Part 1  Organic Farming and Gardening Skills

Unit 1.8
Managing Arthropod Pests

A Project for the Center of Agroecology & Sustainable Food Systems (CASFS)
*University of California, Santa Cruz*
Insects’ Taxonomic Position

Kingdom: Animalia
Phylum: Arthropoda
Class: Insecta
Order: Hemiptera (true bugs)
Family: Miridae
Genus: Lygus
Species: hesperus
Common name = lygus bug
Undiscovered Life

Current species diversity

Vertebrates
Insects
Crustaceans
Mollusks
Roundworms
Plants
Fungi
Protozoans

Number of species (x 1,000)

Red = Known species
Gold = Estimated number of species not yet discovered
Beetle Diversity

• The number of taxonomically described beetles (only one of 31 orders of insects) is more than 250,000 species
  – 1/5 of all described animals
Insect Anatomy

Head: sensory

Thorax: movement, locomotion

Abdomen: respiration, digestion, reproduction

Diagram: Berkeley Natural History Museum
Hemimetabolous Development

Diagram: V. Boucher, UCD
Holometabolous Development

Diagram: Bugwood Wiki
producers

primary consumers (herbivores)

secondary consumers (predators)

tertiary consumers (predators)

parasites and parasitoids

decomposers and detritvores
producers
tertiary consumers (predators)
decomposers and detritvores
Functional Categories
ORTHOPTERA
grasshoppers, crickets and katydids
ORTHOPTERA

grasshoppers, crickets and katydids
Orthopterans in CA

- *Melanoplus* spp. occasionally a pest in wheat and small grains, particularly when adjacent to foothills (UC IPM)
- Katydid in peaches
HOMOPTERA

planthoppers, leafhoppers, aphids, scale, cicadas and mealybugs
HOMOPTERA

planthoppers, leafhoppers, aphids, scale, cicadas and mealybugs
HOMOPTERA

planthoppers, leafhoppers, aphids, scale, cicadas and mealybugs
Homopterans in CA

- Aphids in vegetables
- Scale in citrus
- Leafhoppers in grapes
- Whiteflies in cucurbits
- Mealy bugs in floriculture
- Pysllids in tomatoes
Homopterans as Vectors

Asian Citrus Psyllid

Yellow dragon disease or HLB

Potato Psyllid

Zebra chip
Asian Citrus Psyllid

The Disease:
Huanglongbing caused by three bacteria in the genus *Candidatus Liberibacter*

The bacteria infect the phloem, the circulatory system that transports sugars from the tree canopy to the roots, resulting in blockages.

The blockages starve the roots, which stop properly absorbing nutrients from the soil to send back up to the tree canopy, a circulatory system known as the xylem.
Hemiptera

true bugs
Hemiptera
true bugs
Hemiptera
true bugs
Hemipterans in CA

- Lygus bugs in strawberries, cotton
- Stink bugs in tomatoes, almonds
- False chinch bugs in grapes, walnuts
- Bed bugs...everywhere!
- **Predators:** minute pirate bug, bigeyed bug, damsel bug, assassin bug, stink bug
lygus bug

damsel bug
Lepidoptera
butterflies and moths
Lepidoptera
butterflies and moths
Lepidoptera
butterflies and moths
Lepidopterans in CA

- Diamondback moth in cole crops
- Artichoke plume moth
- Codling moth in apples
- Navel orange worm in almonds
- Citrus cutworm
- Western grapeleaf skeletonizer
- Tomato hornworm
- Corn earworm