Vegetable Insect Management: Corn Earworm & Insect Vectors of Diseases

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Urban & Small Farms Conference

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Vegetable Scouting Project
Davis County

2011 - 2013
Erin Petrizzo, Scout

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Corn Earworm Trapping
Northern Utah Vegetable Scouting Project, 2011-2013
Corn Earworm

- Key pest of sweet corn in Utah
- CEW will also attack field corn, pepper & tomato fruits
- Tan-brown moth (1.5 inch wingspan), active at dusk
  - Carried on wind currents up to 300 miles
- Effective pheromone trap to monitor moth populations
  - Thresholds for timing sprays
Corn Earworm

- Eggs laid on fresh, green silks
  - Up to 1,000 eggs per female
  - Silks grow ~1/2 inch per day
- Eggs hatch in 2 to 10 days (temp. dependent)
- 1st instar larva crawls into ear tip
  - Chews developing kernels, silks & sometimes leaves
  - Tom/Pep fruits: tunnels into fruit, chews leaves
- Mature larva (1.5 inch long caterpillar) feeds in ear 10-14 days
- Pupate in the soil
Corn Earworm Trap

Hartstack Trap

Hercon Pheromone Lure
Typical Corn Earworm Moth Flight Without Insecticides – Northern Utah

Typically 3 generations or flights per season
CEW Moth Trap Data for 2 Davis Co. Farms - 2013

Sweet Corn Fields

Thresholds*:
>6.5: spray every 2 days
0.7-6.5: spray every 3 days
0.2-0.6: spray every 5 days
<0.2: no sprays

*Reapply insecticides to keep an active residue on new silks
CEW Management: Insecticides

- Protect silks when present
- Reapply based on trap threshold & insecticide residual
- Follow insecticide label
- Rotate among classes
- Follow pre-harvest interval

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<tr>
<th>Insecticide class</th>
<th>Common name</th>
<th>Brand name</th>
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<tr>
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<td>bifenthrin</td>
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CEW Management: Cultural & Biological

- Plant early for silking before major moth flight
- Varietal tolerance or resistance
- Fall tillage to destroy overwintering pupae
- Biological control
  - Trichogramma wasp releases
    - Limited success in Utah
  - Natural enemies
    - Predatory & parasitic insects
Sources of Traps & Pheromone Lures

Hartstack Trap & Hercon CEW Lure

• Great Lakes IPM, Inc., Vestaburg, MI
  – www.greatlakesipm.com
• Scentry Biologicals, Inc., Billings, MT
  – www.scentry.com
• Trece, Inc., Adair, OK
  – www.trece.com
Corn Earworm

*Helicoverpa zea* (Boddie)

Diane G. Akton, Entomologist; Sharon Olsen, Davis County Extension Professor
James B arrill, Weber and Morgan Counties Extension Professor

**Do You Know?**

- Corn earworm (*CEW*) is the most destructive insect pest of sweet corn in Utah.
- CEW also attack field corn, and pepper and tomato fruits.
- The adult is a tan-brown moth that is most active at dusk; moths can be carried by wind currents, and may travel up to 300 miles in one night.
- Monitoring moth populations with pheromone traps informs growers when densities are high enough to warrant spraying.
- CEW overwinters as a pupa in the soil in central and southern Utah and immigrates into northern Utah each spring.

**Life History**

- In Utah, there are typically three generations of corn earworm (*CEW*) each year. The first generation of adults either come from overwintering pupae (southern and central Utah) or migrate into northern Utah. The adult moth is tan-brown with a 1/2 inch wingspan. The front wings are marked with a distinct dark spot in the center and darker bands near the outer margins. The hind wings are lighter tan, with a dark band along the outer margins. The male moths have green eyes. Mating occurs primarily on warm, overcast evenings. Moth populations can be monitored using pheromone or black light traps.
- CEW moths prefer to lay eggs singly on fresh, green corn stalks. Each female moth can lay up to 1,000 eggs. Moths will lay eggs on weeds and selected vegetables when corn silk is unavailable. This provides a population that is ready to attack corn as soon as silk is present. Eggs are very small, oval, and oval shaped. The larvae feed on the inner silk. They are creamy white and dome shaped with white, darker in color as they near hatching. The eggs can be seen with the aid of magnification. Egg monitoring is difficult due to their small size and location. Eggs hatch in 2 to 10 days, depending upon the temperature.
- On corn, the newly hatched larva crawls down the corn silk and into the ear. It prefers to feed on the developing kernels in the ear, but may also chew on silk and leaves. On tomato and pepper, it tunnels into the fruits and chews on leaves. CEW strongly prefers corn to other
Insect Vectors of Diseases

Northern Utah Vegetable Scouting Project, 2011-2013
Aphids

Melon (cotton) aphid attacks cucurbitis

Aphids: ~ 1/8 inch long

Green peach aphid & lady beetle larva on pepper leaf

Potato aphid (solanaceous plants)

Cabbage aphid
Aphid-Vectored Viruses

Watermelon mosaic virus

Pepper mottle virus

Alfalfa mosaic virus

More common when peppers are grown near legumes, such as beans & alfalfa
Aphid-Virus Relationship

• 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 – Curly Top Virus

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 common 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 to “hide” target plants
- Reflective mulches & insecticides are ineffective
Thrips & Tospoviruses

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
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
Vegetable IPM Advisory – Free Newsletter

Winter Utah Pests Newsletter 2014

This month’s issue includes articles about Biochar, Onion Pest Management, Brown Rot, & more

In the News
Adapting to Climate Change
Jan 21, 2014

Welcome to Aiblast 101
Jan 05, 2014

Integrated Pest Management for Billbugs in Orchardgrass
Dec 06, 2013

Integrated Pest Management (IPM):
“A comprehensive approach to pest control that uses a combined means to reduce the status of pests to tolerable levels while maintaining a quality environment.”

Small Fruits & Vegetables
IPM Advisory

Insect/Disease Information

VEGETABLES

Why Tomatoes Crack

Cracks or splits can happen in tomatoes either in a circu- lar pattern (parameter) or they may radiate out from the center. Tomatoes crack when the soil moisture is not evenly distributed enough to accommodate growth or internal pressure.

Cracking may happen when the tomato is green, but most often happens as the fruit matures.

The most common case of cracking is nutrient imbalances caused by water fixtures or soil moisture from very dry to very wet. An influx of water after a dry spell causes the fruit to quickly expand and ultimately crack. Mulching the soil under the plants can help to regulate soil moisture.

Cracking may also happen when tomatoes are grown too early exposing fruit to the heat of the sun. The fruit suddenly heats up during the day and cools relatively quickly at night. The temperature differential is higher that it would have been had the fruit been shaded. The cracking expansion and con- traction of the epidermis and its cells can result in cracking.

And finally, excess nitrogen for those fruit that leads to rapid, accen- tuated growth can also lead to cracking.

Most times, cracking is hard to prevent and put a genetic for- ce for the variety. Varieties whose fruits grow very fast in high temperatures and moisture are prone to splitting.

To manage cracking, the first step is to start with varieties that are less susceptible to splitting. According to Kansas State University, Spring Mountain Fruits- Mountain Fresh, Florigrip and San Luise are small-fruited types that have shown great resistance to cracking. Resistance varieties and maintaining soil moisture and fertility will help to prevent cracking.

Stink Bugs on Tomatoes

Stink bugs are the stinkbug family insects that can be gray or brown in color. When disturbed, they can emit a foul odor. Stink bugs feed on tomatoes by puncturing the skin with their sharp, stinger-like mouthparts, and sucking out the juice. The visible damage
 Acknowledge

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