
- Flattened body
- Pale to dark brown
- Forceps-like cerci used to capture prey or defend themselves
- Predators

# Green Lacewings



- Adults generally eat aphids, honeydew, nectar and pollen
- Larvae are predators
- They are commonly found on grass, weeds, cultivated row crops and shrubs

# Green Lacewing Larvae



- Larvae are elongate
- Large, sickle-shaped mandibles, inject a paralyzing venom
- Feed on eggs and immature stages of aphids, caterpillars, leafhoppers, mealybugs, moths, spider mites, thrips and whiteflies

# Green Lacewing Adult



- Adults are greenish white with copper-colored eyes
- About  $\frac{3}{4}$ " in length
- Feed mostly on aphids, honeydew, nectar or pollen

# Beetles

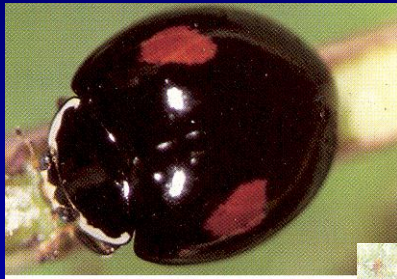


- Adults and larvae of some species are predators





# Ladybird Beetles



- Both adults and larvae prey on aphids, scale insects, mealybugs, mites and other soft-bodied insects

# Adult Ladybird Beetles



- Oval shaped
- Black with yellow or red markings OR orange or reddish with black markings
- Range from 1/16" to 1/2" long



# Ladybird Beetle Larvae



- Larvae are elongate, somewhat flattened & covered with spines
- Usually dark or black with brightly colored spots or bands
- Some are white in color and resemble mealybugs

# Rove Beetles



- Larvae and adults of most species are predators
- Adults are brown or black, slender, with stubby wings
- Larvae resemble adults
- Prey on aphids, springtails, nematodes and fly maggots

# Ground Beetles



- Larvae and adults of most species are predators
- Adults are dark colored, often metallic
- Larvae are elongate, dark brown or black
- Prey on aphids, other beetles, chinch bugs, fly eggs, some caterpillars and moths

# Praying Mantids



- Usually over 2" in length
- Brown or green in color
- Prey on many different insects, including other beneficials

# Minute Pirate Bugs



- Small, oval, flattened, and black with white markings
- Nymphs and adults are predators
- Prey on corn earworms, small caterpillars, insect eggs, leafhopper nymphs, spider mites and thrips



# Big-eyed Bugs



- Gray, brown, black or tan with tiny spots, and bulging eyes
- Prey on eggs and immature aphids, armyworms, hornworms, corn earworms, leafhoppers, lygus bugs, mealybugs, psyllids, spider mites and thrips

# Stink Bugs



- Usually oval or shield-shaped
- Brown, green or gray, many brightly colored
- Prey on many insects, especially caterpillars



# Stink Bugs

## Beneficial forms

- Spines projecting from “shoulders”
- Short, stout beaks

## Plant feeders

- Round “shoulders”
- Long, thin mouth parts



# Robber Flies



- $\frac{1}{4}$  to  $1\frac{1}{4}$ " in length
- Face is usually very hairy with a groove between the eyes
- Prey on many insects including beetles, grasshoppers, bees, leafhoppers, wasps and other flies

# Syrphid Fly Adults



- Adults are bee mimics
- Feed on pollen and aphid honeydew
- Female will lay hundreds of eggs in an aphid colony, using honeydew as an ovipositional stimulant

# Syrphid Fly Larvae



- Some larvae are grayish or greenish with a slug-like appearance
- Each larva can eat hundreds of aphids

# Wasps



- Various sizes
- Slender, brown or black with a constricted waist
- Fairly host-specific; most pests have a complex of parasitoids

# Predatory Mites



- Often red or orange
- Legs are longer than spider mites
- Front legs extended forward
- Commonly attack two-spotted spider mites



# Spiders



- 8 legs, 2 body parts
- Predators
- Hunt
- Spin webs
- Ambush



# Vertebrate Animals



- Armadillos
- Birds
- Fish
- Raccoons
- Snakes
- Squirrels

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