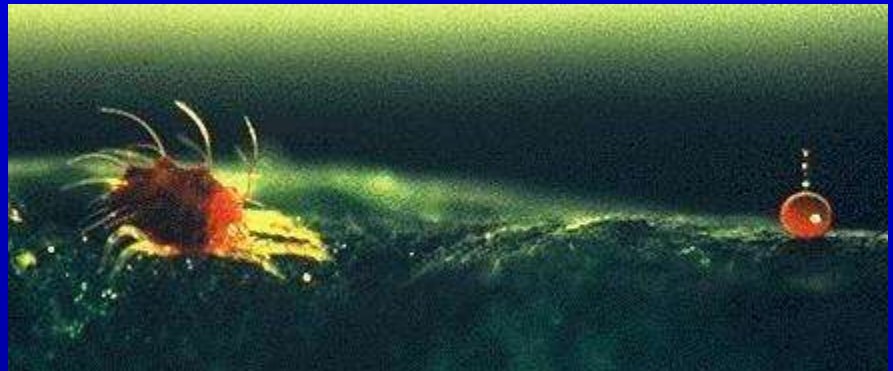
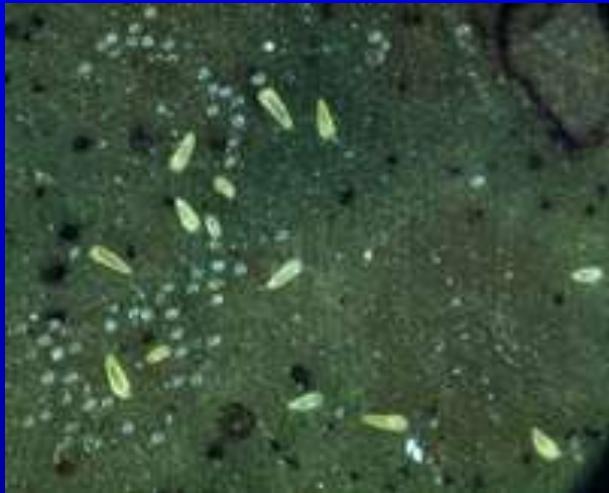


# Mite Pests of Florida Citrus

Phil Stansly, Barry Kostyk and Xavier Martini



# Mite Pests of Citrus

- **Rust mites**
  - Citrus rust mite *Phyllocoptruta oleivora*
  - Pink rust mite *Aculops pelekassi*
- **Spider mites**
  - Citrus red mite *Panonychus citri*
  - Texas spidermite *Eutetranychus banksi*
- **False Spider Mites**
  - *Brevipalpus* spp
- **Broad mites**
  - *Polyphagotarsonemus latus*

# RUST mites: Eriophyid mites

## Eriophyid mites:

- 4 legged individuals
- Less than 200  $\mu\text{m}$  in length
- Majority of these mites are host specific
- Half of the Eriophyid mites described cause galling
- Worm like mites
- Live in plant tissues
- Only mites to transmit viruses



*Aculops leavitaga*  
galls on willow





**Pink Rust Mite**  
*Aculops pelekassi*

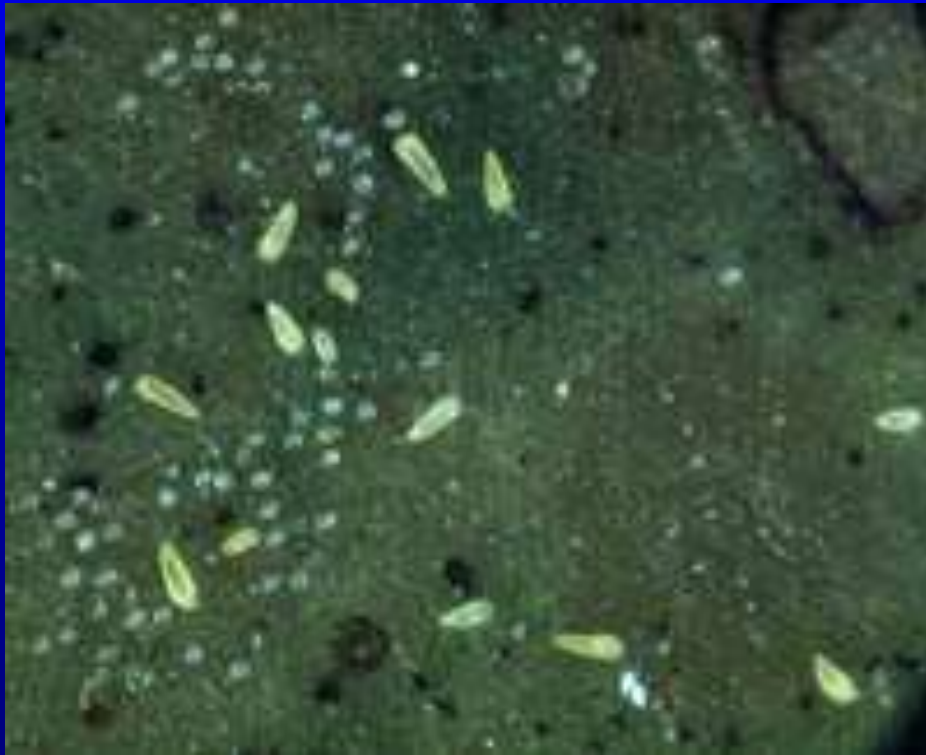
## **Rust Mites**

- Primarily problems in fresh fruit
- Flared by copper and broad spectrum insecticides, especially pyrethroids



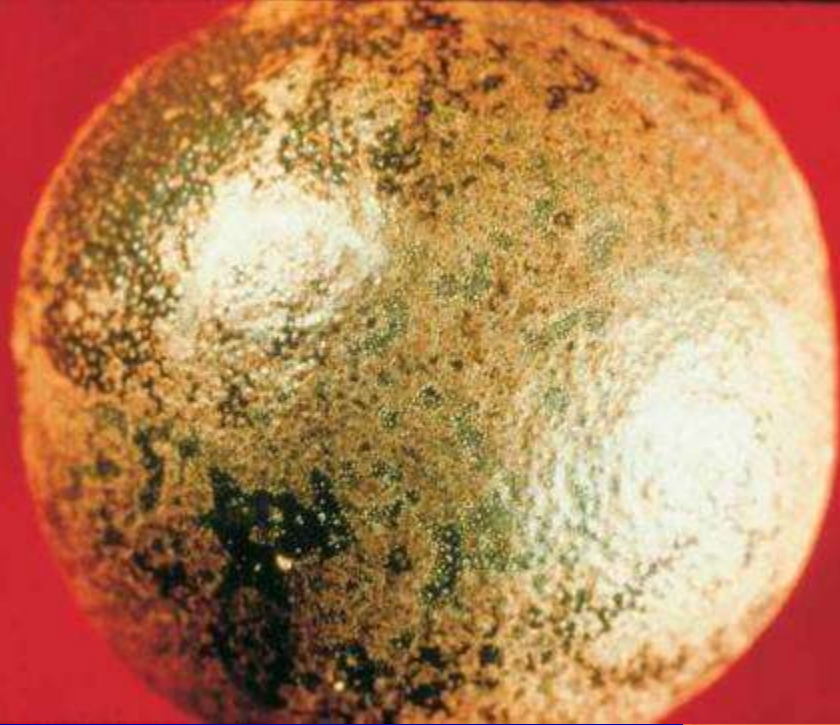
**Citrus Rust Mite**  
*Phyllocoptruta  
oleivora*

**Citrus Rust Mite: *Phyllocoptruta oleivora***  
**Pink Citrus Rust Mite: *Aculops pelekassi***



- Primary Damage is “russetting and/or bronzing” of fruit causing a reduction of grade
- High populations may cause reduced fruit size, increased water loss and greater amount of fruit drop.





**Early damage:  
Sharkskin**

**Late damage:  
Bronzing**



# CRM and PCR

- The citrus rust mite (CRM) and the pink citrus rust mite (PCRM) are found on all citrus varieties throughout Florida.
- Four developmental stages: egg, 1<sup>st</sup> (larva), 2<sup>nd</sup> (3<sup>rd</sup>) instar (nymph), and adult.
- Both species can co-exist on the same leaf or fruit
- The CRM is usually prevalent
- PCRM may develop damaging populations early (April–May)
- On some specialty varieties (such as Sunburst tangerine), damage may be particularly severe on stems and foliage, causing leaf injury and possible abscission.
- Fruit damage is the main concern for fresh fruit!



# Chemical Control of Rust Mites

(from IFAS – 2016 Florida Citrus Pest Management Guide)

- Need to spray dictated by biological attributes and marketing objectives: 1) rapid reproduction, 2) small size, difficult to monitor until visible injury has occurred on the fruit, and (3) fresh or process destination for fruit.
- Cosmetic appearance is a priority for fruit grown for the fresh market. Fruit growth and abscission are not affected until 50% to 75% of the surface has been injured.
- Fresh market groves may receive three or four miticides per year, typically during April, June, August, and October. In contrast fruit designated for processing receive zero to two treatments per year.



# **When to Treat ?**

**Three approaches to monitoring in widespread use:**

- 1) determining the percentage of fruit and/or leaves infested with rust mites;**
- 2) qualitative rating scales;**
- 3) individual adult mite counts taken from fruit on randomly selected trees.**

**These sampling approaches are similar in that they are designed to avoid bias by randomly selecting different representative areas within a grove for sampling, avoiding border rows, and random selection of fruit and/or leaves within a tree.**

# **Variables in Scouting for Rust Mites**

- **Frequency of sampling**
- **Stops/acre**
- **Path through the grove**
- **Number of fruit/stop**
- **Number of lens fields per fruit**
- **The Lens Field**
  1. **Size**
  2. **Magnification**
  3. **Position**

# Standardize the Lensfield

Lensfield size depends on:

- Magnification
- Distance between eye and eyepiece





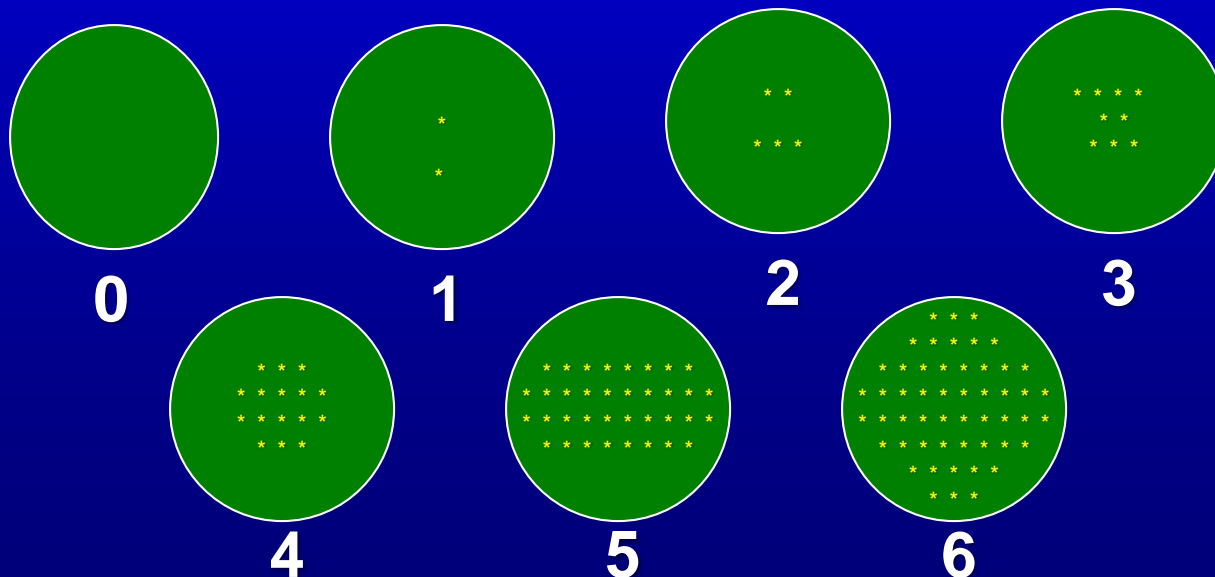
## Field Trials a SWFREC



- A 14X Bausch & Lomb Coddington hand lens is used to view an area of approximately 1.0 cm<sup>2</sup>, referred to as the “lens field”, on two partially shaded areas on 4 fruit per tree and the total number of mites recorded.

# What the Heck is the H-B Rating System?

- Developed by Horsfall & Barratt (1945) to measure disease incidence.
- Based on density recognition rather than individual counts.



# Florida Pest Management Guide\*:

- Process: Every 2-3 Weeks
- Fresh: every 10-14 days
- 80 Lensfields /block (10-40 acres)
  - ✓ Stops/ per block = 10
  - ✓ Trees per stop = 4
  - ✓ Fruit/tree = 2
  - ✓ Lens fields per fruit = 1
  - Sun-shade transition
  - ✓ Location of Fruit: all 4 quadrants, midway in canopy
- Record Mites/lens field
- Provides < 25% variation if CRM > 10/cm<sup>2</sup>
- Thresholds process: 6 CRM/ LF - Caution  
10 CRM/LF - Spray
- Threshold fresh: 2 CRM/LF - Spray

\*2011 Florida Citrus Pest Management Guide, Publication SP-43, UF Gainesville  
<http://edis.ifas.ufl.edu/cg002>

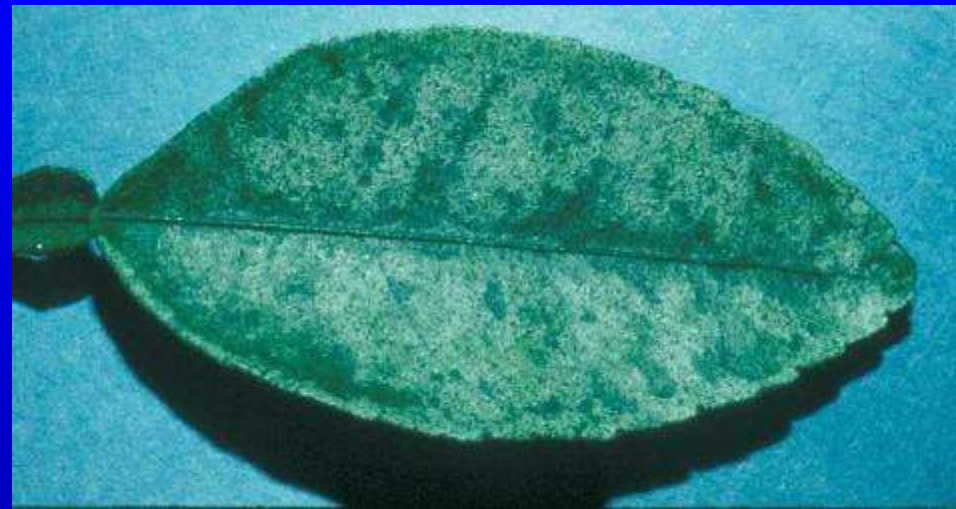


## Miticides Recommended for FL Citrus

Pesticide	IRAC MOA	Comments	Pests Controlled	Pesticide	IRAC MOA	Comments	Pests Controlled
Abamectin + Petroleum spray Oil	6	Do not apply any abamectin containing product within 30 days of last treatment or exceed 0.05 lb ai abamectin or more 3 applications in any growing season.	Rust mites Broad mites Leafminer	Nexter	21	Tank mixing with oil or copper results in reduced residual activity.	Spider mites False spider mites Rust mites
Comite	12C	Leaf distortion and/or fruit spotting may occur when used in the spring or if tank mixed with oil or applied within 2 weeks prior to or following an oil application. Do not use in spray solution above pH 10.	Rust mites Spider mites	Petroleum Oil 97+% (FC 435-66, FC 455-88)	NR <sup>3</sup>	Do not apply when temperatures exceed 94°F.	Rust mites Scales Whiteflies Spider mites Greasy spot Sooty mold
Envidor	23	Only one application per season. Tank mixing with oil results in reduced residual activity.	Rust mites Spider mites	Micronized Sulfur	NR <sup>3</sup>	Do not combine with oil or apply within 3 weeks of oil to avoid fruit burn. May cause eye irritation to applicators and fruit harvesters.	Rust mites Broad mites
Micromite	15	See restriction on the label.	Rust mites Root weevils Leafminers	Vendex	12B	Reduced residual activity if tank mixed with oil or copper. Do not apply to fruit less than one inch in diameter within 10 days of oil spray.	Rust mites Spider mites
Movento MPC + Petroleum spray Oil 97+%	23	Limit of 32 fl oz of product (0.32 lb ai) per acre per season. Do not make back-to-back applications with Envidor.	Psyllid nymphs Some scale insects				

# Spider Mites:

- Dry weather
- Upper surfaces of young hardened leaves
- Stippling, Firing



Texas citrus mite



Citrus red mite

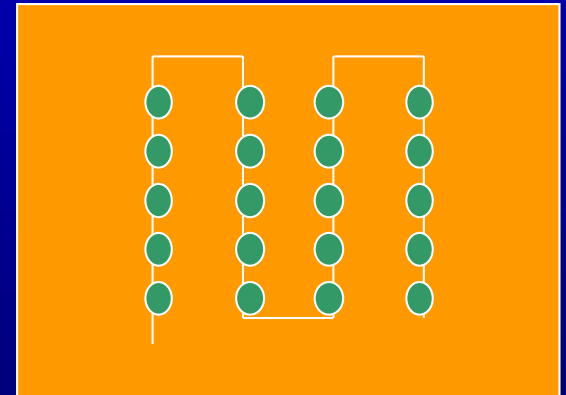


Firing



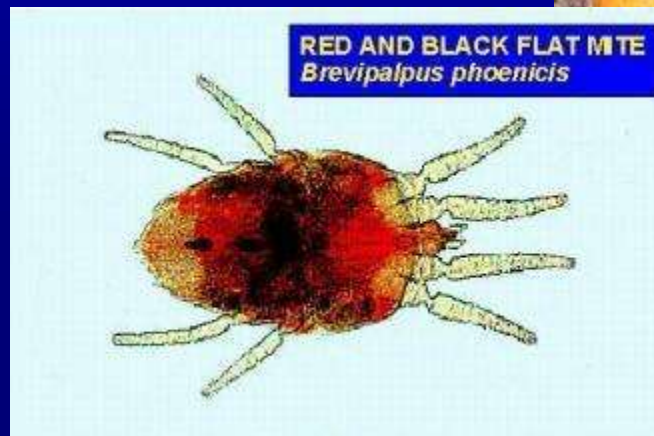
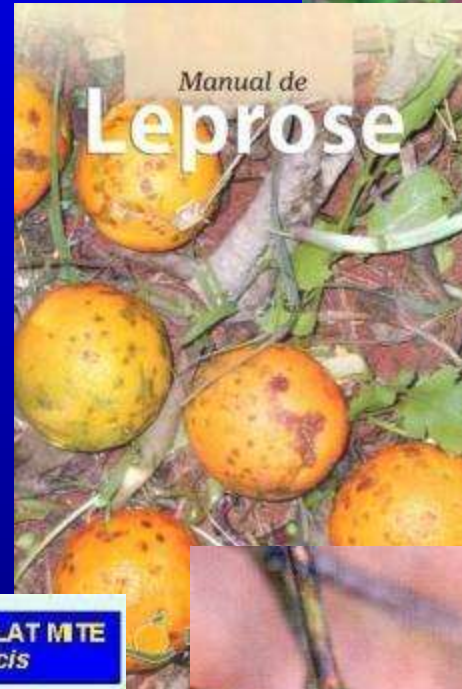
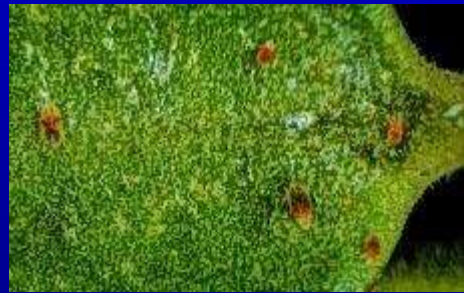
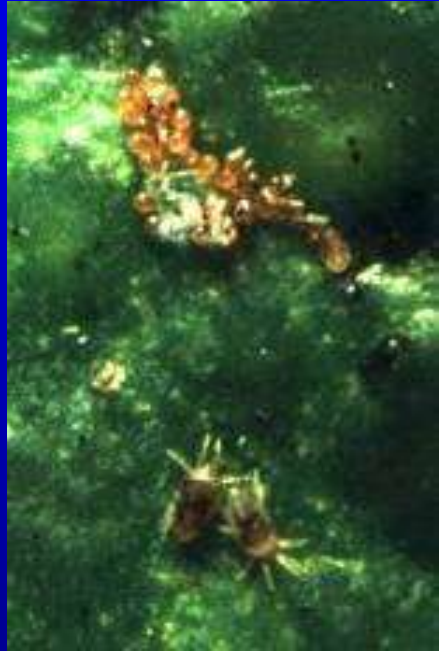
# Scouting for Spider Mites

- Follow CRM sample pattern
- 4 leaves per tree
- Threshold 5-10/leaf, depending on :
- Population trends
  - ↓ Predominantly males
  - ↑ Nymphs and females
- Weather
- Tree Condition





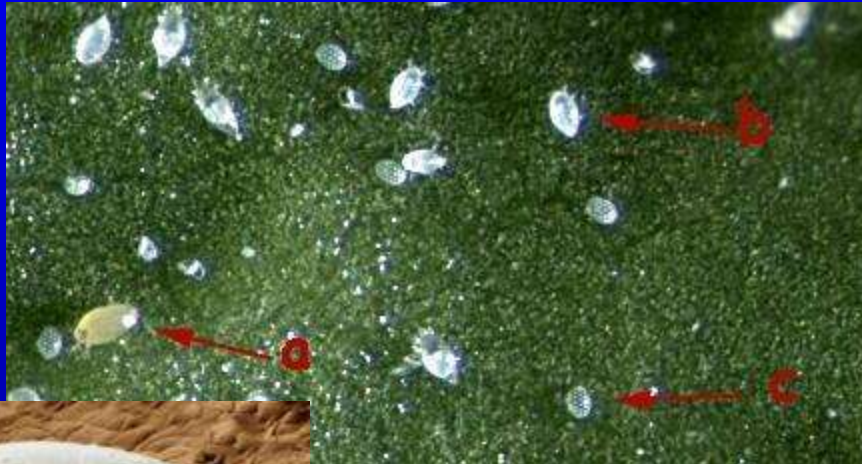
# False spider mite *Brevipalpus* spp: Vector of Leprosis (not yet in US)



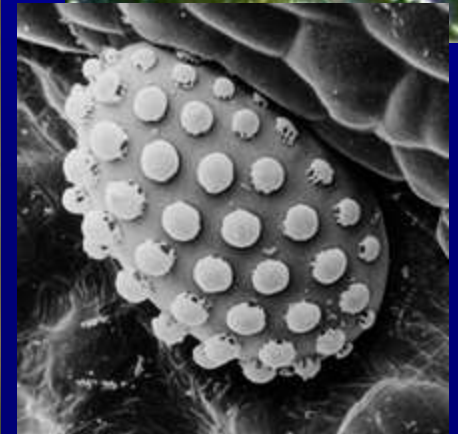


# Broad mite

## *Polyphagotarsonemus latus*



Mostly a pest  
of lemons  
and limes



# Key Florida Citrus Pests and some of their Biological Control Agents

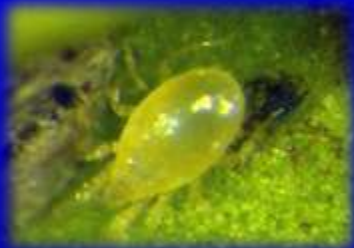


- **Mites:** Rust mites, spider mites  
*Hirsutella*, mites, ladybeetles
- **Thrips**
  - Minute pirate bugs, mites
- **Leafminer**
  - Ants, Spiders, *Ageniaspis*
- **Root weevils**
  - Nematodes, egg parasitoids
- **Scales:** armored, soft
  - Ladybeetles, *Aphytis* spp.
- **Asian Citrus Psyllid**
  - Ladybeetles, *Tamarixia*



# Phytoseiid mites (Acarina: Phytoseiidae)

Important natural enemies in citrus:



*Euseius tularensis*  
*Euseius stipulatus*



*Panonychus citri*

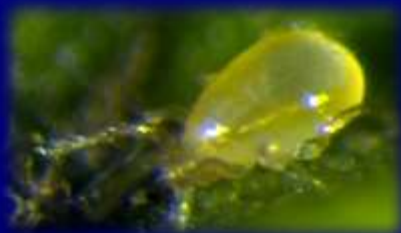


*Amblyseius swirskii*  
*Iphiseius degenerans*  
*Typhlodromus athiasae*  
*Euseius scutalis*

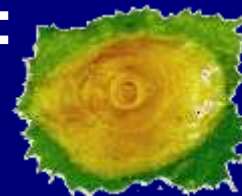


*Phyllocoptruta*  
*oleivora*

Predators of small insects or  
immature stages:



Whiteflies

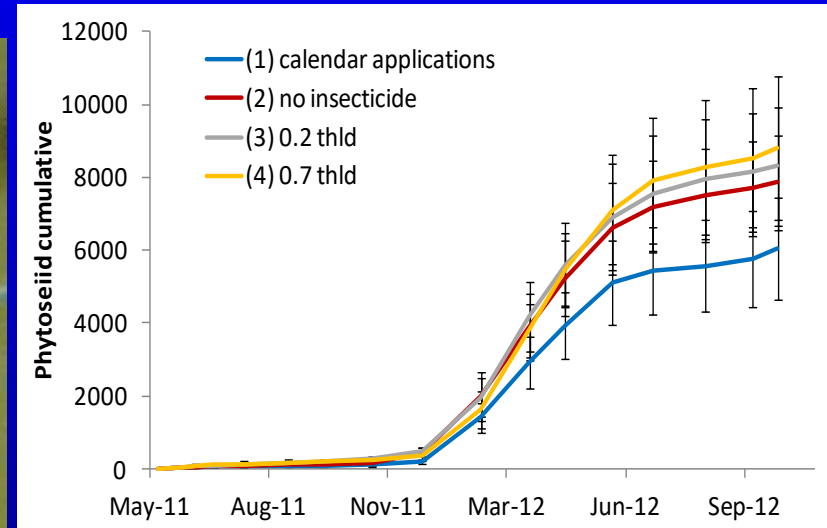
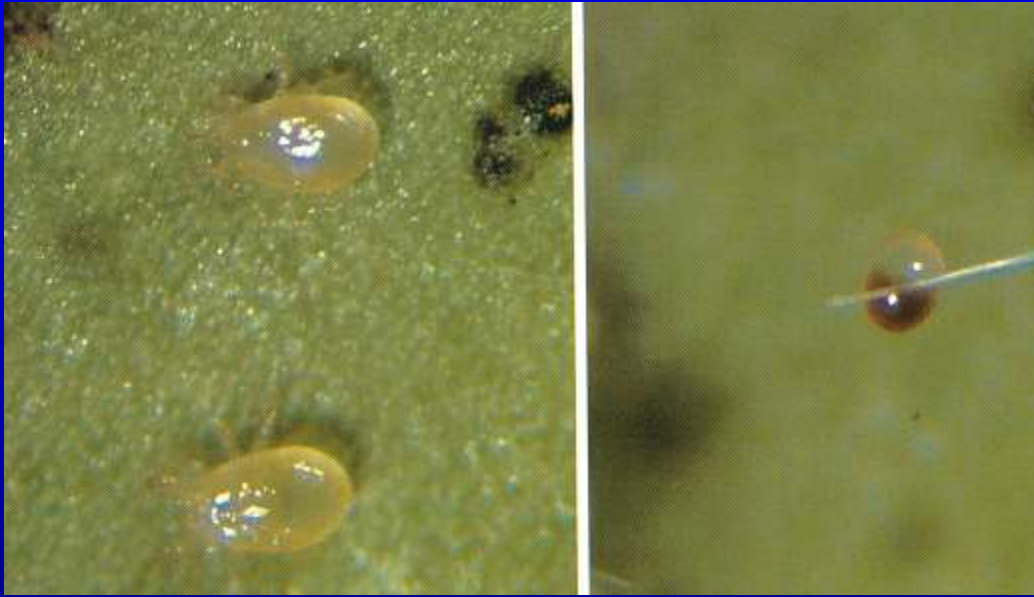


Armored  
scales



Asian citrus psyllid

# Predaceous mites: Phytoseiids



**Cumulative numbers of phytoseiid mites by insecticide treatment schedule**

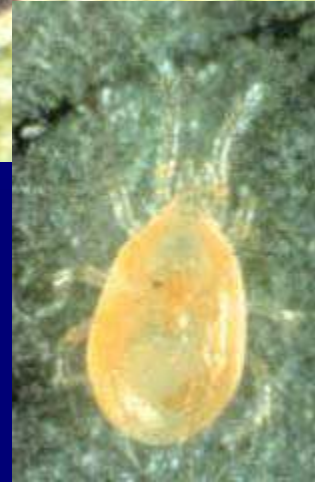
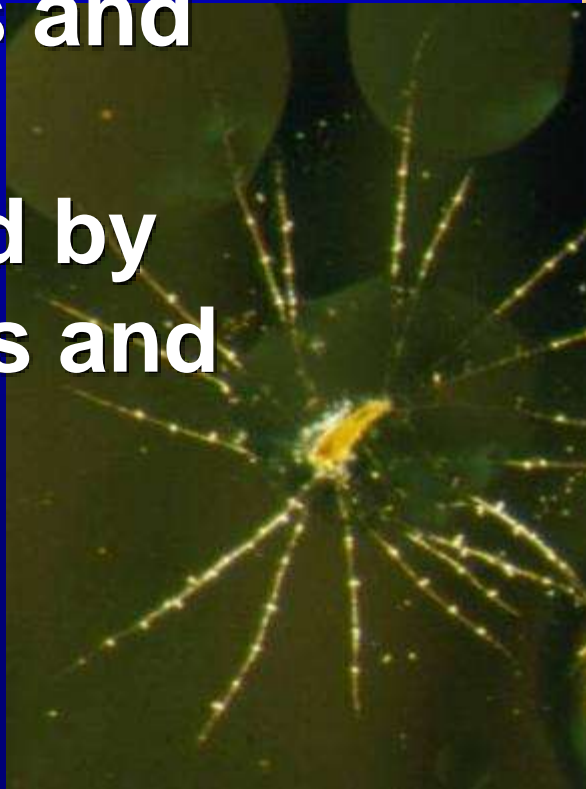




# Citrus Rust Mite

## *Phyllocoptruta oleivora*

- Biological control by mites, ladybeetles and *Hirsutella*
- Disrupted by insecticides and copper.



# Questions?

