

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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USDA Extension
IPM Grant



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



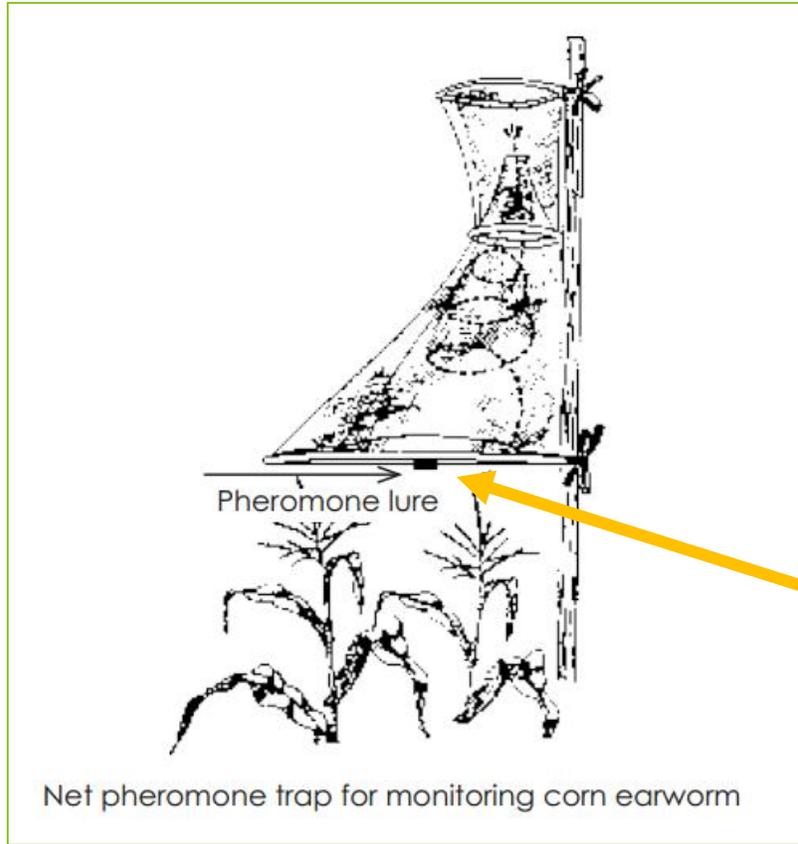
Corn Earworm

- 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

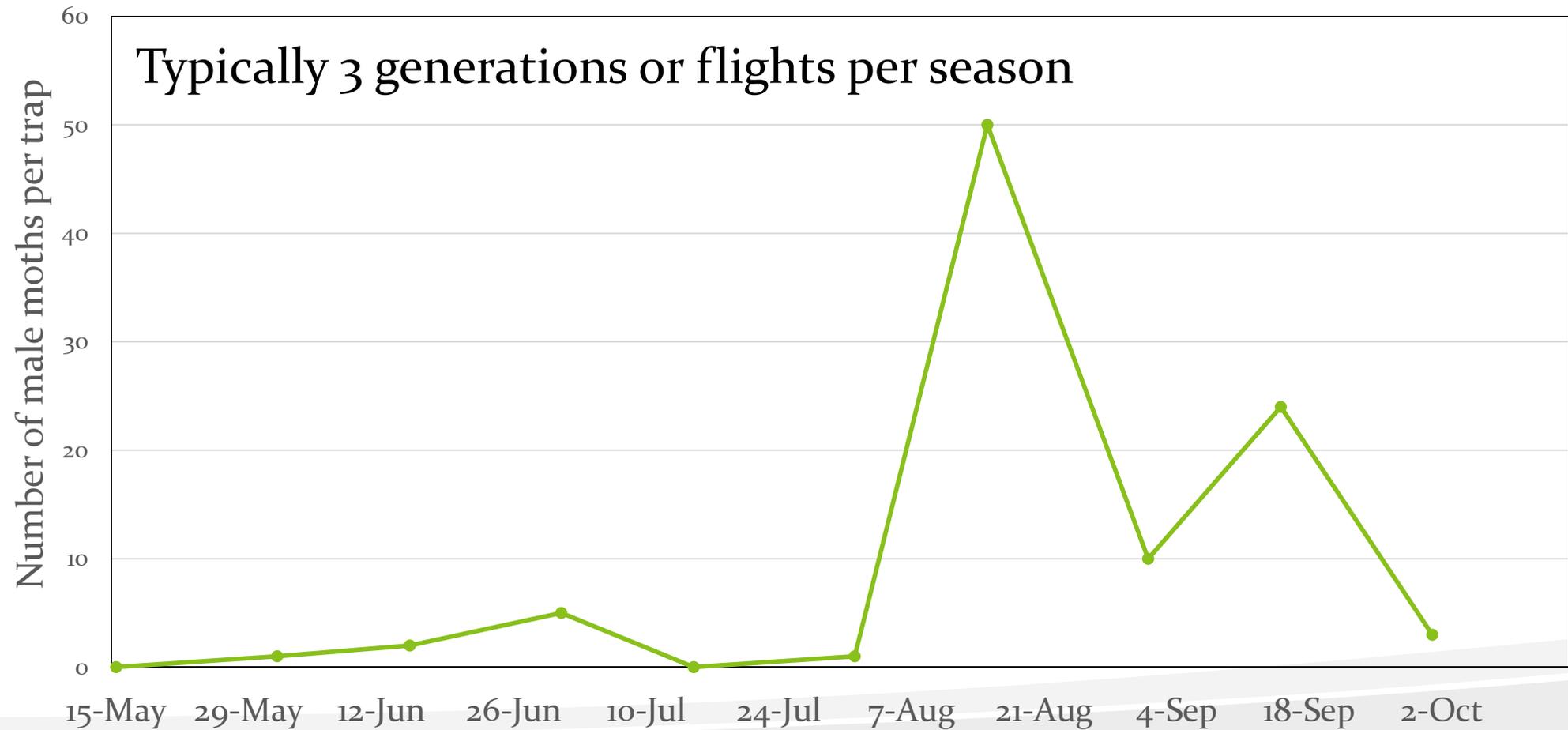


Hercon
Pheromone
Lure

Hartstack Trap

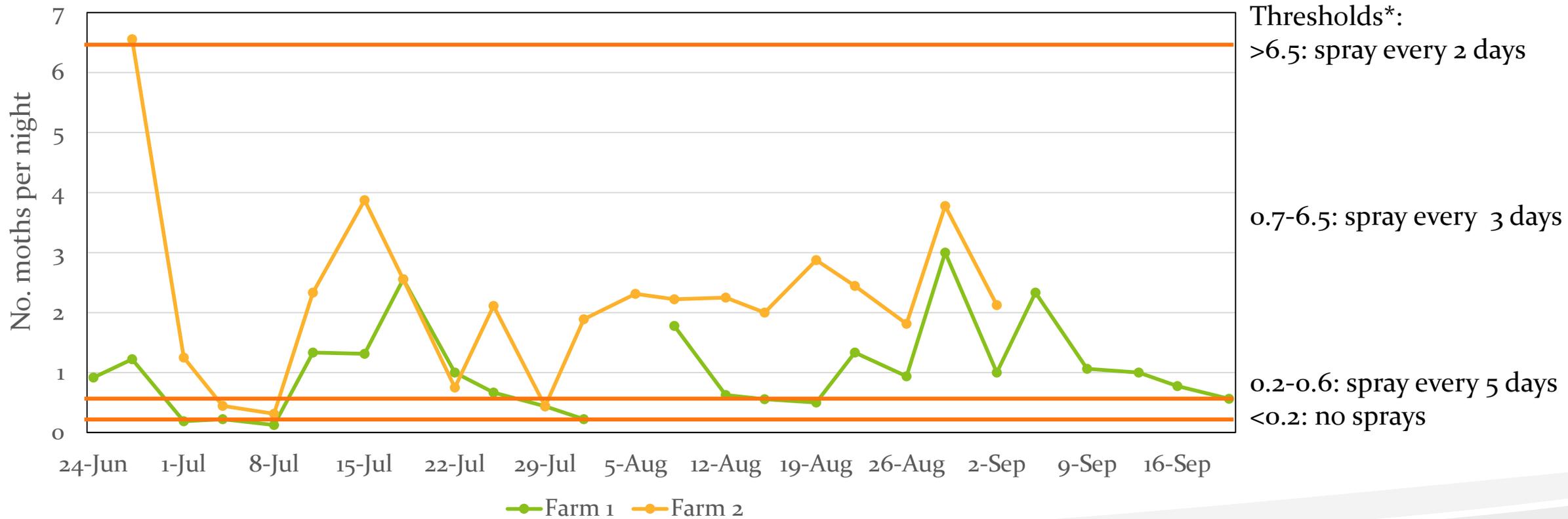


Typical Corn Earworm Moth Flight Without Insecticides – Northern Utah

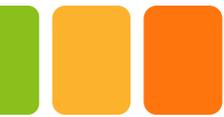


CEW Moth Trap Data for 2 Davis Co. Farms - 2013

Sweet Corn Fields



*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

Insecticide class	Common name	Brand name
Pyrethroid	bifenthrin cyfluthrin esfenvalerate lambda-cyhalothrin permethrin zeta-cypermethrin	Brigade Baythroid Asana Warrior Ambush Mustang
Carbamate	carbaryl methomyl thiodicarb	Sevin Lannate Larvin
Organo-phosphate	malathion	Malathion
Spinosyn	spinosad	Success, Entrust(Org)

CEW Management: Cultural & Biological

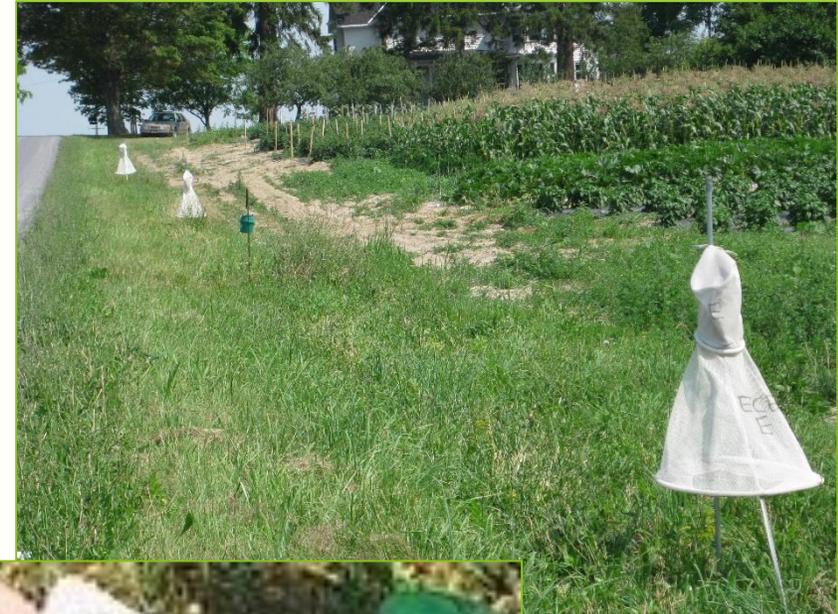
- Plant early for silking before major moth flight
- Varietal tolerance or resistance
- Fall tillage to destroy overwintering pupae
- Biological control
 - Trichogramma wasp releases
 - Limited success in Utah
 - Natural enemies
 - Predatory & parasitic insects



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



Online Fact Sheet –

www.utahpests.usu.edu

Corn Earworm [*Helicoverpa zea* (Boddie)]

Diane G. Alston, Entomologist • Shawn Olsen, Davis County Extension Professor
James Barnhill, Weber and Morgan Counties Extension Professor

Do You Know?

- Corn earworm (CEW) is the most destructive insect pest of sweet corn in Utah
- CEW will 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 on 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



Larvae feed on corn kernels within the ear. Larvae vary in color from green to brown to black (University of Minnesota).

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 tannish brown with a 1 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. Moth flight occurs primarily on warm, overcast evenings. Moth populations can be monitored using pheromone or black light traps.



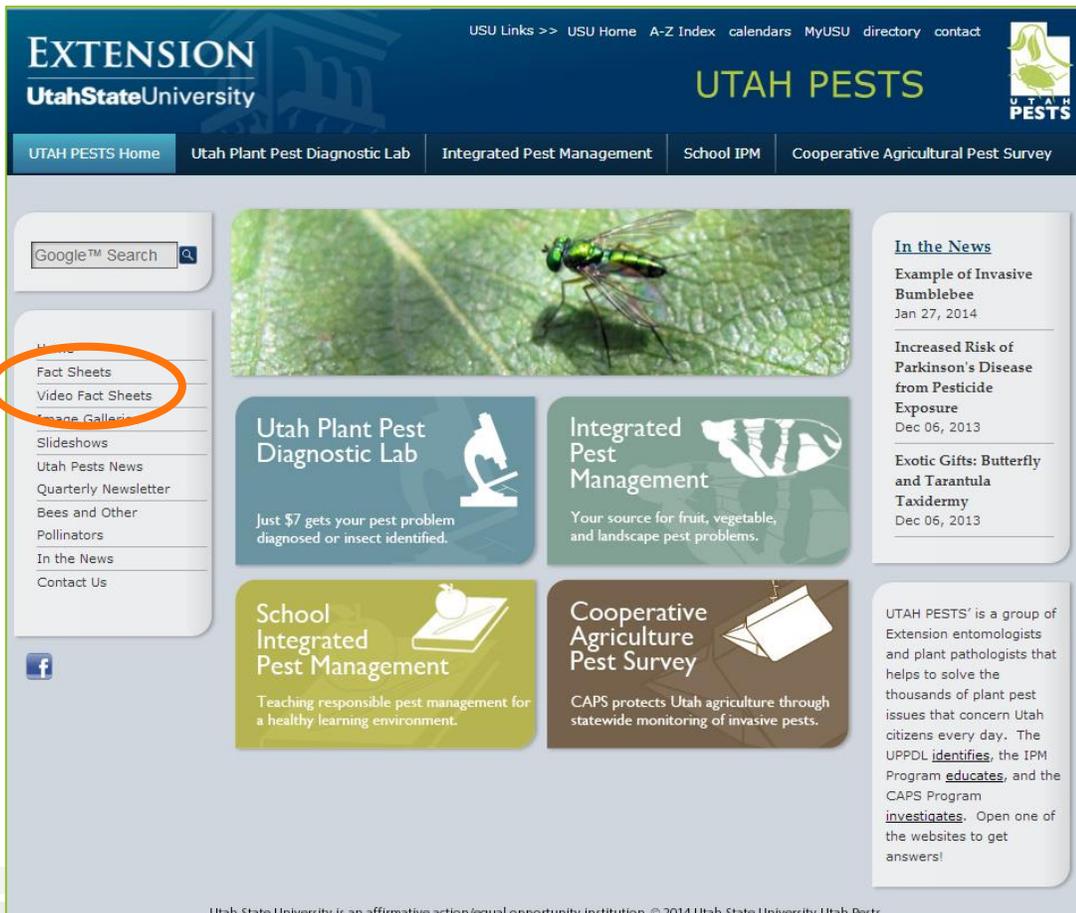
Moths have tan wings with a distinct spot and dark margin on each forewing (Bruce Martin, citrusimage.com).

CEW moths prefer to lay eggs singly on fresh, green corn silks. 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 silks are present. Eggs are very small, one-half the size of a pinhead. They are creamy white and dome shaped with ridges; darkening 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.



Corn earworm moths lay their eggs on fresh corn silk. Note the tiny white eggs stuck on the silks (Cornell University).

On corn, the newly hatched larva crawls down the corn silk and into the ear tip. It prefers to feed on the developing kernels in the ear, but will also chew on silks and leaves. On tomato and pepper, it tunnels into the fruits and chews on leaves. CEW strongly prefers corn to other



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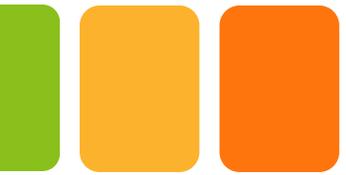
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Insect Vectors of Diseases

Northern Utah Vegetable Scouting Project, 2011-2013



Aphids



Green peach aphid & lady beetle larva on pepper leaf



Melon (cotton) aphid attacks cucurbits

Aphids: ~ 1/8 inch long



Potato aphid (solanaceous plants)



Cabbage aphid



Aphid-Vectored Viruses



Watermelon mosaic virus



Pepper mottle virus

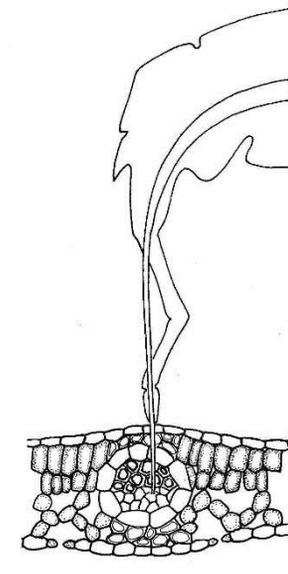


Alfalfa mosaic virus

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

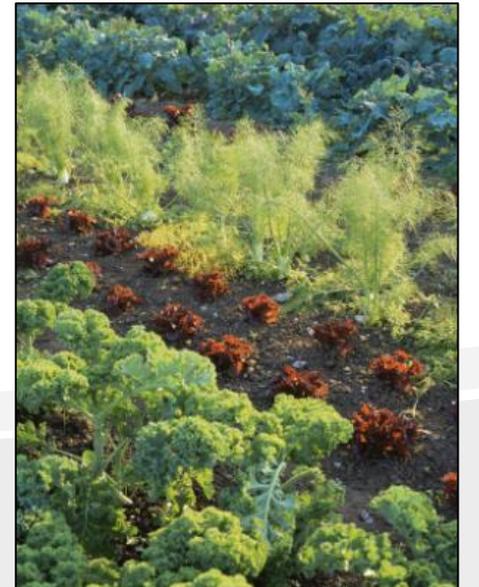


Russian thistle and weedy mustards are
major hosts for beet leafhopper

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



TSWV (left) & IYSV in onion

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



Virus-free transplants!

Vegetable IPM Advisory – Free Newsletter

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Winter Utah Pests Newsletter 2014

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"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

Pest and Production Update, Utah State University Extension, August 9, 2013

Insect/Disease Information

VEGETABLES

Why Tomatoes Crack

some tomato varieties are genetically susceptible to cracking in concentric rings

radial cracks may be managed by even watering, proper pruning and nutrition, and a timely harvest

Cracking may also happen when tomatoes are pruned 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 bigger than it would have been had the fruit been shaded. The resulting expansion and contraction of the epidermis and its cells can result in cracking.

And finally, excess nitrogen fertilizer that leads to rapid, succulent growth, can also lead to cracking.

Most times, cracking is hard to prevent and just a genetic factor of 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, Mountain Spring, Mountain Pride, Mountain Fresh, Floralina and Sun Leaper are smaller-vined types that have shown good resistance to cracking. Resistant varieties and maintaining soil moisture and fertilization will help to prevent cracking.

Stink Bugs on Tomatoes

late-season stink bug feeding causes "cloudy spot" on the fruit, that extends into the flesh

Cracks or splits can happen in tomatoes either in a circular pattern (concentric) or they may radiate out from the stem. Tomatoes crack when the skin of the tomato does not stretch enough to accommodate growth or internal pressure.

Cracking may happen when the tomatoes are green, but most often happen as the fruit nears maturity.

The most common cause of cracking is irrigation practices that lead to wide fluctuations of 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.

Stink bugs are the shield-shaped insects that can be green or brown in color. When disturbed, they can emit a foul odor. Stink bugs feed on tomatoes by piercing the skin with their straw-like mouthparts, and sucking out the juices. The visible damage

Acknowledge

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 - USDA Extension IPM Grants Program



Slideshow Available

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