Managing Some Hard to Control Vegetable Pests of the mid-Atlantic Region

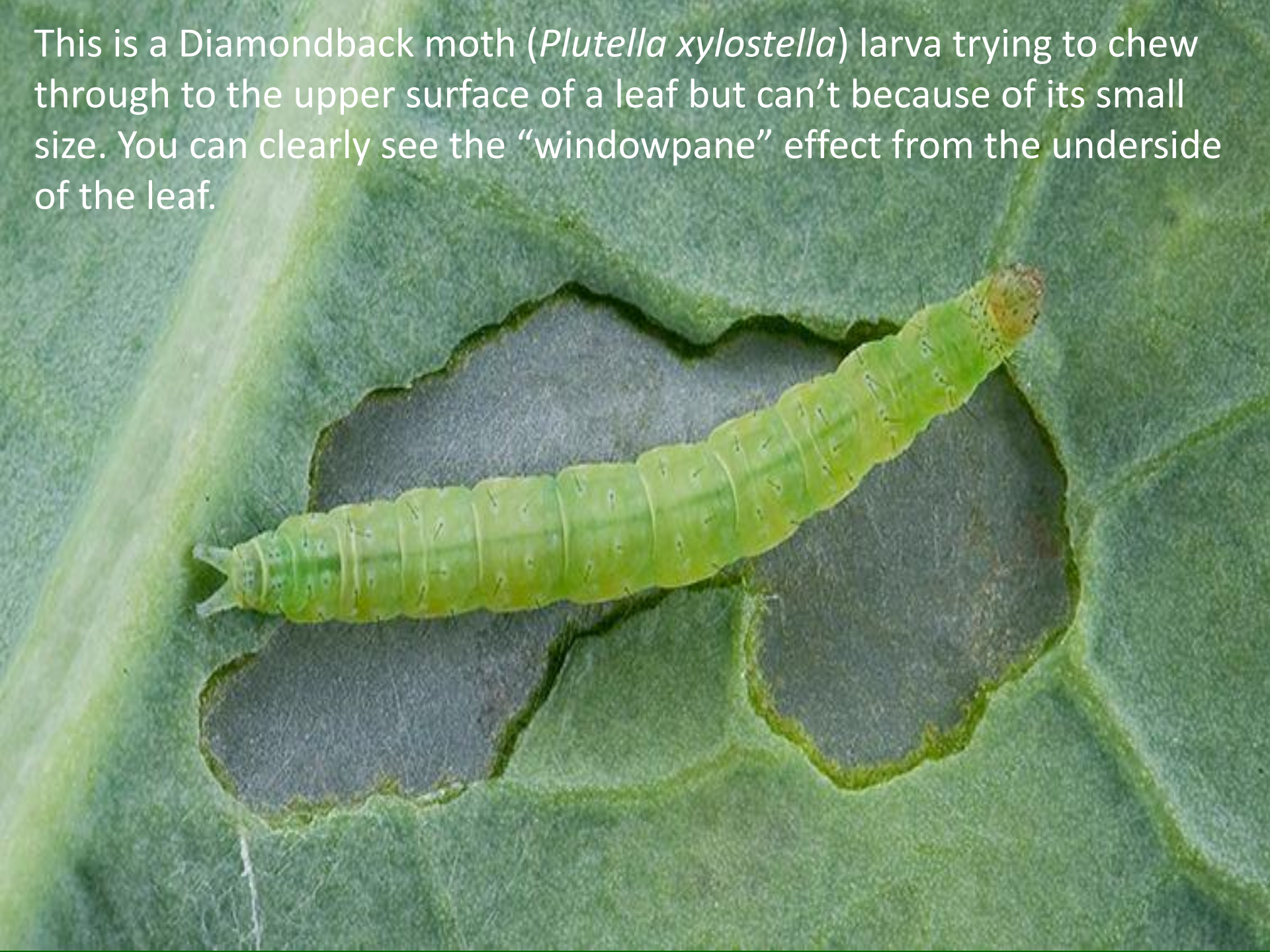
Over the last 4-5 years I have received calls and emails from growers about insect pests that they cannot seem to control as well as they had in the past. This presentation is going to look at some of the top vegetable pests that growers in the mid-Atlantic have had problems with and some ways to mitigate those problems.

Spodoptera ornithogalli – Yellow striped armyworm

Spodoptera exigua beet armyworm

½ inch; once larvae get bigger (longer) than ½ an inch they will be very difficult to control. These two species as well as other ‘worm’ pests must be controlled at less than a half inch in length.


This damage is called “windowpane”. It indicates that there are small caterpillars on the underside of the leaf that are trying to chew through, but cannot because they are so small, and the epidermal layer is too difficult to chew through.


This is a Diamondback moth (*Plutella xylostella*) larva trying to chew through to the upper surface of a leaf but can't because of its small size. You can clearly see the "windowpane" effect from the underside of the leaf.


The holes in this broccoli leaf now indicate that larvae are larger and can chew all the way through the leaf. Larvae must be controlled now, or their size will increase to the point where they can’t be controlled very well.

Management

Btk- Dipel, Bta-XenTari*

Radiant (Entrust*)

Intrepid or Confirm

Coragen

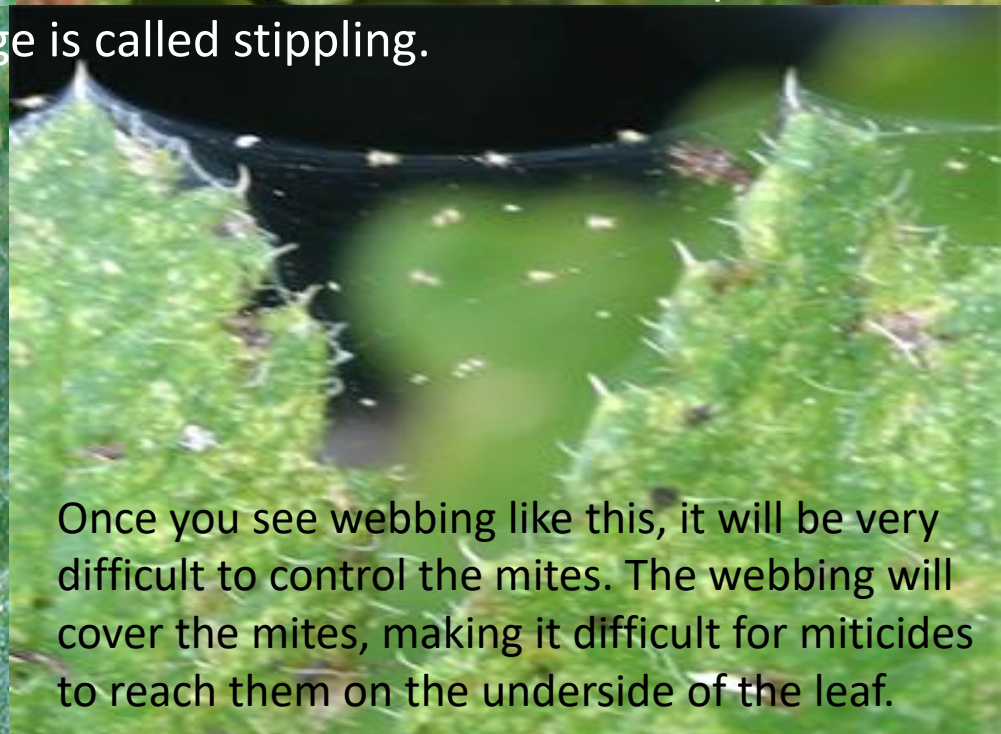
Pyrethroids- Asana, Bifenthrin, Warrior II
(Mustang Maxx, Tombstone, Baythroid)

* OMRI approved organic controls

Two spotted spider mite

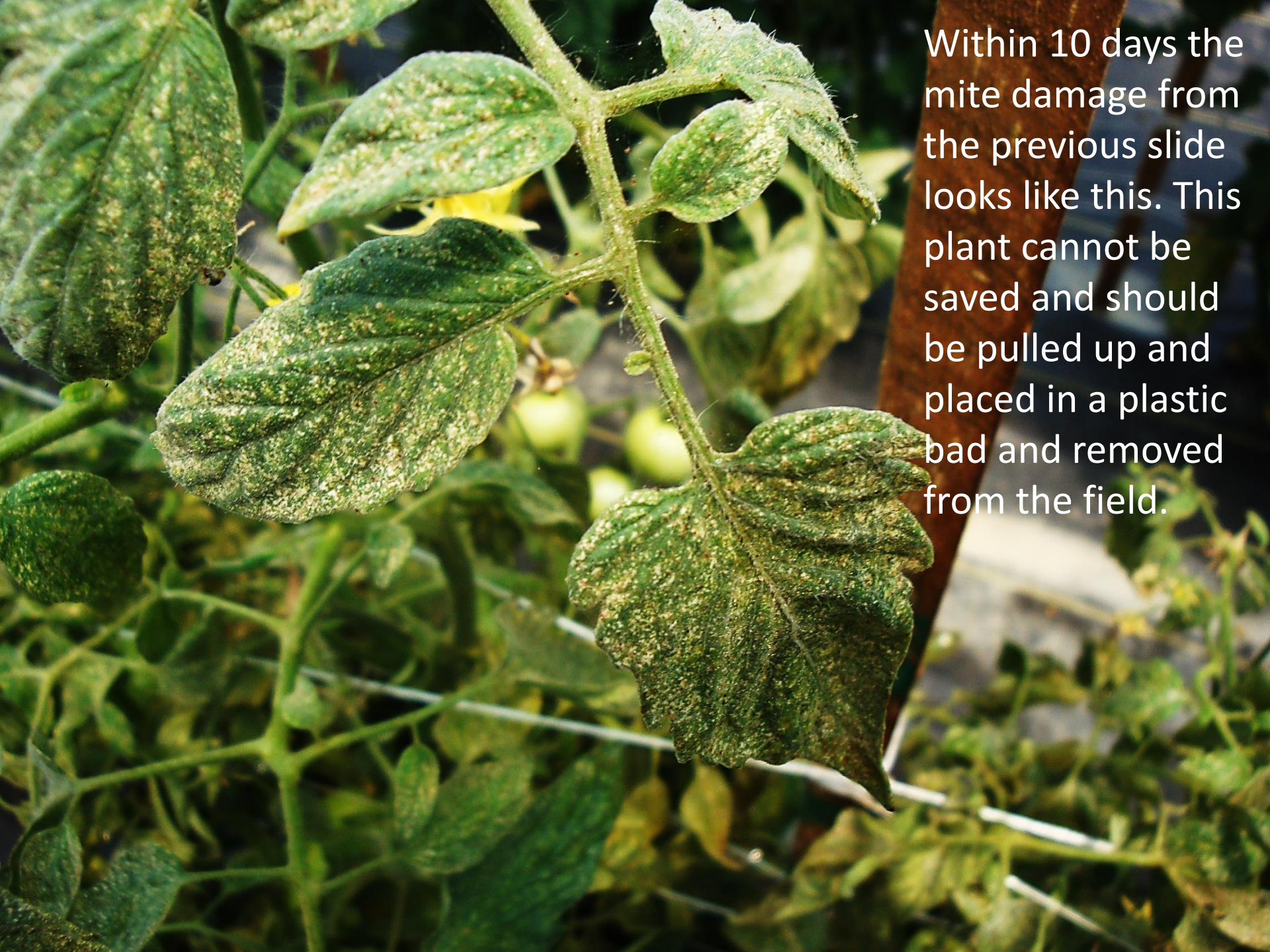
Tetranychus urticae

These mites remove chlorophyll from the leaf with their mouthparts. This damage is called stippling.



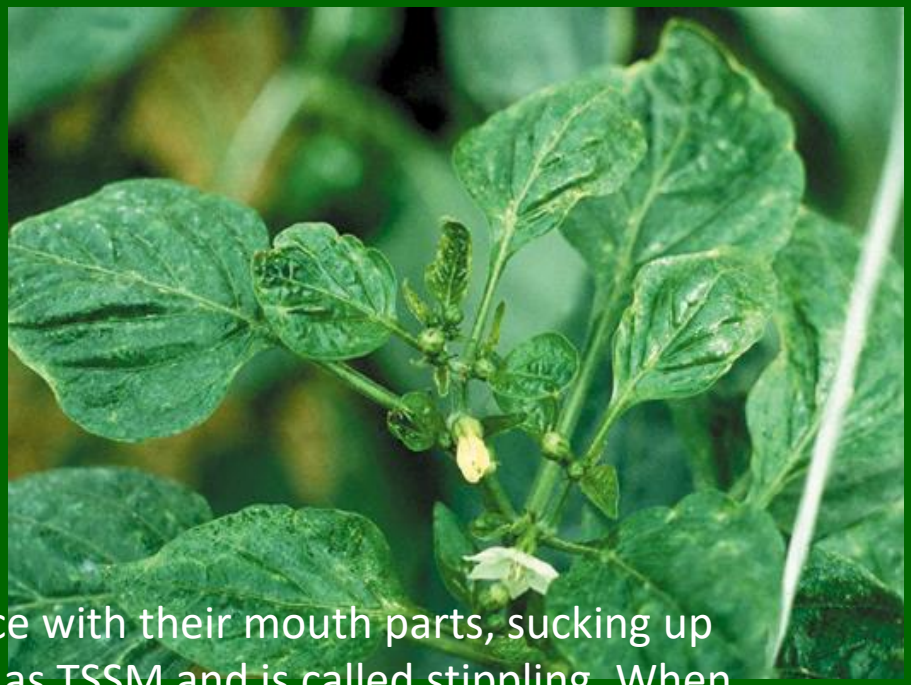
Once you see webbing like this, it will be very difficult to control the mites. The webbing will cover the mites, making it difficult for miticides to reach them on the underside of the leaf.


The small white flecks on these tomato leaves indicate that there are 1,000s of mites on the underside of each leaf
This is heavy mite damage to tomato leaves. Controls should have gone out before this point

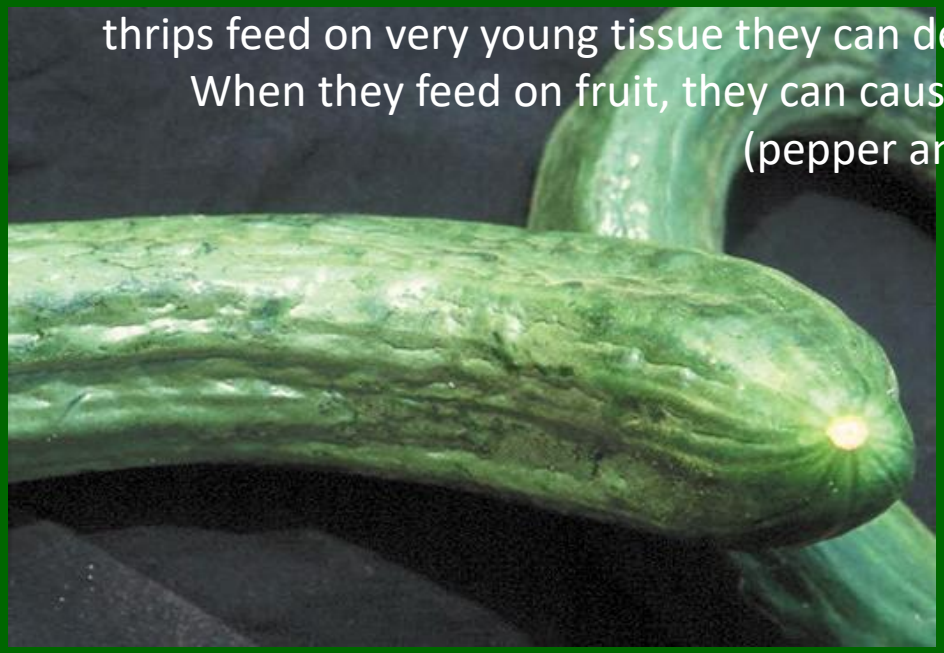

Within 10 days the mite damage from the previous slide looks like this. This plant cannot be saved and should be pulled up and placed in a plastic bad and removed from the field.

Thrips

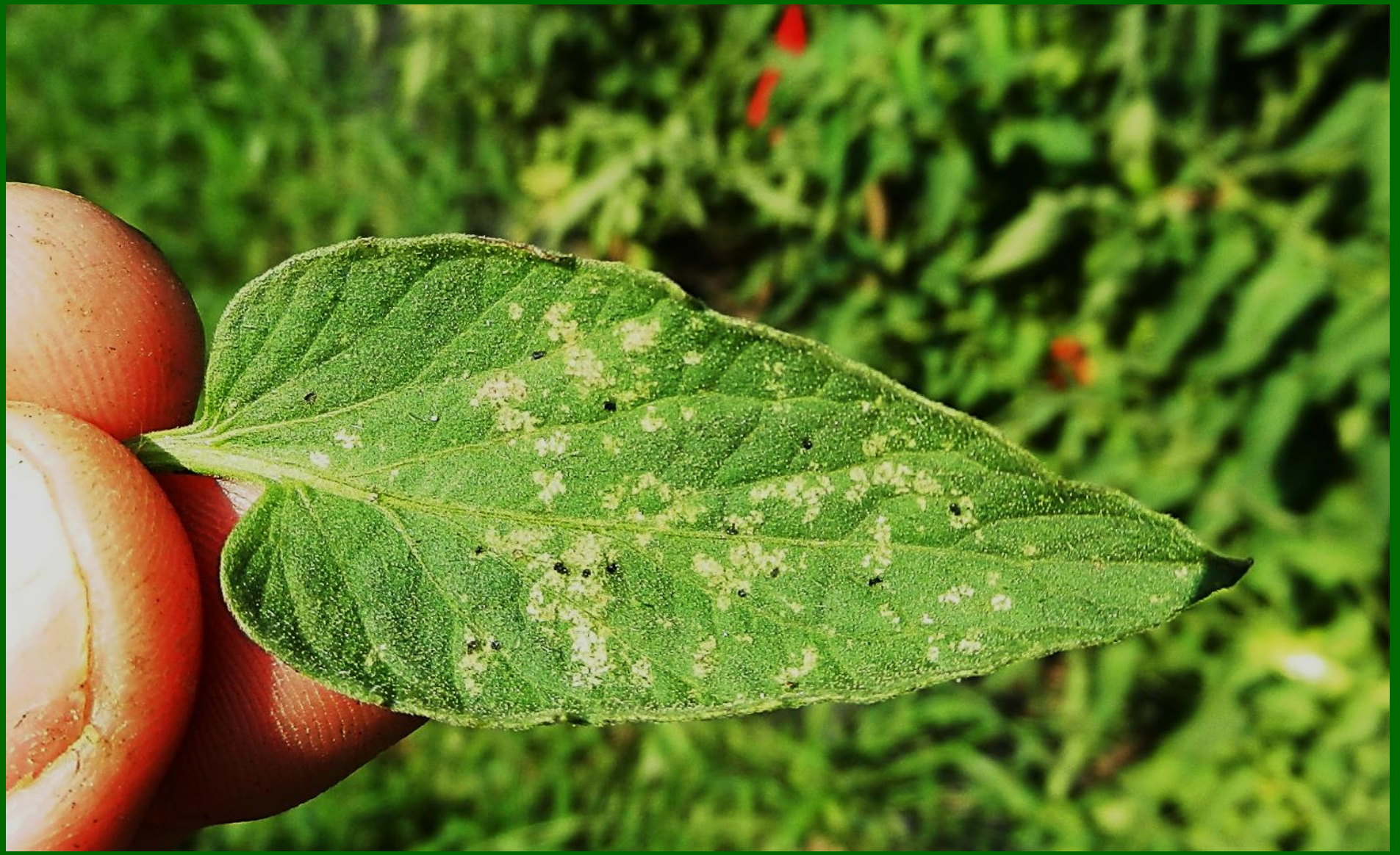
Because thrips feeding damage looks much like
two spotted spider mite feeding damage I am including them here



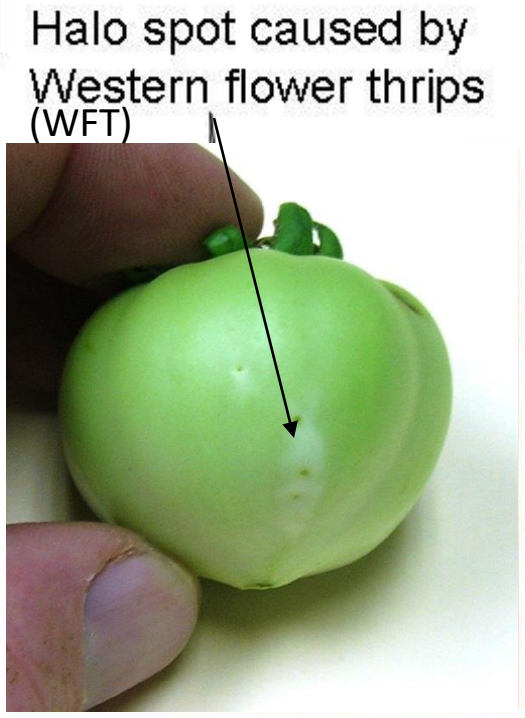
Thrips feed by scraping the leaf surface with their mouth parts, sucking up the juices. The damage looks the same as TSSM and is called stippling. When thrips feed on very young tissue they can deform its growth causing malformed leaves. When they feed on fruit, they can cause scraping damage (cucumber) or spots (pepper and tomato)



In order to tell two spotted spider mite stippling damage from thrips feeding damage look at the damaged leaf and see if you can see any black flecks as seen in this picture. The black flecks are thrips feces, mites have clear feces that can not be seen.



Dimples and halo spot in tomato fruit caused by thrips ovipositioning



Oviposition marks show where a female thrips used her ovipositor to lay eggs. She normally does this in leaf tissue where she lays eggs into the leaf epidermal layer. When she does this on fruit it causes a dimple to form. Western flower thrips cause a white thickened layer of fruit to form around their dimple.

Thrips can also transmit the virus that causes the disease Tomato spotted wilt

This is a high tunnel in February, it has chickweed inside and outside (snow and my foot) of the tunnel. The grower will clean this up just a week or two before they are ready to plant seeds for transplant production. Chickweed can harbor both thrips and mites on it over the winter. The clean-up of this HT needed to be done in November or early December to get rid of any overwintering hosts of thrips or mites as well as the pests themselves.

This transplant production house has weeds located under the benches. These weeds can harbor several pests including thrips and mites. The weeds need to be controlled throughout the production of the transplants. Otherwise the pests on the weeds can easily move from the weeds onto the transplants.

It is common now for bedding plants and herbs to be grown along with vegetable transplants that the grower sells to retail stores or at their farm.

Flowers/plants that strongly attract TSSMs- herbs, marigolds, ivy geraniums

Flowers that strongly attract WFT- ivy geraniums, new guinea impatiens, mums

When I examined growers' transplants before they went to the field, I found that 20% of them had mites or mite eggs or thrips or thrips eggs on their leaves. Most of the infestations were from mite and thrips eggs-hard to scout for.

Many mite eggs on this leaf. Usually there were only 3-5 eggs found on a leaf.

Thrips eggs are oviposited under the leaf's epidermal layer

For early season mites or thrips that could be on transplants use a prophylactic spray treatment of Hort oil (summer oil) twice before going to the field. Apply the 1st spray ~ 1 week before going to the field and the 2nd spray ~ 5-7 days after the first.

TSSM Management

Agri-Mek

Portal

Oberon

Acramite

Horticultural oils*

Predatory mites* - for HT only

* OMRI approved

Horticultural oils

- Some are made from a mixture of petroleum hydrocarbons produced from paraffinic crude oil.
- They are 95-99 percent pure. After distillation and filtration, they are formulated with an emulsifier to make it easier for the oils to blend with water.
- Plant based oils are also available that may contain soybean, cottonseed, sesame, neem or other oils. Some may also contain essential oils from herbs and spices such as thyme, mint or cinnamon. These oils are less refined and may cause more plant damage than the more highly refined petroleum and plant-based oils.
- Cottonseed oil is generally considered the most insecticidal of the vegetable oils.

Thrips Management

Pyrethroids

Neonicotinoids

Radiant (Entrust*)

Harvanta

Torac

Hort oils*

* OMRI approved

Stink bugs

There are several species of stink bugs that can cause damage to vegetables, but their damage is very similar. Stink bugs use their needle-like mouthparts to inject fluids into their feeding site in a plant. These fluids liquify cells and cell contents and the stink bug then sucks these fluids up. When feeding on fruit they usually leave a blotch or brown area where they have fed. This causes the fruit to be nonmarketable, but often times yeasts and other organisms are injected into the plant causing even more damage and rot. In green tomatoes the damage appears as a white blotch that turns yellow as the fruit ripens and is called ‘cloudy spot’

Brown stink bug
adult and below nymph

Euschistus servus

Green stink bug
adult and below nymph

©Marlin E. Rice

Chinavia halaris

Brown Marmorated SB
Adult and below nymph

Halyomorpha halys

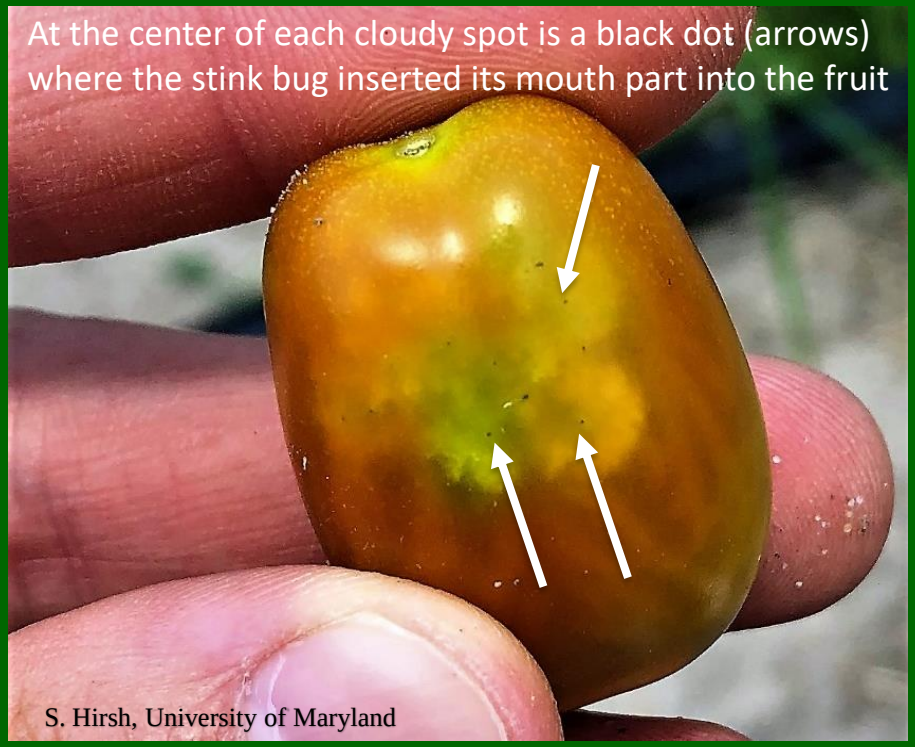
Stink bug damage to tomato fruit is called cloudy spot

Peel away the epidermal layer and below this you'll find a white spongy mass

Cloudy spot in cherry tomatoes

S. Hirsh, University of Maryland

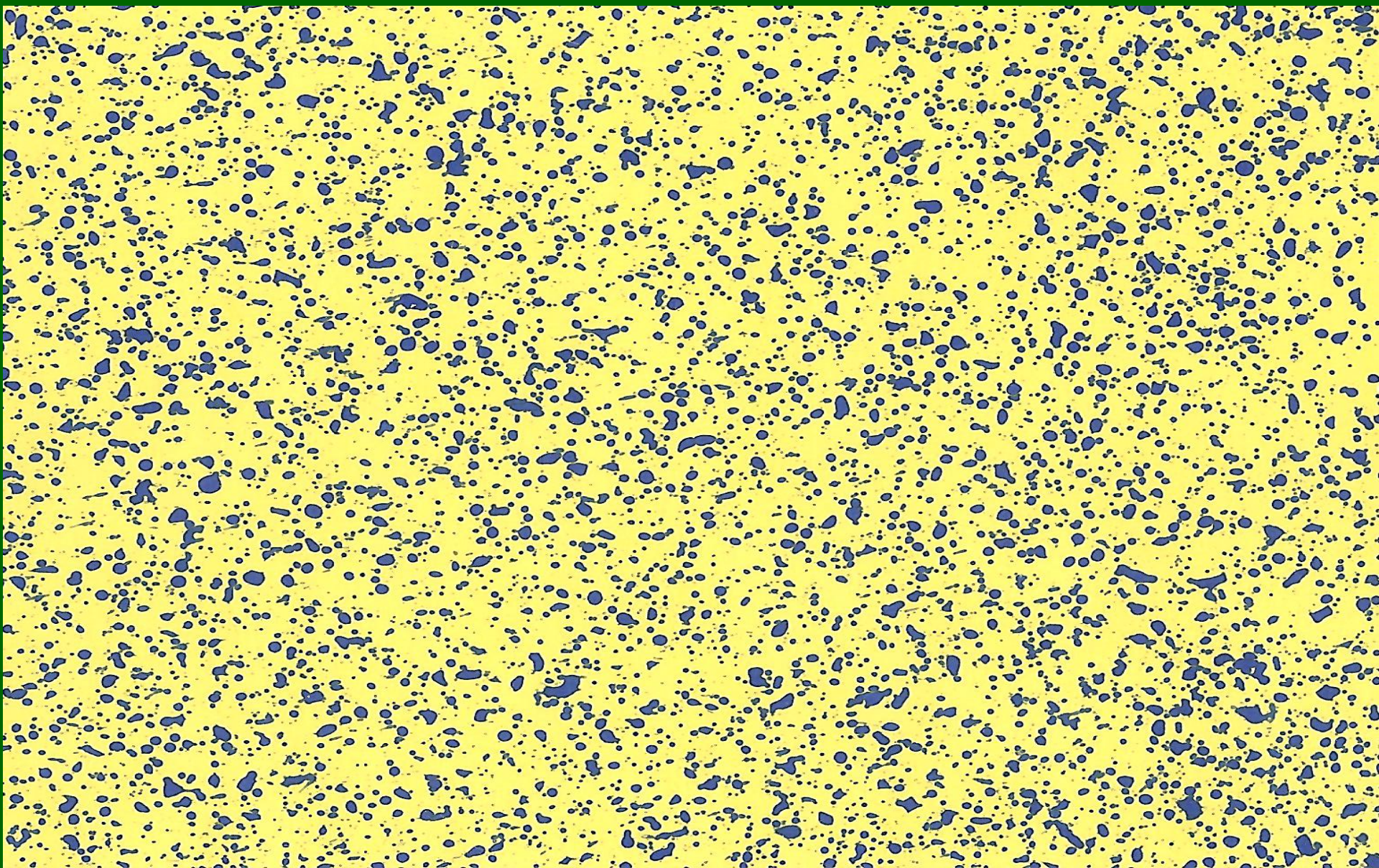
At the center of each cloudy spot is a black dot (arrows) where the stink bug inserted its mouth part into the fruit



S. Hirsh, University of Maryland

Stink bug adults and nymphs are notoriously difficult to scout for. No good scouting method has been developed for staked tomatoes. Adults come and go from a field over time. Both adults and nymphs hide in the center of a plant during the day. In addition they will quickly drop from the plant and hide at its base if the plant is disturbed. All these behaviors make it difficult to direct sprays to the pest.

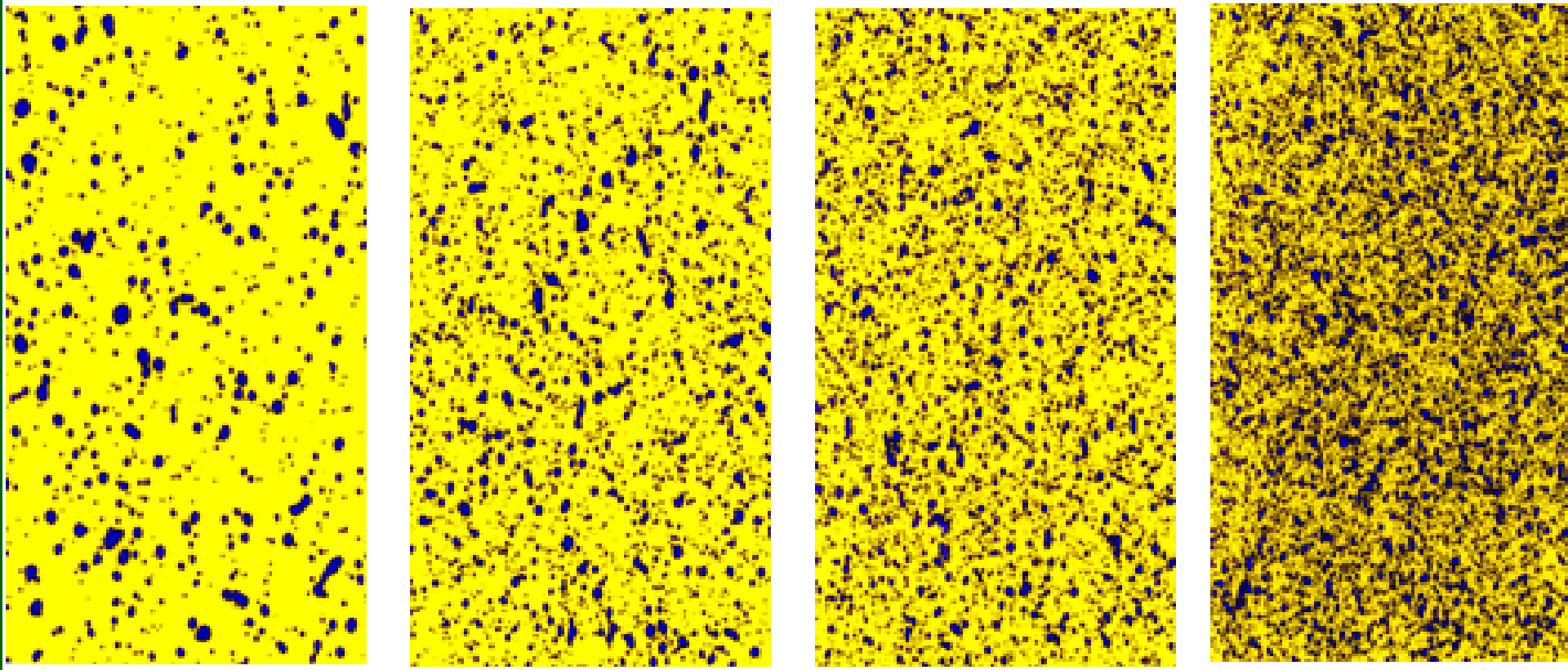
This water sensitive card demonstrates how much insecticide spray is reaching the plant and pest. Cards are placed in the plant before a spray treatment is conducted using just water. This card shows only 20% spray coverage



Four spray cards were placed in the tomato canopy to the right. One card was placed on the outer edge of the canopy, another was placed 1/3 of the way into the canopy, a third was placed 2/3 of the way into the canopy and the 4th in the center of the canopy. A spray application was then made using the grower's standard spray rig.

These are the results of the trial that was repeated 10X in the field. The interior of the plant received only 10-20% of the possible spray. This is where stink bugs are hiding, and this amount of coverage is NOT going to control stink bugs. Coverage must be better.

Inner area of plant ← Outside of plant



Management

- Pyrethroids, Neonicotinoids, Lannate or combo products (Brigadier, Endigo, Leverage) can be used to reduce damage

- Sprays should be directed towards the center of the plant using:
  1. hollow cone drop nozzles
  2. high pressure (~200 psi)
  3. high spray volume (50-100 gal/A) and
  4. reducing sprayer speed (2 to 2.5 mpg)

An unusual pest in our high tunnel (HT) winter vegetables

This is a high tunnel in January that is growing leafy greens such as spinach.
There are several areas where the plants have been removed because of heavy damage from a new pest.


The damage looks like someone has removed the chlorophyll from the leaf material and this is exactly what has happened. The small reddish dots are the problem.

Red legged winter mites

Penthaleus dorsalis

These mites prefer cool almost cold conditions and become inactive when it gets hot in the summer. So they are a problem only in winter grown leafy greens in the high tunnel. The round dots on the mites are water droplets formed because the mites are hydrophobic, water (or anything in the water carrier) just beads up on them and does not penetrate their body.


Early damage by the mites
Damage 1 week later

Populations can build before growers realize what is happening. At this point control is almost impossible.

Cultural Management

- Use high levels of heat such as clear plastic mulch that is used to heat the soil and kill mites in the summer--even their eggs.
- Steam heat used to control nematodes and soil pathogens can be used to greatly reduce mite numbers before next fall planting.
- Many cultivations during the summer can significantly decrease the number of over-summering eggs.
- Growing a grain crop in the spring and letting it dry down and then burning the stubble also can greatly reduce mite egg survival.

Chemical Management

- Red legged winter mites are difficult to control even when using synthetic chemicals.
- Foliar sprays of Pyrethroids (check label for the particular crops that are labeled as this will vary greatly) or Pyrethrum + Neem or *Beauveria bassiana* + Pyrethrum will reduce feeding, but if mite populations are high it will be difficult to eliminate the damage.
- Applications should start as soon as damage is noticed before mites have a chance to build their population.
- Foliage should be thoroughly covered with spray material as should the soil around the base of the plants.

This has been a presentation about just some of the most difficult to control insect and mite pests of vegetables in the mid-Atlantic region. Additional presentations on how to manage other hard to control pests will follow.

Questions

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Solutions in your community

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