VEGETABLE SCOUTING PROJECT
DAVIS COUNTY

2011 & 2012
Erin Petrizzo, Scout

Funded by a USDA Extension IPM Grant
APHIDS

Green peach aphid & lady beetle larva on pepper leaf

Potato aphid (solanaceous plants)

Melon (cotton) aphid attacks cucurbits

Cabbage aphid

Aphids: ~ 1/8 inch long
**Aphid-Vectored Viruses**

- Watermelon mosaic virus
- Pepper mottle virus
- Alfalfa mosaic virus

More common when peppers are grown near legumes, such as beans & alfalfa.
Most aphid-vectored viruses in Utah are non-persistent

- Virus picked up on aphid’s mouthparts w/in a few seconds of feeding on an infected plant
- Transmitted by “winged” aphids to a new plant during subsequent feeding bouts
- The virus does not replicate w/in the insect’s body & is not passed to its offspring

Virus is typically spread quickly & early in the growing season

- Disease symptoms may not be evident until later
APHID & VIRUS MANAGEMENT

- Reflective mulches
  - Reduce early-season aphid populations
- Resistant/tolerant cultivars for some crops & viruses
- Good weed control
- Reduce nitrogen appl. rates
- Separate fields of susceptible crops
- Biological control
  - Numerous predators & parasitoids, but usually doesn’t reduce aphid populations quickly enough to prevent virus infection

Metallic & red mulches can reduce aphid populations
APHID INSECTICIDES

- **Commercial**
  - **Organic**
    - azadirachtin (neem), horticultural oil, insecticidal soap, Mycotrol (fungus), pyrethrins
  - **Conventional**
    - acetamiprid (Assail), bifenthrin (Brigade), beta-cyfluthrin (Baythroid), esfenvalerate (Asana), dinotefuran (Scorpion), flonicamid (Beleaf), imidacloprid (Provado), malathion, spirotetramat (Movento), thiamethoxam (Actara), zeta-cypermethrin (Mustang), and many more

- **Home Use**
  - Organic products + acetamiprid, bifenthrin, esfenvalerate, imidacloprid, malathion
Beet leafhopper (~1/8 inch) vectors Beet curly top virus in tomato & pepper

Broad host range: weeds, ornamentals, many vegetables

Russian thistle and weedy mustards are major hosts for beet leafhopper

Tomato on left is infected with Beet curly top virus: yellow & stunted plants, thickened & rolled leaves, may have purple veins, twisted leaves & stems, fruits ripen prematurely
BEET LEAFHOPPER MANAGEMENT TO PREVENT CURLY TOP VIRUS

- Non-persistent virus transmission
- CTV more severe in southern UT, but occurs in the North
  - BL overwinters in southern U.S. & Mexico, and moves north each spring
- More severe in home gardens & small farms with numerous attractive plant hosts
- BL does not like tomato & pepper, but a quick feeding bout can transmit the virus
- Tolerant tomato cultivars: ‘CVF 111’ & ‘Saladmaster’, but ‘Roma’ highly susceptible
- Cover young plants with floating row cover or wall-of-water
- Good weed control, plant alternate rows of different vegetables
- Reflective mulches & insecticides are ineffective
Two primary species of thrips vector important vegetable viruses:

- Western flower thrips
- Onion thrips

~ 1/25 inch long, fringed wings
Punch-and-suck mouthparts tear open plant cells
Insert eggs into plant tissues

Tomato spotted wilt virus (left), Onion with Iris yellow spot virus
Thrips-Virus Management

- Persistent virus transmission
  - Plant hosts for virus must also be reproductive host for thrips
  - Thrips larvae acquire the virus, the virus replicates in the insect’s gut, moves to salivary glands – transmitted by adult (wings) to new plant

- Tomato spotted wilt virus & western flower thrips have very broad plant host range
  - weeds, ornamentals, vegetables, fruits

- Virus-free transplants!!
- Weed control, reduce nitrogen rates
- Remove infected plants when detected to reduce virus spread
- Insecticides

Virus-free transplants!
Flea Beetles

Many vegetable crops: tomato, pepper, eggplant, potato, radish & relatives, cabbage & relatives, beans, herbs, etc. Also many weeds.

Numerous flea beetle species in Utah: ~ 1/8 inch long, black & brown, sometimes metallic, jump quickly when disturbed. Adults overwinter under plant debris & soil clods. Adults chew small “shotholes” & pits in leaves – seedlings are most at risk for damage; larvae feed on roots.
Flea Beetle Management

Close-up of injured bean seedling cotyledons (left), and compared to a healthier bean (right)
- Good seedbed preparation to accelerate seedling growth (raised, good drainage)
- High seeding rate
- Thick mulch and diatomaceous earth can interfere with egg-laying and larval stage
- Floating row cover to exclude adults
- Insecticides: azadirachtin, spinosad, carbaryl, bifenthrin, permethrin, pyrethrin
● Tan blotches on leaves of greens:
  ○ spinach, Swiss chard, beets, & others
● True fly, adult emerges from soil in mid spring, lays eggs on underside of leaves
● Larvae tunnel between layers of leaf forming mines
● Early spring & fall plantings may escape damage
● Frequently cultivate soil around plants to destroy pupae
● Cover young plants with floating row cover
● Pick & destroy infested leaves to reduce population
● Insecticides:
  ○ azadirachtin, spinosad, permethrin, pyrethrin
Squash Bug

- Remove squash vines & till soil to reduce overwintering adult populations
- Copper, oval eggs laid in masses on undersides of leaves
- Suck sap from leaves, stems, & fruit – congregate on lower plant
- Destroy cells where they feed, if severe, can lead to rapid wilt & collapse of plant
- Cause depressions & corky spots on fruit
- Winter squashes & pumpkin most commonly damaged
**SQUASH BUG MANAGEMENT**

- In small plantings, crushing eggs & hand-picking bugs can be effective
  - 1-2× per week during June (N UT)
- Remove debris at base of plants & no mulch
- Insecticides:
  - Diatomaceous earth at base of plants
  - Kaolin clay (Surround) once per week when nymphs are active
  - acetamiprid, bifenthrin, carbaryl, esfenvalerate, lambda-cyhalothrin, permethrin, zeta-cypermethrin
CORN EARWORM

- Overwinter as pupae in the soil (primarily central UT & south)
- Moths (1.5 inch wingspan) can fly long distances on wind currents – active near dusk
- Typically 3 generations per year in northern UT
- Lay eggs on fresh corn silks (other plants too, but not much in UT)
- Larvae crawl into ear tip to feed
  - Direct damage to kernels, feed on silks – reduce ear fill, contaminate ear (frass, mold), open ear to other pests (earwig, sap beetle)
CORN EARWORM MOTH FLIGHT PATTERN

Moth flight begins 3-4 wk earlier in southern UT & there can be a 4th flight

Monitor moth flight with a staked net trap with a CEW pheromone lure – catch only male moths
Corn Earworm Management

- Early planted corn can escape injury (before 1300 DD<sub>50</sub>, ~Jul 20-Aug 5)
- Fall tillage to destroy pupae in areas where CEW overwinters
- Biological control
  - natural predators, parasitoids
  - release of *Trichogramma* wasps
- Insecticides
  - time in relation to moth trap catch
  - bifenthrin, carbaryl, cyfluthrin, esfenvalerate, horticultural mineral oil, lambda-cyhalothrin, malathion, methomyl, permethrin, thiodicarb, zeta-cypermethrin
Fact Sheet
Insects – Vegetables

Sources for traps and lures
Insecticide timing guidelines

<table>
<thead>
<tr>
<th>Number of moths trapped per night</th>
<th>Insecticide reapplication interval (days)</th>
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<tbody>
<tr>
<td>Less than 0.2</td>
<td>None</td>
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<tr>
<td>0.2 to 0.6</td>
<td>5</td>
</tr>
<tr>
<td>0.7 to 6.5</td>
<td>3</td>
</tr>
<tr>
<td>More than 6.5</td>
<td>2</td>
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The following reapplication intervals are based on guidelines from Maine and seem to work in Utah. Reapply insecticides using the suggested intervals while silks are still actively growing. Stop sprays when silks turn brown.
utahpests.usu.edu

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