

Tomato, Eggplant and Pepper Insects



Frank G. Zalom, Department of Entomology, UC Davis

Whiteflies

Bemisia spp.

Greenhouse whitefly (GWF)



Bemisia

Adults- tiny, 1.5 mm long

- *Bemisia* spp. hold wings at an angle, rooflike over body, space between wings at rest
- GWF hold wings flat over body, no space between wings at rest

Fourth-instar nymphs-

- GWF nymphs have long waxy filaments around the edge of their bodies
- *Bemisia* spp. nymphs do not

Whiteflies colonize the underside of leaves



Greenhouse whitefly

Whiteflies

Damage

Whiteflies suck sap and excrete honeydew, a substrate for sooty mold

- Feeding causes leaves to yellow and curl
- *Bemisia* feeding causes fruit to ripen unevenly
- *Bemisia* transmit gemini viruses such as Tomato Yellow Leaf Curl
- GWF vectors Tomato Infectious Chlorosis virus



Whiteflies

Control

When possible, plant tomatoes at least 0.8 km upwind from key whitefly hosts such as melons, cole crops, and cotton

- Rotate with non-host crops
- Use reflective polyethylene mulches on planting beds if virus transmission is a major concern

• Treatment threshold for *Bemisia* sp. (silverleaf whitefly) is about 4 adults per leaf in a random 30-leaf sample of healthy leaves



Whiteflies Control

Beneficials can control light infestations

- If populations are higher at field margins than field centers, treat only the field margins; this reduces treatment costs and preserves beneficials
- Augmentation is possible with *Encarsia* sp. in protected culture



Aphids

- Many aphids have a broad host range
- Others are more specific



UC Statewide IPM Project
© 2000 Regents, University of California



UC Statewide IPM Project
© 2000 Regents, University of California

Aphids

Damage

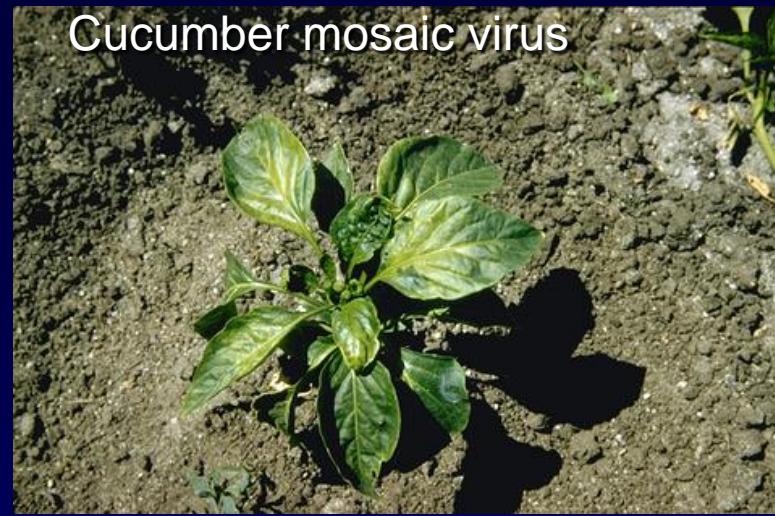
Early season aphids

- Greatest concern is as virus vectors since plants are typically affected by viruses when inoculated early

Later season aphids

- High densities can distort leaves and stems, stunt plants, and cause necrotic spots on leaves
- Aphids secrete honeydew creating a substrate for sooty mold

Cucumber mosaic virus



Aphids

Management

- Many parasites and predators attack aphids
- If virus transmission is a major concern, reduce or delay the early-season buildup of aphid populations using reflective mulches
- Application of neonicotinoid insecticide at transplanting or through drip lines controls early season infestation; spot treating early colonies reduces aphid build-up later
- Good spray coverage is important in controlling high populations later season



Aphids

Management

- Growing plants in protected culture with screens will exclude aphids, whiteflies, Lepidoptera and other insects
- Floating row covers reduces early infestations
- Look for and destroy virus infected plants
- Avoid over-fertilizing with nitrogen



Aphids

Biological Control

Beneficial insects can have a significant impact on aphid populations



Lacewing larva



Lady beetle and larvae



Parasitoid wasp with mummies
vide J. L. Capinera, University of California

Aphids

Biological Control



- Preserve habitat for beneficial insects around the field
- Keep dust down to encourage parasitism and predation
- Avoid using pesticide sprays that are highly disruptive of natural enemy populations

Leafminer

Liriomyza spp.



Adults - small, shiny, black flies with bright yellow, spot on upper thorax; lay eggs within the leaf

Larvae - feed beneath leaf surfaces; drop to the ground to pupate

- Multiple generations per year
- Heavily infested plants may lose most of their leaves



Leafminer

Liriomyza spp.

Monitoring and Control

Diglyphus sp.

UC Statewide IPM Project
© 2000 Regents, University of California



- Check transplants before planting and destroy any that are infested
- Varieties with curled leaves are less susceptible
- Avoid use of early season applications of broad-spectrum insecticides to conserve natural enemies
- *Diglyphus begini* parasitoid



Thrips

Flower thrips



- Adult flower thrips ~1.5 mm long; pale yellow to light brown in color
 - Wings are fringed with long hairs
 - Immature stages similar to adults, but lighter in color and wingless
- Broad host range including grasses
- Thrive in hot, dry conditions

Thrips

Damage



Nymph

- Vector of tomato spotted wilt and other viruses
- Nymphs acquire virus by feeding on infected plants; can transmit the virus all their lives and pass it on to their offspring

Control

- Avoid planting tomatoes next to hosts that may become dry or be harvested earlier
- Spinosyns are the most effective pesticide at present
- Treating thrips with other pesticides is not recommended to prevent virus transmission

Fruitworm

Heliothis spp.

< 24 hr old



> 24 hr old



Newly hatched larva

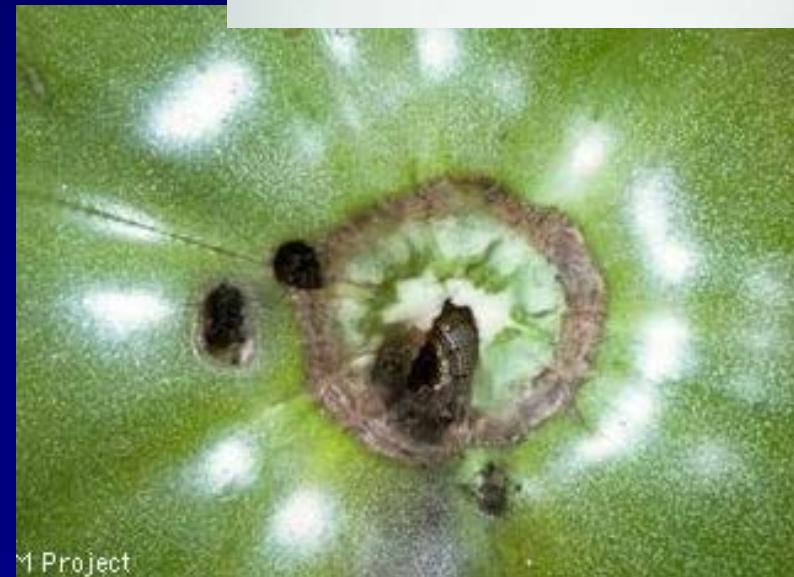


Fruitworm

Heliothis spp.

- Eggs are laid singly on leaves, usually in the upper part of the plant
- Larger larvae vary in color, but have fine white lines along the body and black spots at the base of hairs

Damage - Larvae enter green fruit at the stem end to feed, resulting in a watery internal cavity filled with cast skins and feces



Fruitworm

Heliothis spp.

Heliothis has a broad host plant range that includes beans, corn, cotton, and lettuce, in addition to tomato, pepper and eggplant

Control-

- Rotate crops; avoid planting susceptible crops one after the other
- *Trichogramma* parasites are important
- Time treatments to larval hatch; once larvae enter fruit they are difficult to kill



Parasitized egg



Armyworms

Spodoptera spp.



Infestations often originate from moths or caterpillars that migrate from alfalfa fields when the alfalfa is cut or from beans and other crops when they are harvested or dry out



Adults are nocturnal



Eggs are laid in clusters on leaves

Armyworms

Newly hatched larvae feed in groups, skeletonizing leaves and leaving webbing and frass



Control

- Treat young larvae with *Bt*; larger worms require other insecticides
- Prevent larvae migrating into field by digging a trench or by a strip treatment of an insecticide on the field perimeter

Potato Tuberworm

Adult - small moth, 1 cm long, gray with darker gray-brown or black markings; narrow appearance at rest.



UC Statewide IPM Program
© 2007 Regents, University of California

Larva - whitish to pink caterpillars - greenish when feeding on stems or leaves; 1 cm long when full grown, brown head and dark prothoracic shield



Potato Tuberworm



Damage

- Larvae prefer to enter the fruit at the calyx end, making a dry burrow through the core; damage difficult to detect externally
- Usually spin a web over their burrow entrance

Management

- Avoid planting near infested potato fields or cull piles
- Destroy volunteer solanaceous plants

Bugs



UC Statewide IPM Project
© 2000 Regents, University of California



UC Statewide IPM Project
© 2000 Regents, University of California

- Nymphs look like adults but are wingless
- Feed on the fruit or seeds of many flowering plants
- Move to solanaceous plants when their primary hosts dry or are disturbed
- Adults overwinter in sheltered area or on weeds; they become active in Spring and begin to lay eggs

Bugs

Monitoring

- Using a beating tray, shake plants to dislodge adults and nymphs



Plant Bug Damage

Control

- Destroy weed hosts to prevent overwintering
- Treatment is difficult with insecticides; a tank mix of a pyrethroid with a neonicotinoid is most effective



Stink Bug Damage