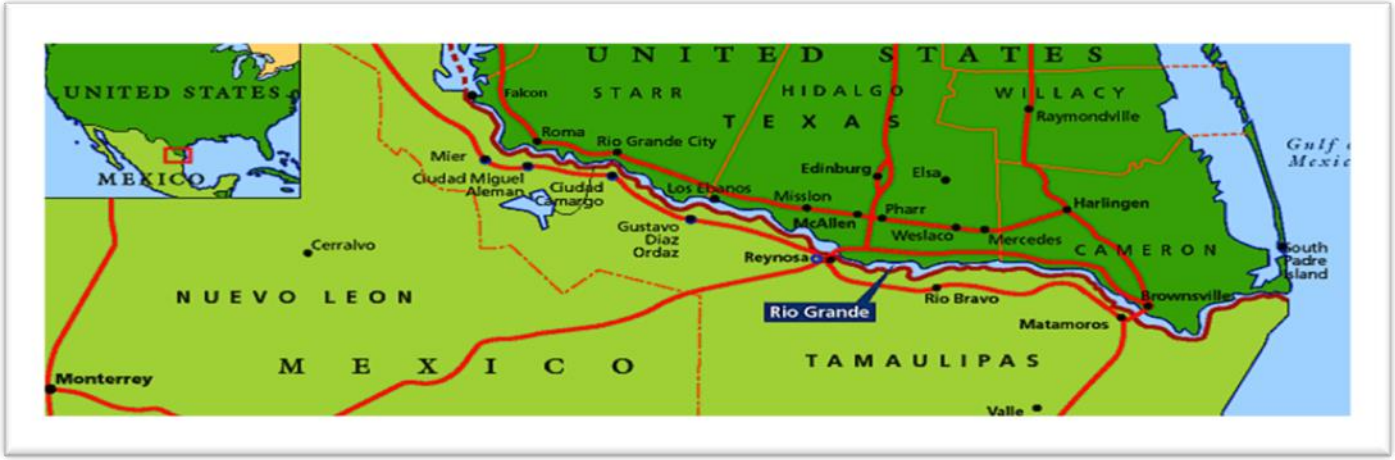
Integrated pest management on vegetables for insect pests and vectors in South Texas



Adrian Silva and Ismael E. Badillo-Vargas
Texas A&M AgriLife Research
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Insect pests of vegetables in the Lower Rio Grande Valley

- whiteflies
- thrips
- psyllids
- aphids
- leafminers
- loopers
- fruit flies

All these insect pests are very small.

Whiteflies

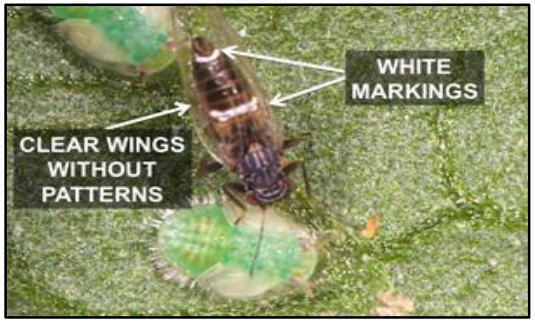
- Eggs are laid on leaves in different arrangements (*e.g.* spiral).
- Some nymphs have very ornate bodies that vary from species to species. This morphological feature is used to identify these insects to the species level.
- In some situations whiteflies can go from the egg stage to adult in 16 days. The adults can move readily and will fly if disturbed.
- Whiteflies feed on multiple plant species (polyphagous) and can cause extensive feeding damage when present in high numbers.

Thrips

- Eggs are laid inside the leaves.
- There are two larval stages, a prepupal and pupal stage that do not feed and mostly occur in the soil, and then adult males (smaller) and females (larger) emerge and disperse using their fringed wings.
- Thrips feed on multiple plant species (polyphagous) and can cause extensive feeding damage when present in high numbers.

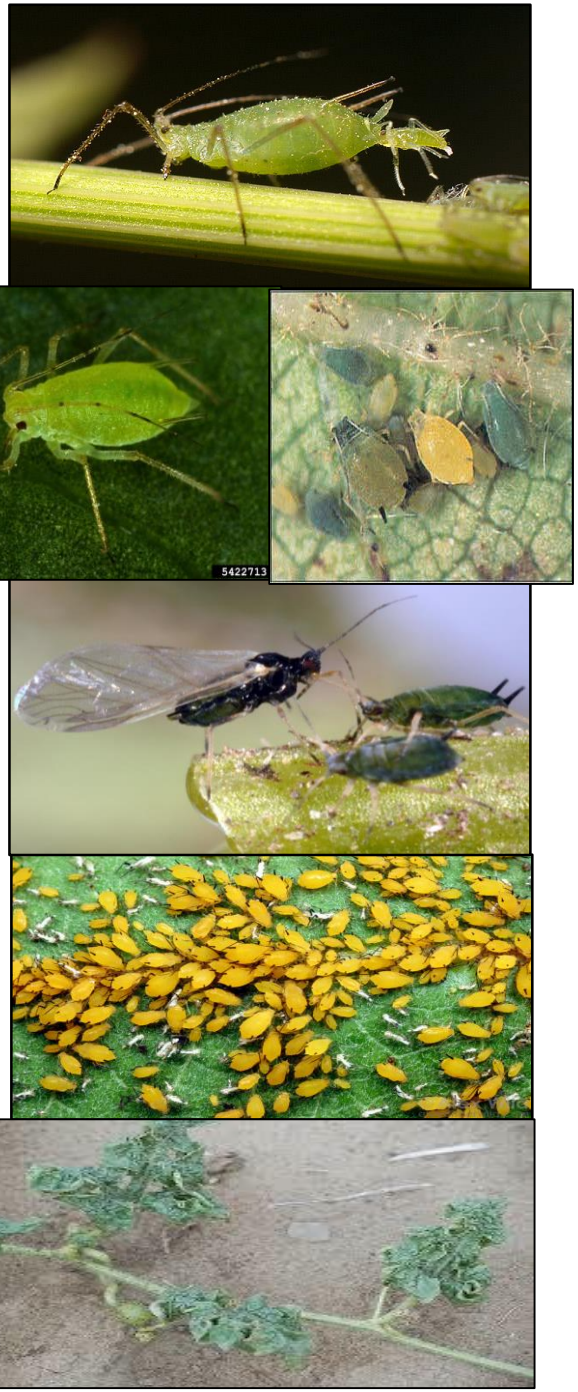
Psyllids

- The main concern in vegetable production is the tomato/potato psyllid.
- The yellow football-shaped eggs are usually laid on the undersides and edges of leaves on very fine stalks.
- There are 5 nymphal stages differing only on their body size.
- The adults have white markings and roof-like wings to disperse to other fields and throughout very long distances.
- Tomato/potato psyllids feed on multiple solanaceous species, including weedy ones (polyphagous) and can cause extensive feeding damage when present in high numbers. Nymphs cause “psyllid yellows” by feeding.



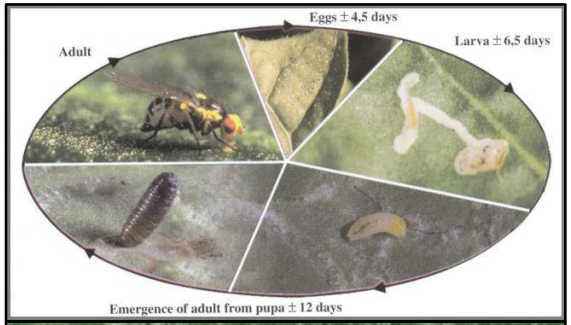
Aphids

- Aphids come in various colors and sizes.
- Common aphids in vegetable crops are the green peach aphid, melon/cotton aphid, and potato aphid.
- Aphids give birth to live young or and can lay eggs.
- Most adults do not have wings but in overpopulated situations they may develop wings to disperse and colonize other fields.
- Aphids feed on multiple vegetable species (polyphagous) and can cause extensive feeding damage when present in high numbers.



Leafminers

- Eggs are laid on leaves.
- When the larvae hatches it eats its way inside the leaf tissue where it creates “mines”.
- It makes a cocoon outside of the leaves where it pupates until the adult emerges and flies to other plants.
- Leafminers feed on multiple vegetable species (polyphagous) and can cause extensive feeding damage when they are larvae.
- The adult looks completely different to the immature stage (larvae) as it is a moth that could fly to other plants.



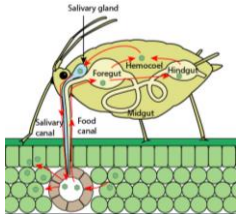
Loopers

- There are several different species of loopers that can infest vegetable crops.
- Eggs are laid in groups on the underside of the leaves.
- When the larvae emerges it feeds on leaves and fruits using its chewing mouthparts.
- Loopers feed on multiple vegetable and fruit plant species (polyphagous) and can cause extensive feeding damage.

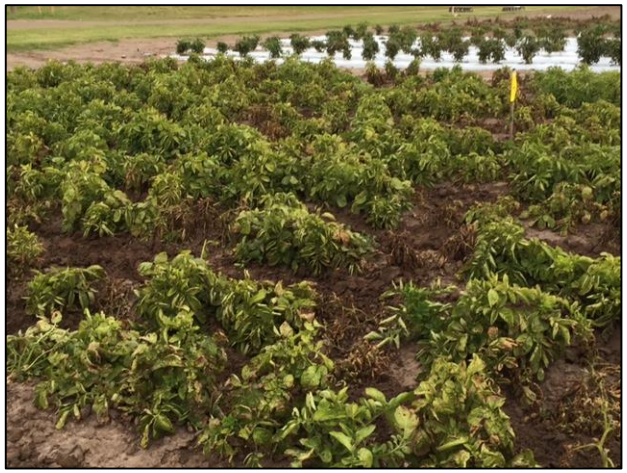
Fruit flies

- Fruit flies lay their eggs inside fruits. Thus, they are not a problem before fruit production.
- When the larvae hatches it feeds on the interior of the fruit causing extensive damage.
- It pupates inside the fruit and eventually emerges as an adult.
- Fruit flies feed in various fruits and other plant species (polyphagous) and can cause severe damage in the field and during storage when they are larvae.
- The Mediterranean fruit fly is currently a quarantine pest not present in the US.

Insect pests as trojan horses



- Some insect pests are also vectors of plant pathogens.
- They carry these plant pathogens within them and transmit them to plants.
- Once these plant pathogens are delivered into the host plant, they cause plant diseases.
- These plant pathogens can also cause tremendous yield losses in vegetable crops.



Insect pests as trojan horses (cont'd)

- Whiteflies transmit begomoviruses such as *Tomato yellow leaf curl virus* (TYLCV).
- This virus infects vegetables, many weedy hosts, and has recently been shown to infect papaya (Olufemi Alabi, personal communication).
- Plants can be severely stunted, and leaves curl up, and become bright yellow and can eventually die.
- If fruits are produced they might have necrotic spots and are unmarketable.

Insect pests as trojan horses (cont'd)

- Western flower thrips transmit tospoviruses such as *Tomato spotted wilt virus* (TSWV).
- This virus infects vegetables, ornamentals, and many weedy plants.
- Plants can be severely stunted, become chlorotic, necrotic and eventually die.
- If fruit are produced they might have concentric rings and are unmarketable.

Insect pests as trojan horses (cont'd)

- Onion thrips also transmit tospoviruses such as *Iris yellow spot virus* (IYSV).
- This virus infects onion, garlic, leek and Iris plants.
- Plants develop oval-shaped or diamond-shaped lesions.
- Ultimately plants can collapse and die bearing small fruit or none at all.

Insect pests as trojan horses (cont'd)

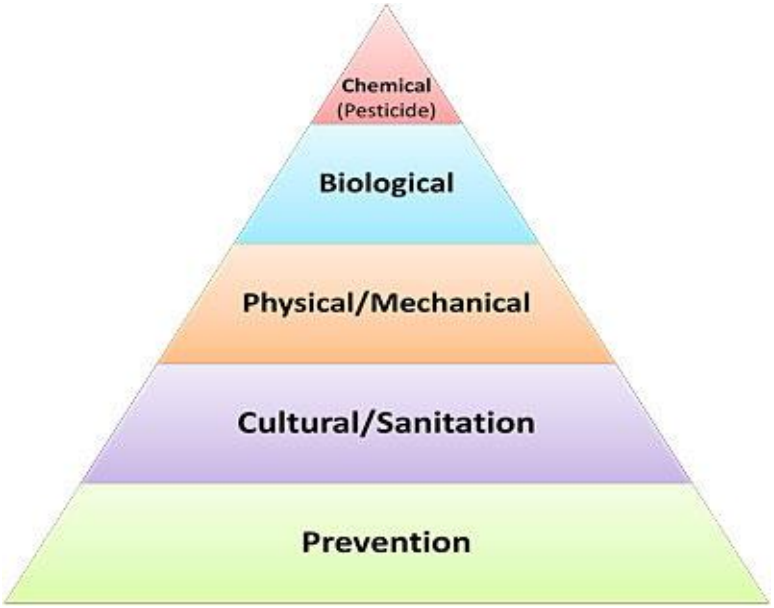
- Tomato/potato psyllid transmit the Lso bacterium that causes vein-clearing disease in tomato and Zebra chip in potato.
- This bacterium infects potato, tomato, pepper and several solanaceous weeds.
- Potato plants can be stunted and developed purple leaves that roll up and eventually die.
- Infected tubers have dark strips that intensified when fried.

How to control these insects and diseases?

- Chemical control – insecticides
- Cultural control – modifying planting date, rotating different crops
- Physical control – using plastic mulches, growing plants inside protected structures (*e.g.* greenhouses)
- Biological control – using insects (predators or parasitoids), fungi and bacteria that kill the insect pests
- Genetic control – resistant varieties generated by plant breeding

Integrated Pest Management (IPM)

- IPM is an ecosystem-based strategy that focuses on long-term prevention of insect pests/pathogens or their damage through a combination of techniques such as chemical control, modification of cultural practices, biological control, and use of resistant varieties.



Chemical control - Insecticides

- In many cases insecticides are the most effective and only method available for controlling insect pests and insect-transmitted pathogens to plants.

- It is important to use these insecticides correctly and do not abuse them.

- Alternating insecticides with different modes of action is important to avoid insects developing insecticide resistance to these chemicals.

Cultural control

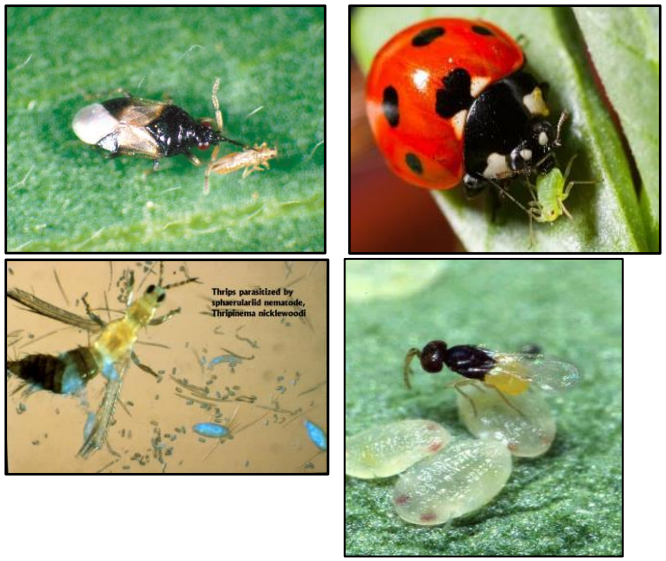
- Modifying the planting date could be an easy strategy to escape the arrival of insect pests.
- Rotating different crops could be used to break the insects life cycle with a crop that is not suitable for them to live on.

Physical control

- Using plastic mulches could help to confuse insect pests in locating their host plant by reflective light.
- Protected structures such as greenhouses, net-houses, and high tunnels exclude insect pests but represent an additional cost of production.

Biological control

- Using insects (predators or parasitoids), fungi, bacteria, and nematodes that kill the insect pests but do not harm the plants is an environmental friendly strategy.

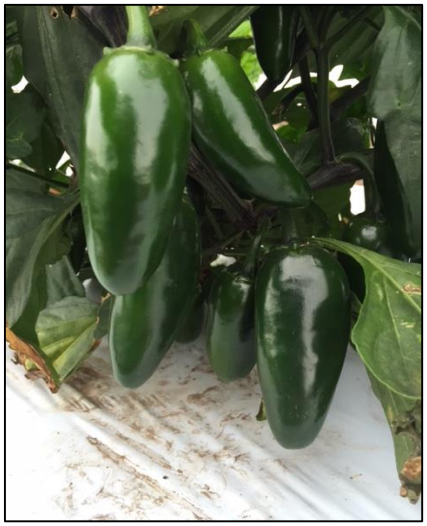


Genetic control

- Using resistant varieties naturally occurring or generated by plant breeding is the best practice. However, resistant varieties are not always available.

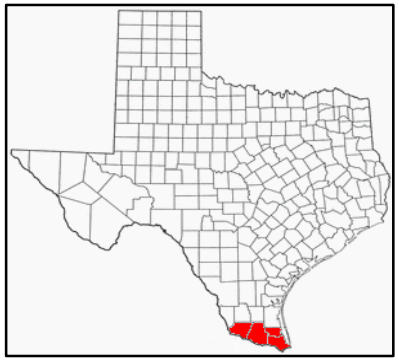
Questions?









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