

Aphids, Viruses, and Watermelons

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The Aphids

Green Peach Aphid
Myzus persicae



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Cotton Melon Aphid
Aphis gossypii



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Green Peach Aphid--Wingless



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Cotton Melon Aphid Wingless



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Several Things Must be in Place for a Virus Problem to Occur

- 1. There must be a source of inoculum—
Could be a crop or weeds
- 2. There must be a vector—Aphids in our case
- 3. There must be a susceptible host—
Watermelons in our case.



The Viruses

Virus

- Papaya Ringspot
- Watermelon Mosaic
- Zucchini Yellows Mosaic
- Lettuce Infectious Yellows
- Beet Curly Top
- Squash Mosaic
- Cucumber Mosaic
- Cucurbit Yellow Stunt Disorder

Vector

Aphids

Aphids

Aphids

Whitefly

Leafhopper

Seed, Cucumber Beetle

Aphids

Whitefly



Papaya Ringspot Virus



Watermelon Mosaic Virus 2



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Zucchini Yellows Mosaic Virus



Beet Curly Top in Cantaloupe



Lettuce Infectious Yellows Virus



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Squash Mosaic Virus



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Cucumber Mosaic Virus



Cucurbit Yellow Stunt Disorder Virus

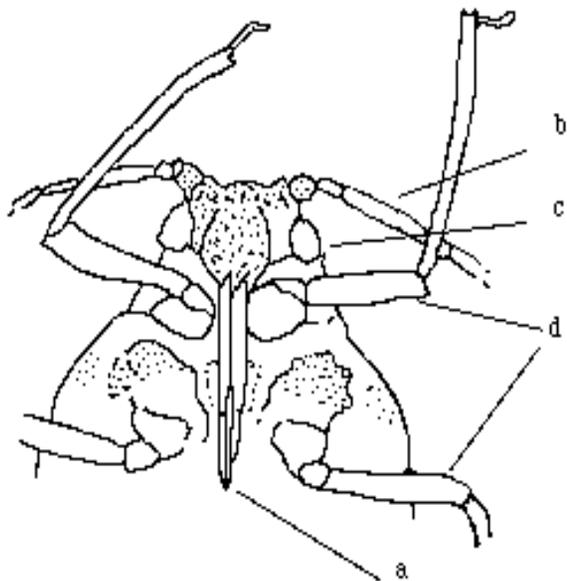


Some Comments about Visual Symptoms

- 1. Viruses are difficult to identify by visual symptoms—Many produce the same or similar symptoms.
- 2. Positive identification can only be made by using ELISA or PCR techniques.

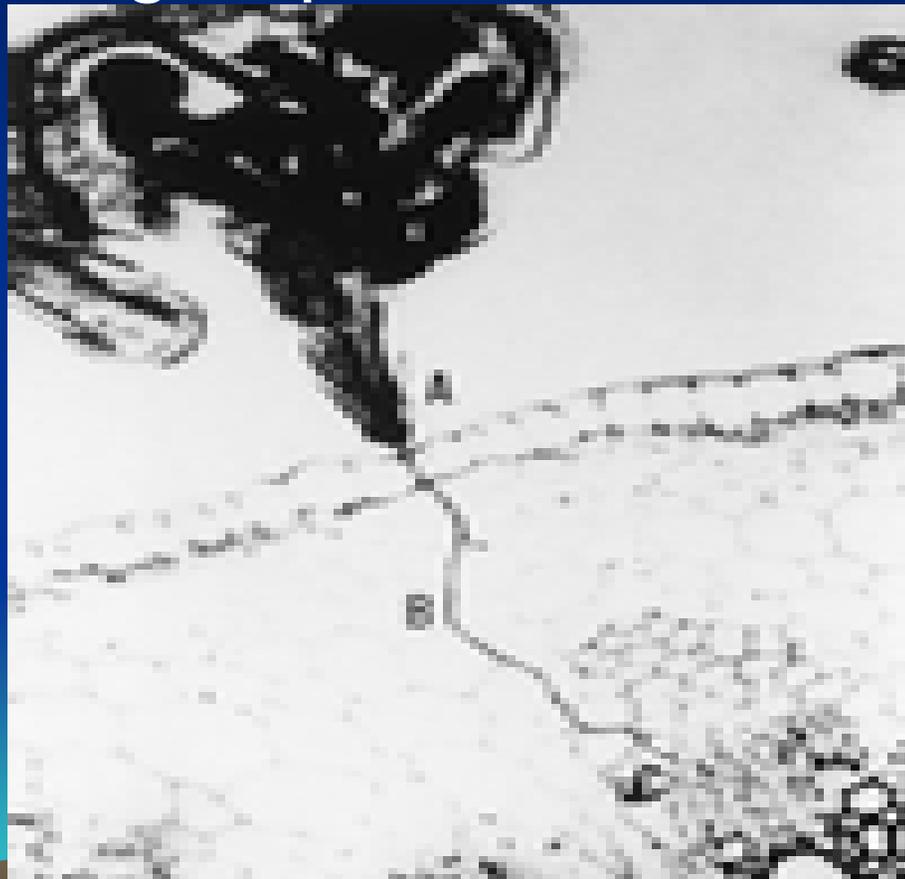


Aphid Mouthparts

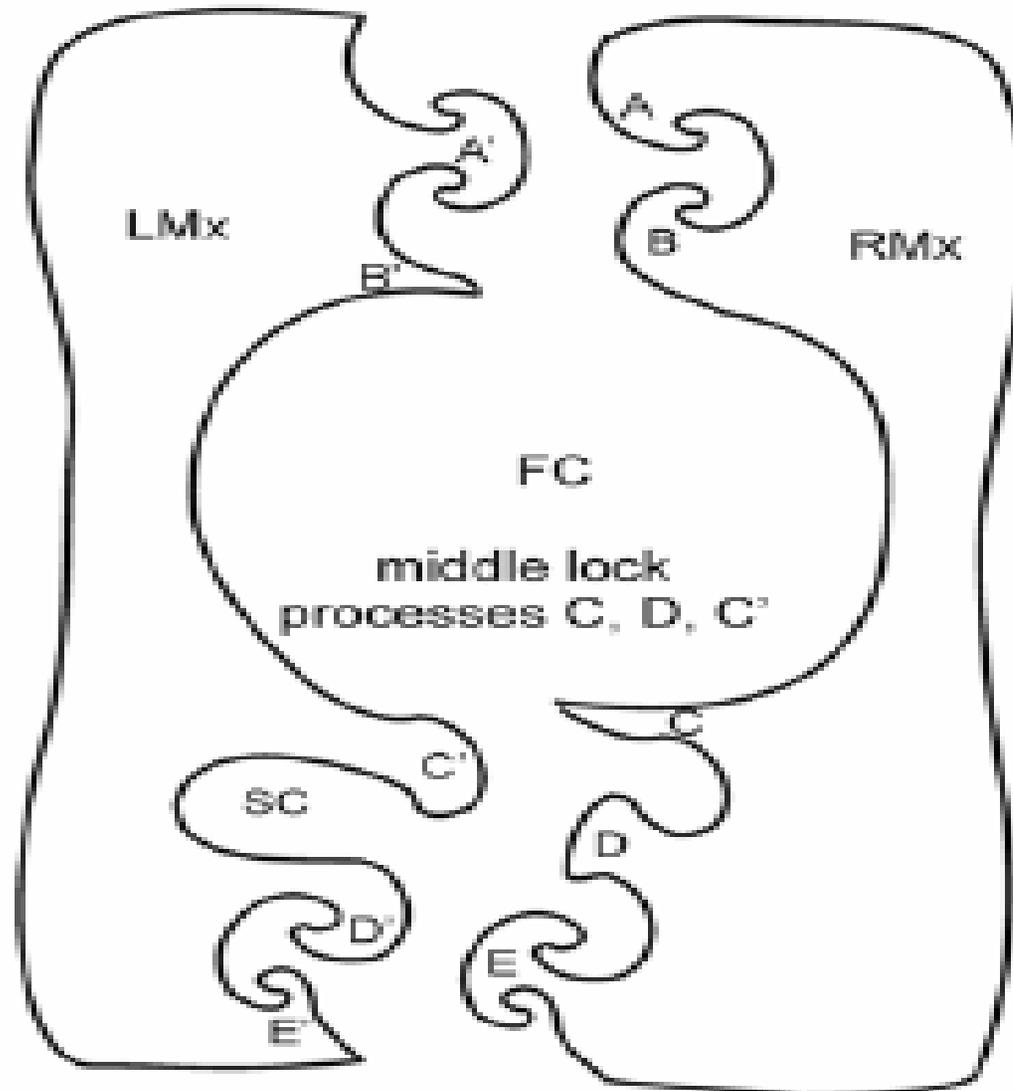


Aphid Stylet Inserted into Leaf

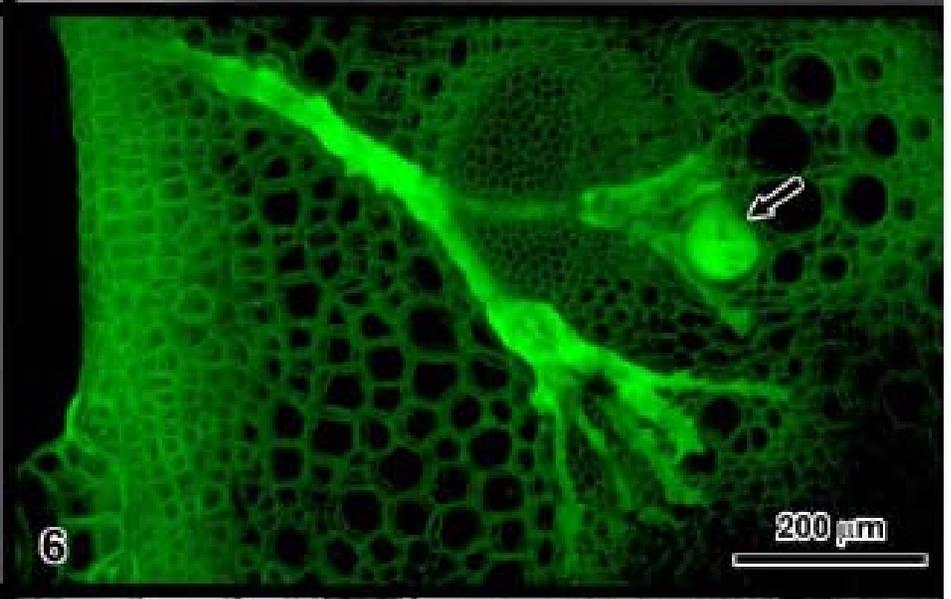
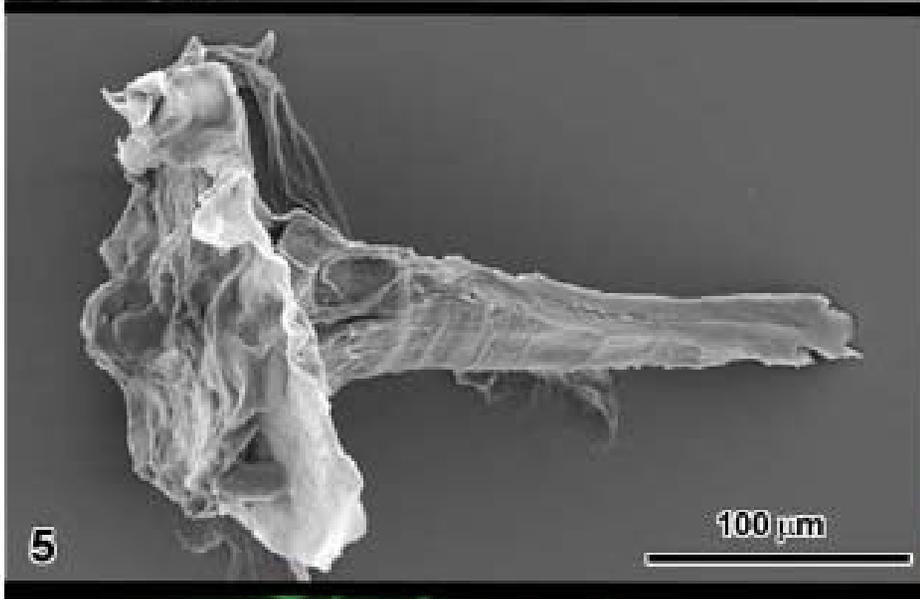
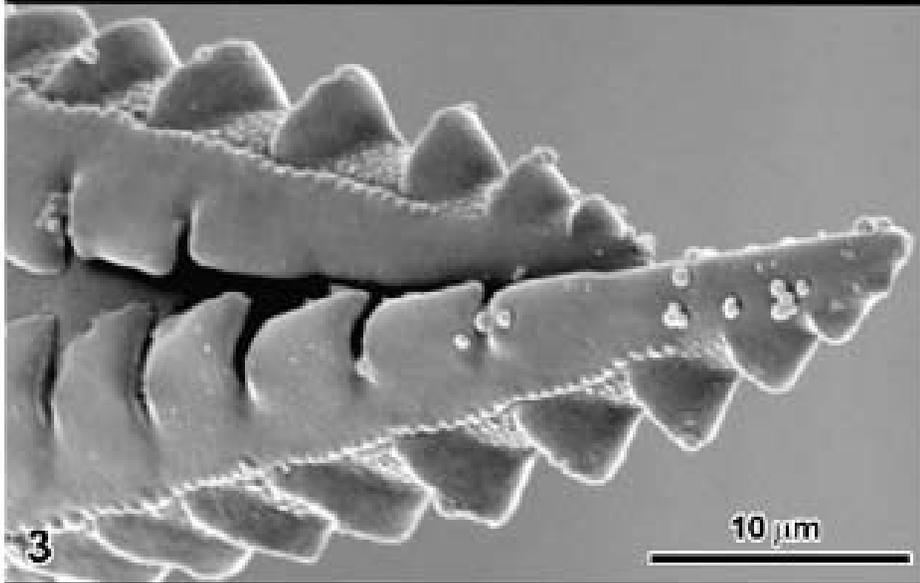
Section Through Aphid Head and Stylets



Cross Section of Aphid Stylet



Salivary Sheath



Mechanisms of Virus Transmission

1. Non-Persistent Transmission-Stylet Borne

- Virus Acquired in “Test Probes” of 20 to 30 Seconds
- Virus Transmitted in “Test Probes” of 20 to 30 Seconds
- Virus Retained by the Vector for < One Hour
- Examples: Most Cucurbit Viruses Including Cucumber Mosaic, Papaya Ringspot (WMV 1), Watermelon Mosaic 2, “Zucchini Yellows Mosaic



Mechanisms of Virus Transmission

- Semi-Persistent
 - Require Longer Acquisition Times, up to Several Minutes of Feeding
 - Very Short Latent Period—Transmissible Within A Couple of Hours
 - Vector Retains the Ability to Transmit the Virus for Several Hours up to Several Days—Looses Ability to Transmit the Virus After a Molt



Mechanisms of Virus Transmission

- 3. Persistent

Require Longer Periods of Feed to Acquire the Virus—Up To Several Hours

A Latent Period Exist Between Acquisition and Being Able to Transmit the Virus—This Period May be From a Few Hours to a Few Days.

Vector Retains the Ability to Transmit the Virus for Life, Including Following a Molt

Circulative—Virus circulates in hemolymph

Propagative—Multiplies within the vector-

Aphid Damage Without Virus Transmission

- Aphids can cause severe injury by sucking plant juices and injecting a toxin.
- There are no treatment thresholds developed for aphids on Cucurbits



Managing Aphids When Viruses are not present

- 1. Silver Reflective Mulch
 - Must be in place at plant emergence
 - Are generally effective until 50-60% canopy cover
 - Delay colonization by aphids
 - 2. Row Covers-Not Recommended in SJV
 - 3. Biological Control
 - Predators
 - Parasites
 - 4. Insecticidal Soaps
 - 5. Insecticides
- 

Managing Aphids and Viruses

- 1. Silver Reflective Mulch
 - Must be in place at plant emergence
 - Are generally effective until 50-60% canopy cover
 - Delay colonization by aphids and delays the onset of virus diseases
- 2. Biological Control
 - Not effective—Too slow
- 3. Insecticides
 - Not effective against non-persistent viruses. Viruses acquired and transmitted before vector get lethal dose of insecticide. May even increase the spread of virus by making the vector more active due to insecticide intoxication
- 4. Virus Resistant Varieties are being Developed-Stay Tuned

Reflective Mulch



Aphidius sp.

Adult laying egg



of California

Mummified aphids



f California

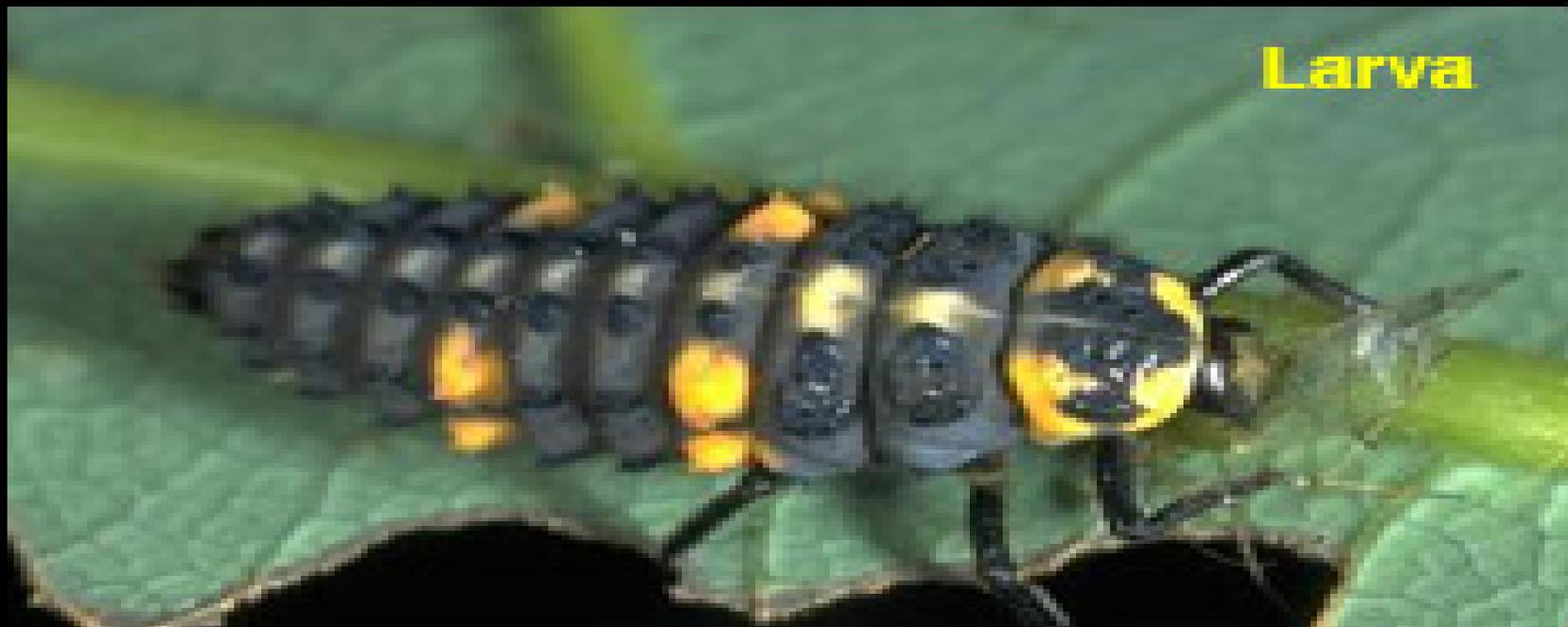


Mummy with exit hole

Lady Beetle



Adult



Larva

I Leave you This Morning to Enjoy Old Faithful
Thank You

