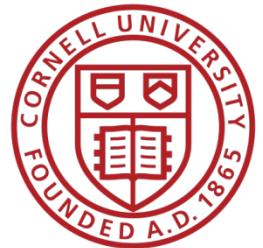


Natural Enemies

Master Gardener Volunteer Training

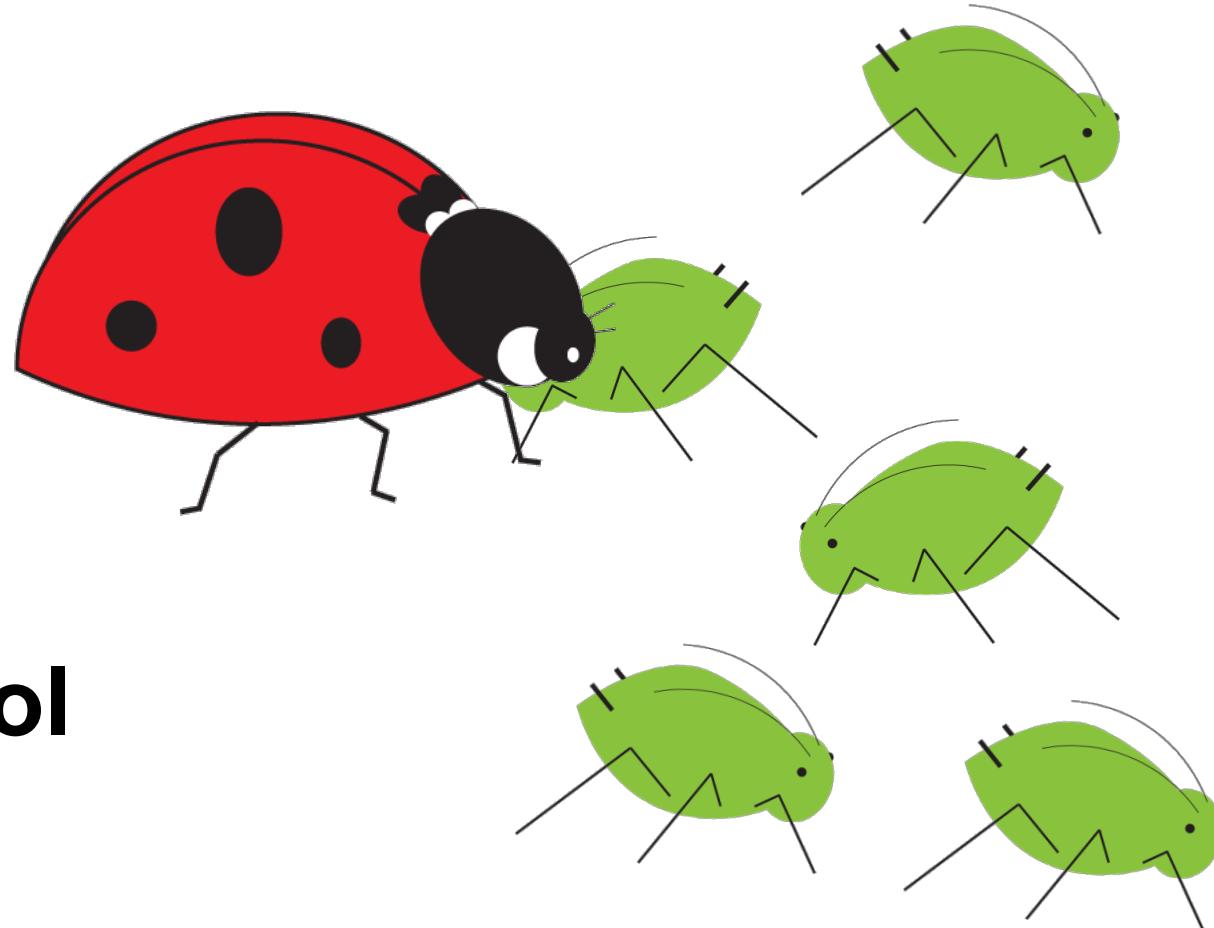
June 8, 2024

Cornell Cooperative Extension
Orange County



Overview

- Predators
- Parasitoids
- Biological Control



Predators



Predators

1. Target organism = prey



Predators

2. Usually bigger than their target organism



Predators

3. Both generalists and specialists



Predators

4. Use all life stages of the target organism



Predators

5. Kill the target organism quickly



Predators

6. Females, males, and immatures search for the target organism



Predators

7. Each individual kills and consumes many target organisms



Predators

8. All life stages can kill target organisms



Predators

9. Include many different orders of insects and arachnids



Predators

Odonata – Dragonflies and Damselflies



Predators

Mantodea - Mantids



Predators

Hemiptera - True Bugs



Predators

Coleoptera - Beetles



Predators

Neuroptera – Antlions, Lacewings, Mantidflies, etc.



Predators

Diptera - Flies



Predators

Hymenoptera - Ants, Bees and Wasps



Predators

Araneae - Spiders



Predators

Acari - Mites



Parasitoids

Parasitoids

1. Target organism = host



Parasitoids

2. Usually smaller than their target organism



Parasitoids

3. Specialists



Parasitoids

4. Use a specific life stage of the target organism



Parasitoids

5. Kill the target organism slowly



Parasitoids

6. Only females search for the target organism



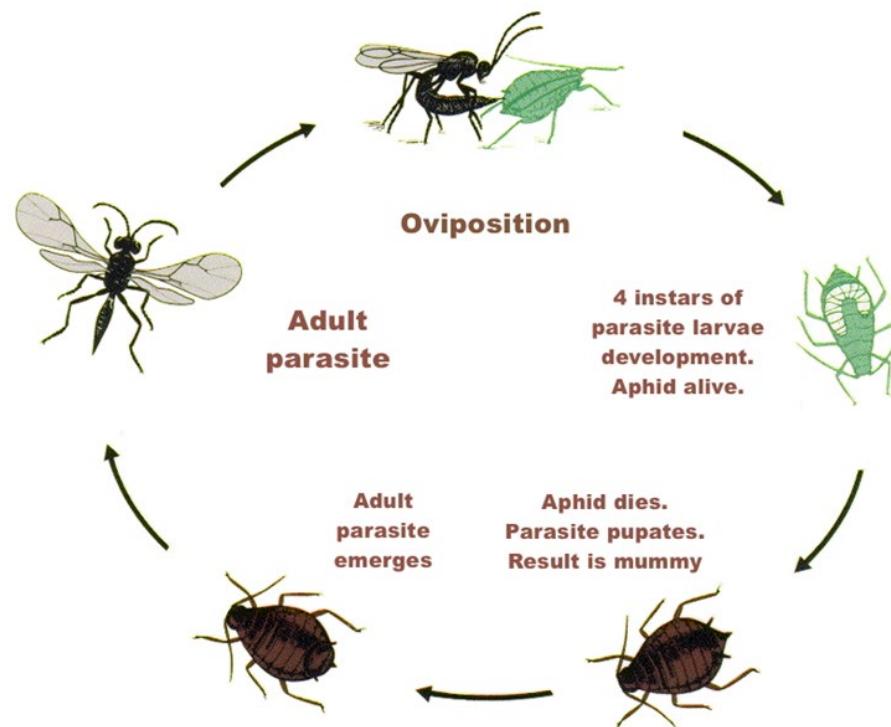
Parasitoids

7. Each individual kills and consumes one target organism



Parasitoids

8. Immatures kill the target organism



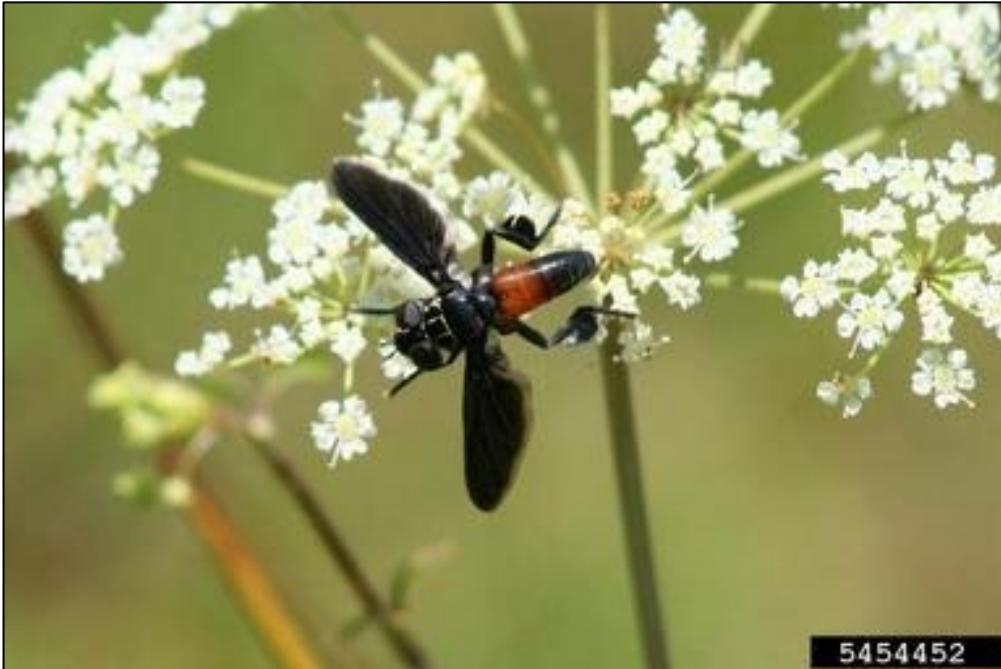
Parasitoids

9. Include only insects that undergo complete metamorphosis



Parasitoids

***Diptera* - Flies**



Parasitoids

***Hymenoptera* - Ants, Bees and Wasps**



Biological Control

- the use of beneficials organisms to reduce pest populations or to maintain populations at sufficiently low levels
- Two kinds:
 - **Conservation**
 - **Augmentation**

Biological Control

- **Conservation** – provide habitat (food, shelter, etc.) for beneficials already present in the system
 - Planting flowers in your vegetable garden
 - Letting herbs flower
 - Leaving plant debris in the garden over the winter
 - Not using broad spectrum pesticides

Biological Control

- **Augmentation** – adding benificals to the system
 - **Inoculative** – add once and the offspring of the introduced benificals will help manage the pest populations
 - **Inundative** – introduce large numbers of benificals to manage pest populations

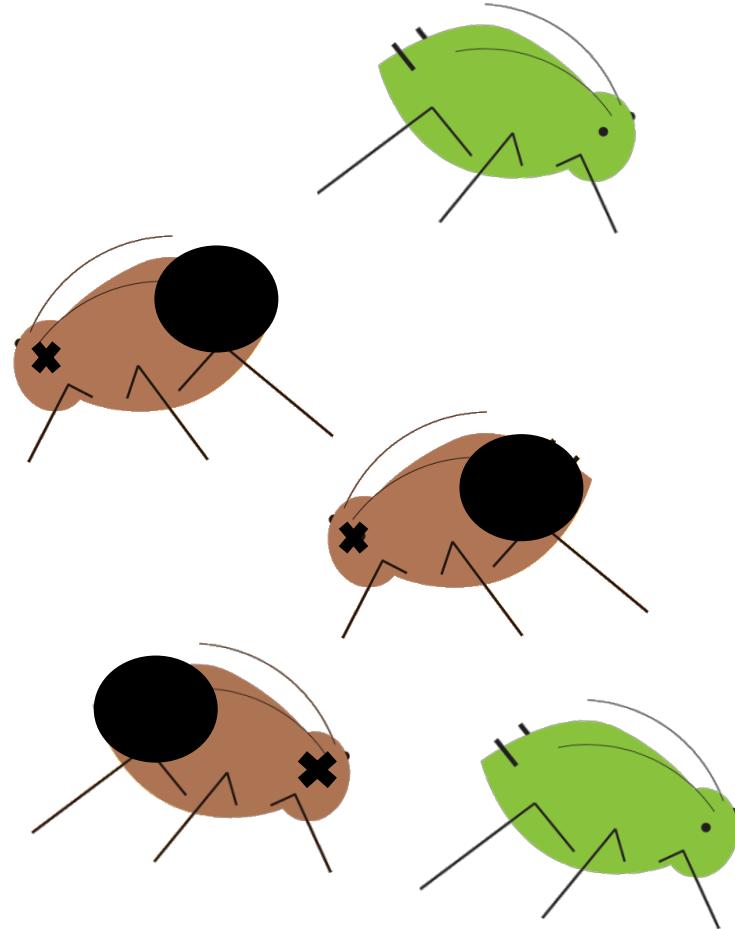
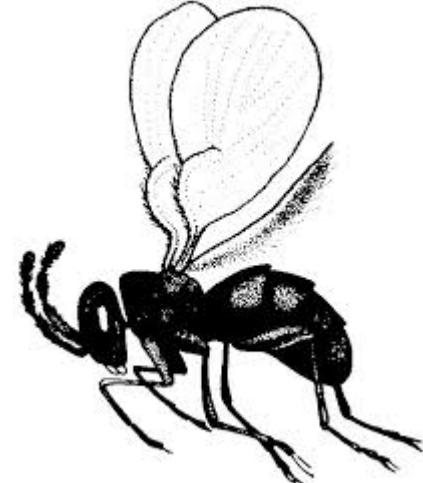
Biological Control

- Purchasing Predators and Parasitoids

[IPM Labs](#)

Review

- Predators
- Parasitoids
- Biological Control





Questions?