Pest Ecological Relationships

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Trophic Interactions of Pests

Direct

Indirect
Multiple Attack

Leafhopper

Fusarium

Alfalfa
Multiple Attack

Leafhopper

Alfalfa

Graph showing the number of alfalfa plants per 15 m² over different harvest dates and treatments:
- =none
- =Fus.
- =Lh.
- =Fus.+Lh.

Harvest dates: 7/26/74, 9/6/74, 4/1/75.
Crop Pest and Weed Interactions

- Consumers that feed on weeds but not crops are beneficial.
- Consumers that feed on both crops and weeds vary in their impact.
  - The pest may have higher impacts on the weed than the crop (unlikely).
  - The weed may serve as a reservoir for pests (think nightshades and Colorado Potato Beetle).
- Weeds external to the Cropping System.
Crop Pest and Weed Interactions

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• Weeds external to the Cropping System
Indirect Interactions

Variegated Cutworm

Alfalfa

Weeds
Indirect Interactions

Variegated Cutworm

Alfalfa
Weeds as host refuges
Weeds as host refuges

- Vineyard (summer)
- Riparian habitat (winter)
- Spring
- Fall
- Beneficial parasite (Anagrus epos)
- Prey (Grape leafhopper)
- Host plant for prey (Grapevines)
- Anagrus epos
- Dikrella leafhopper
- Wild blackberry
Soybean Aphid Life Cycle

- Winged Female (Emigrants)
- Wingless Female
- Stem Mother
- Overwintering Egg
- Soybean Aphids on Buckhorn
- Female
- Male
- Sexual Winged Female (Fall Migrant)

Soybean Aphids on Soybean

Spring, Summer, Winter, Autumn
Figure 1. Volatile compounds are released by plants in response to insect feeding triggered by an interaction of elicitors from the oral secretions of insect herbivores with damaged plant tissue. These volatiles are used by some parasitoid wasps to locate their hosts.
Habitat Modification

• When pest activities result in:
  • Altered resource concentration
  • Altered apparency
  • Altered Microenvironment
Resource Concentration

- Pests reproduce best on contiguous habitat
- Varying habitat (host prevalence) lowers their reproductive potential
- What are the assumptions?
Apparency

• Crop is “Hidden” from pest

• Perimeter Trap Cropping

• Used in Cucurbit production for striped cucumber beetle
FIGURE 4.6 Light attenuation under the canopy of a squash monoculture, a corn monoculture, and a corn/squash intercrop. The data for each crop show the percentage of full sunlight remaining at each of six horizontal levels. (From Fujiyoshi, 1997)
Pest Management

- Positive: Net benefit on TOTAL pest injury
- Neutral: no net benefit on TOTAL pest injury
- Detrimental: Net detriment on TOTAL pest injury