

Integrated Pest Management

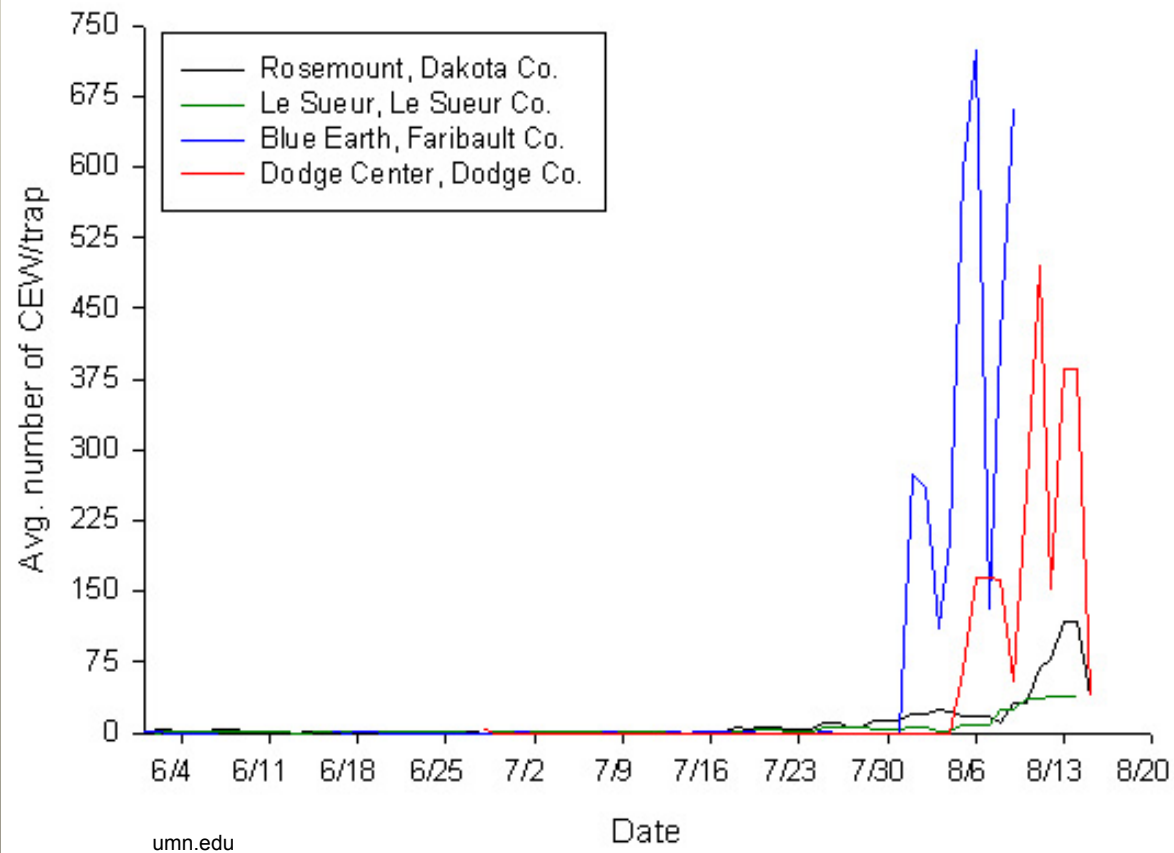
- **UC IPM:** Integrated pest management (IPM) is an ecosystem-based strategy that focuses on long-term prevention of pests or their damage through a combination of techniques such as biological control, habitat manipulation, modification of cultural practices, and use of resistant varieties. Pesticides are used only after monitoring indicates they are needed according to established guidelines, and treatments are made with the goal of removing only the target organism. Pest control materials are selected and applied in a manner that minimizes risks to human health, beneficial and nontarget organisms, and the environment.

Prevention

- Site selection
- Planting date
- Crop rotation
- Host resistance
- Field sanitation
- Landscape diversity
- Alternate host management
- Fertilization/Irrigation
- Row covers
- Cultivation
- Cover cropping
- Farmscaping

Pest Avoidance (Temporal)

Figure 1. Corn Earworm pheromone trap moth catch - 2006



Pest Avoidance (Spatial)

- Crop rotation prevents pest population build up during consecutive growing seasons
- Especially relevant for soil-dwelling or largely sessile insects



Pest Avoidance (Physical)

A physical barrier to pest infestation



Row covers



Flea beetles

Field Sanitation

- Remove pest habitat and reduce reproductive opportunities



Fertilization



Excess nitrogen on broccoli tends to increase cabbage aphid

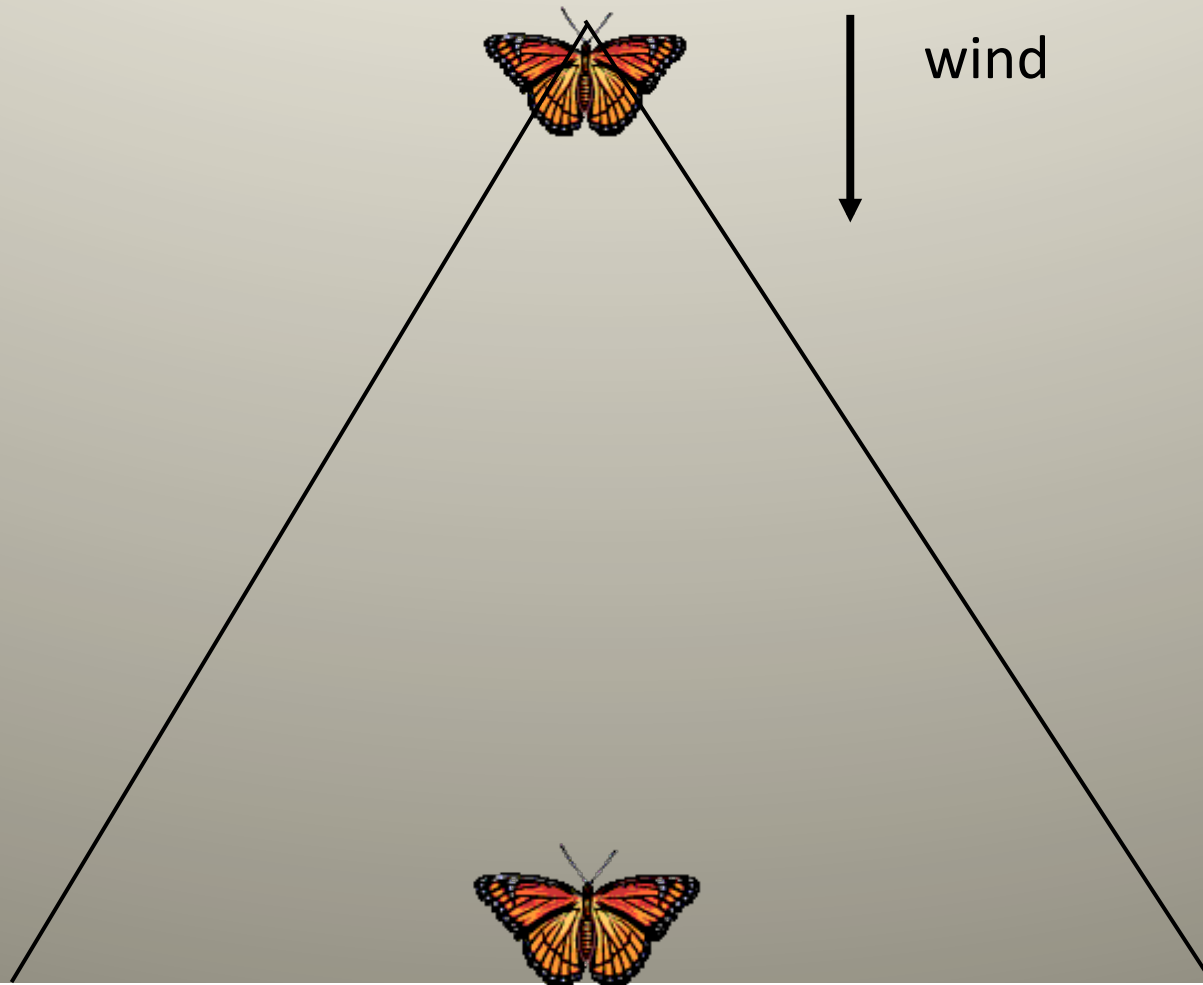
Pest Suppression

- Pheromones
- Habitat Management
- Biological Control
- Mechanical Control
- Soil Solarization
- Insecticides

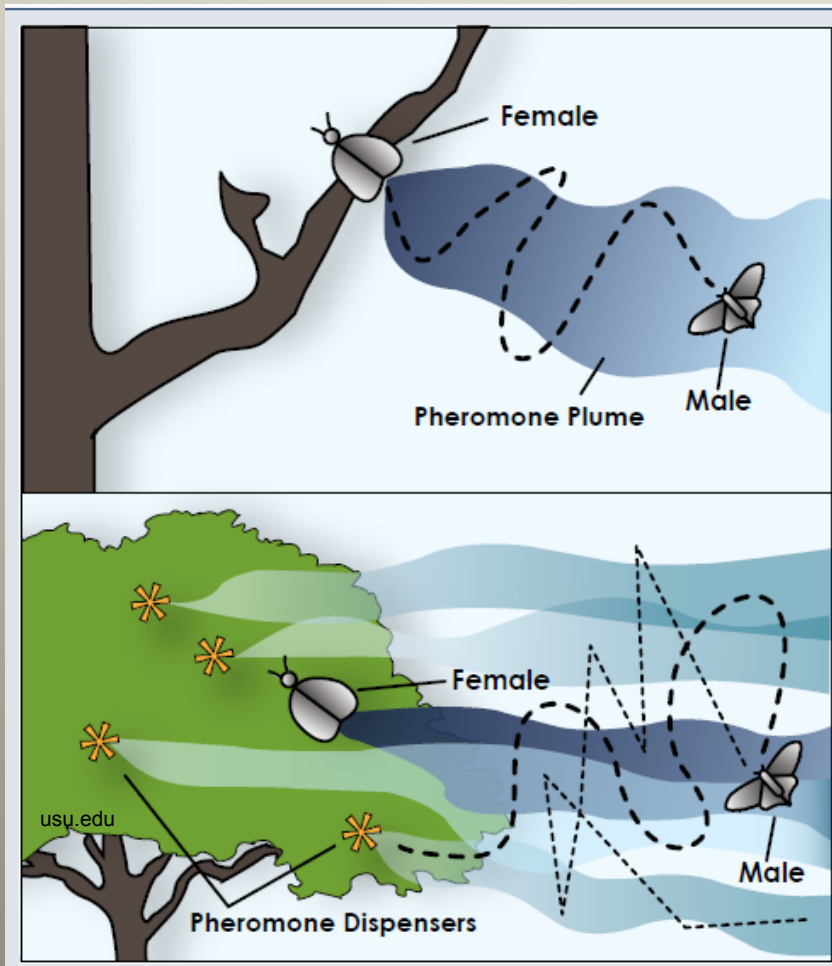
Pheromones

- Emitted chemical that elicits a response from other members of a population
 - Sex pheromones most often used in agriculture

Most sex pheromones are produced by the female and used by the male for mate location.

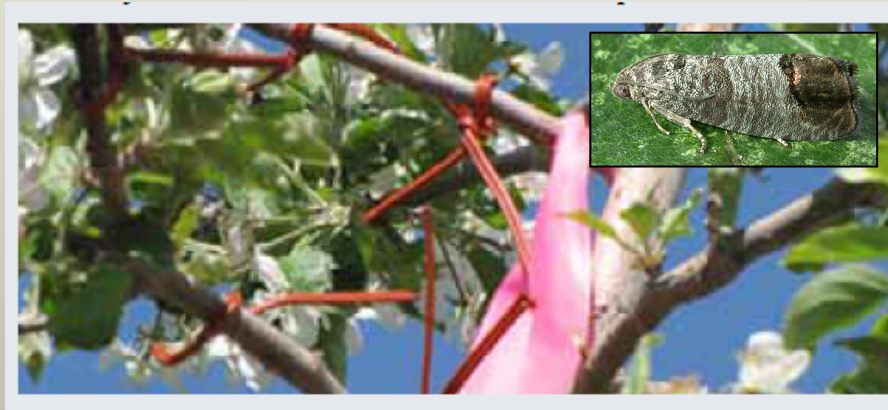


Mating Disruption: codling moth in apples



gardenofeden.blogspot.com

Mating Disruption Using Pheromone Twist-Ties



Habitat Modification

Pest problems happen when conditions required for survival by the pests are favorable.

Habitat modification intentionally limits or alters one or more of these requirements



alfalfa trap crop



sweet alyssum beneficial insectary

Biological Diversity

- Functional diversity is most valuable to a grower



Biological Control

There are three approaches or types of biological control:

Classical

Augmentation

Conservation



Classical BC

- Introduced species constitute 98% of the U.S. food system (Pimentel et al. 2005)
- Creates trophic imbalances in agroecosystems
- Classical BC is a chemical-free approach to restoring top-down control of pests using only the most selective organisms

Classical BC for Asian Citrus Psyllid (ACP)

- CA oranges worth \$716 million annually
- ACP first detected in Los Angeles in 2008
- CDFA started spraying pesticides in LA to eradicate ACP and prevent them from spreading
- CDFA sprayed 46,941 properties at a cost of \$4.7 million
- As 40% of houses in LA have at least one citrus tree (i.e. 1.2 million properties), many more homes would need to be sprayed
- Once the state suspended its pesticide campaign in LA, more sustainable and cost effective strategies (i.e. biological control) were utilized

Tamarixia radiata
(Hymenoptera: Eulophidae)



Classical BC for Asian Citrus Psyllid (ACP)



ACP nymphs



parasitized ACP nymphs

Augmentative BC



Rincon-Vitova Insectaries



Mechanical Control

Mechanical controls include practices that mechanically destroy pests or present a physical barrier to their infestation



Tractor-mounted vacuum




Tanglefoot band to exclude ants

Organic Insecticides

- Not cheap!
- Not always effective
- Not always selective
- Not always on the OMRI (Organic Materials Review Institute) list
- Similar to conventional crops, should be used as a last resort

Organic Insecticides

- **Botanicals:** derived from plants
 - Pyrethrum (from *Chrysanthemum*) or Azadirachtins (from the neem tree)
- **Soaps:** K fatty acids used for soft-bodied insects
 - M-pede[®]
- **Microbials:** bacteria harmful to certain insects
 - *Bt* or Entrust[®] (from *Saccharopolyspora spinosa*)



Are there any
questions?

References Cited

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