Non-ACP Arthropod Pests of Citrus

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Citrus Health Forum
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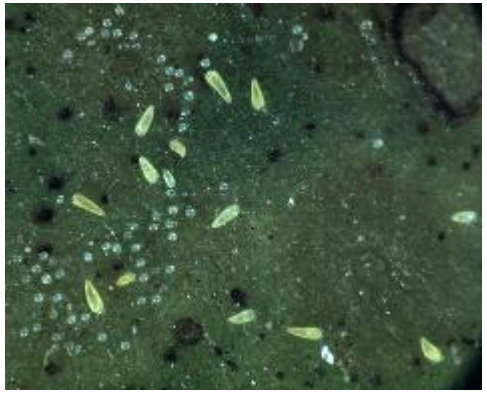
Mites in Florida citrus

- Rust Mites
  - Citrus Rust Mite (CRM), Pink Citrus Rust Mite (PCRM)
- Spider Mites
  - Citrus Red Mite, Texas Citrus Mite, Six-spotted Spider Mite
- False Spider Mites
  - Brevipalpus sp.
- Broad Mites
  - *Polyphagotarsonems latus*

Rust Mites

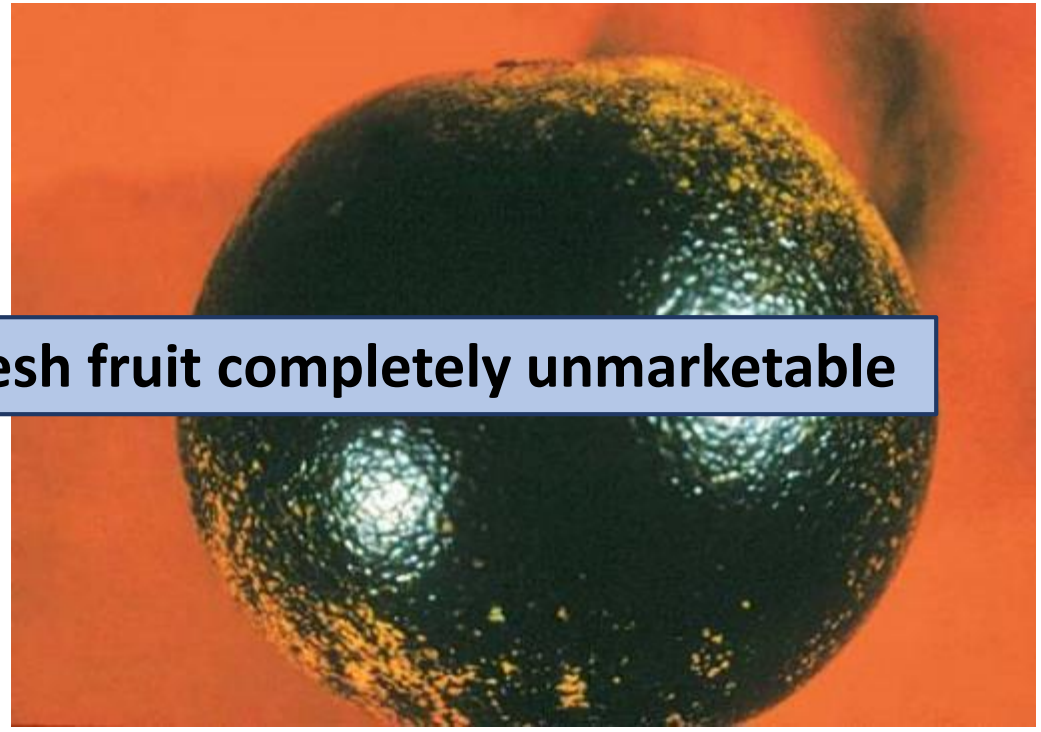
- Mainly damage FRESH fruit
- Populations flared by copper and broad spectrum insecticides (esp. pyrethroids)
  - Copper is used to manage canker
  - Pyrethroids commonly used (ex: bifenthrin, fenpropathrin, permethrin…)

Citrus Rust Mite (CRM) & Damage



Pink Citrus Rust Mite (PCRM) & Damage

Rust Mite Damage

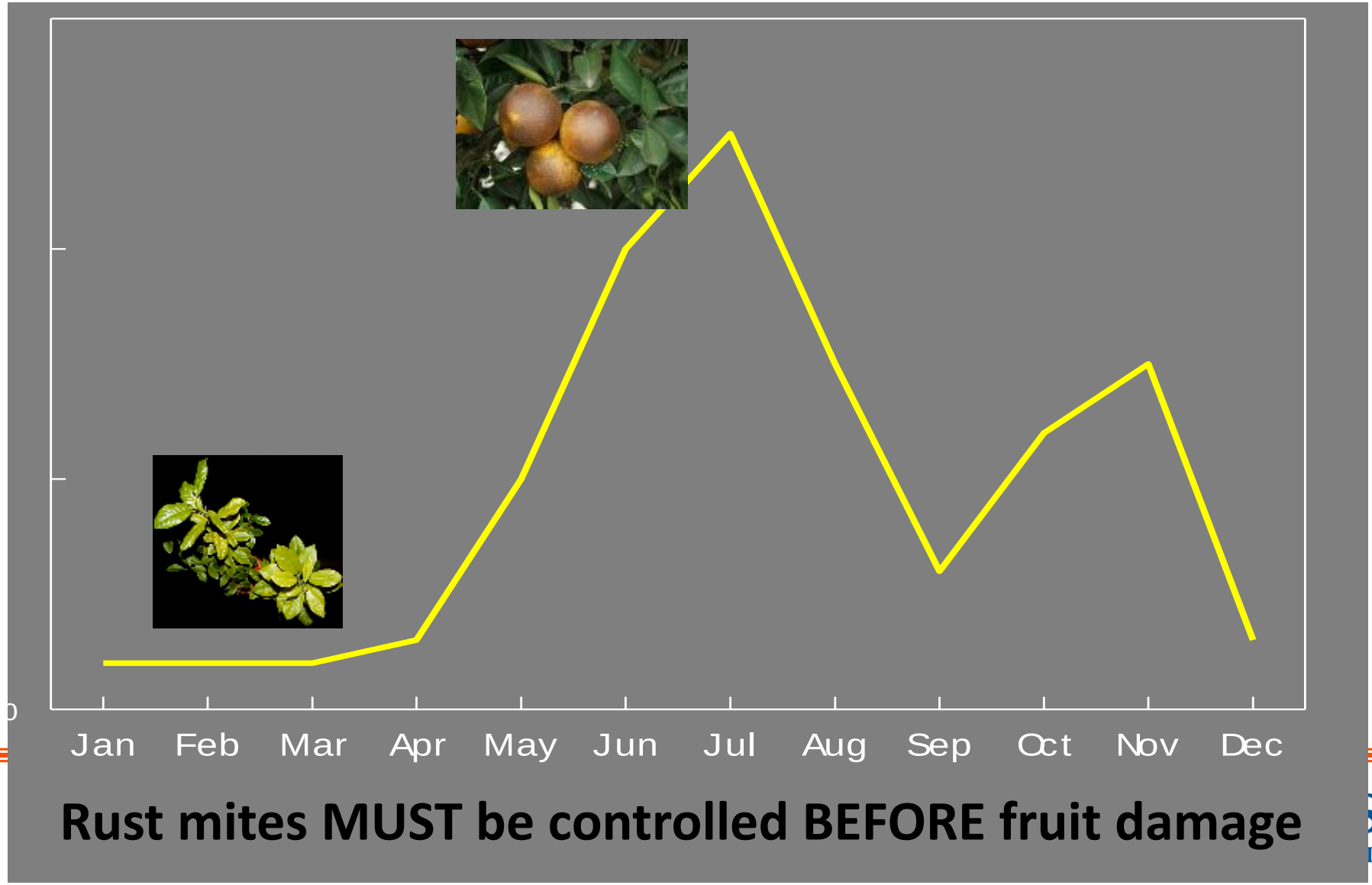


High levels of rust mite damage makes fresh fruit completely unmarketable

“Sharkskin”: early damage to developing fruit

Bronzing: later damage to fruit

Citrus Rust Mite seasonality

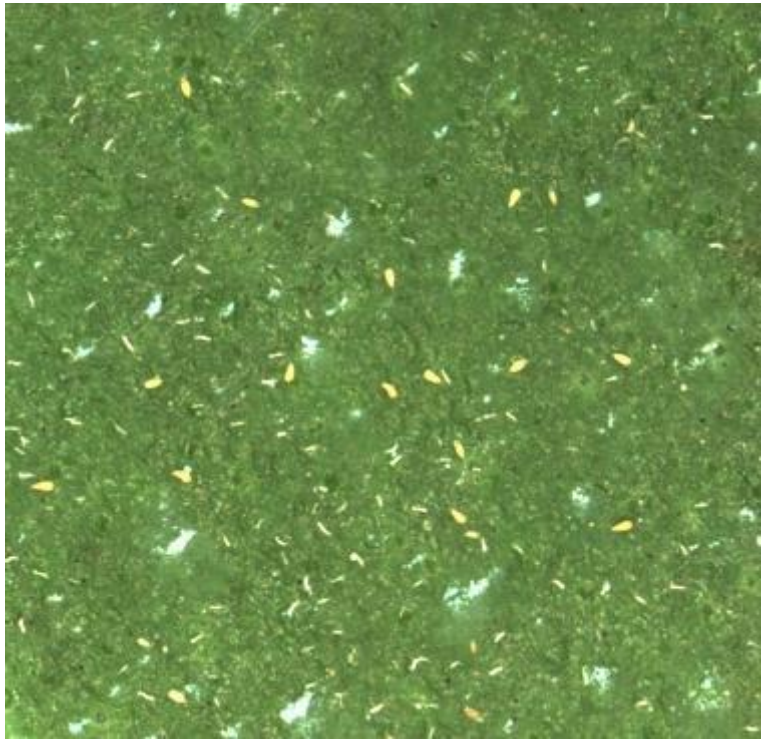


Rust mites MUST be controlled BEFORE fruit damage

How do I look for rust mites?

Note: Rust mites are SMALL and FAST!

Underside of leaves

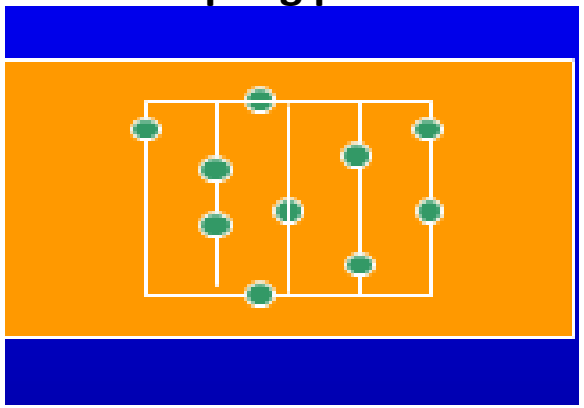


Protected (back) side of fruit

Rust mite sampling

- Frequency
  - Processed: Start in early April, look on leaves & fruit, monitor every 2-3 weeks
  - Fresh: Start in early April, look on leaves & fruit, monitor every 10-14 days
- Random stops/10 acre block = 20
- # fruit/stop = 4
- Location of fruit = midway in canopy
- Lens field per fruit = 1
- Count # mites/lens field
- Action Thresholds:
  - Processed: 10 rust mites/ 2 cm^2 (average)
  - Fresh: 2 rust mites/ 2 cm^2 (average)

Example of randomized sampling pattern



2018-2019 Florida Citrus Production Guide
https://crec.ifas.ufl.edu/extension/pest/PDF/Rust%20Mites.pdf

Spider mites

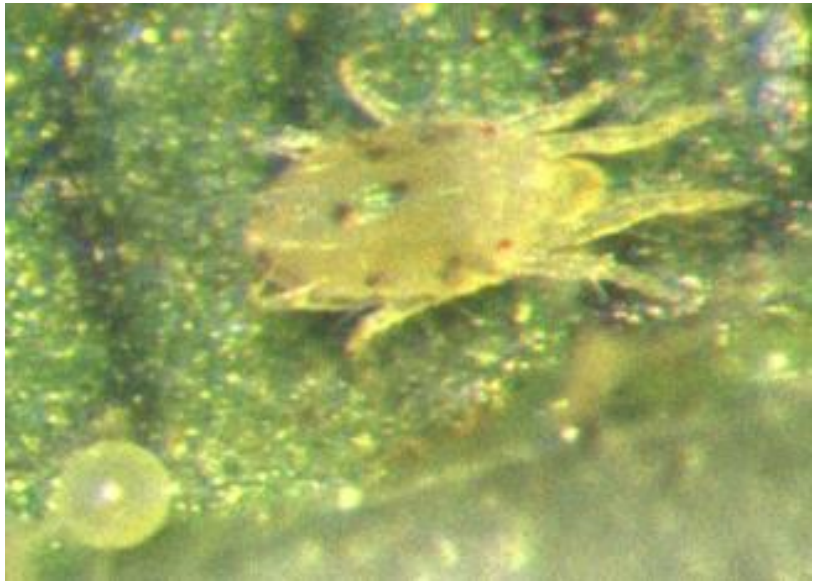
- Populations increase during dry weather
- Feed on upper surfaces of young, hardened leaves
  - Damage: stippling, firing, leaf drop

Common spider mites in florida citrus

Citrus red mite
Panonychus citri

Texas citrus mite
Eutetranychus banksi

Six-spotted mite
Eotetranychus sexmaculatus



Spider mite sampling

- Weekly or biweekly
- Sample unit = mature leaf immediately behind flush leaves
- Sample 4 leaves/tree from 6 trees from 4 areas per 10 acres (96 leaves total from 24 trees/10 acres)
- Threshold will vary depending on market
- Several species of predatory mites often keep spider mites to low levels, BUT 5-10 mites per leaf between September and May (FL) = time to treat

Timing based Citrus miticide selection

Supplemental (early spring)	Post Bloom	Summer	Fall	Supplemental Fall
--	--	Agri-mek + oil	--	--
Apta	Apta	--	Apta	Apta
--	--	--	Comite	Comite
Envidor	Envidor	Envidor	Envidor	Envidor
--	Petroleum oil	Petroleum oil	Petroleum oil	--
--	--	--	Sulfur	Sulfur
--	--	Micromite	Micromite	--
--	--	--	Nexter	Nexter
Movento	Movento	Movento	--	--
Vendex	Vendex	--	Vendex	Vendex

*Except for petroleum oil, **do not use the same miticide chemistry** more than once a year

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Biological control of mites

- **Predators:**
  - **Other mites**
  - **Predatory insects: lady beetles, lacewing larvae, sixspotted thrips**
  - ***Hirsutella* fungus**

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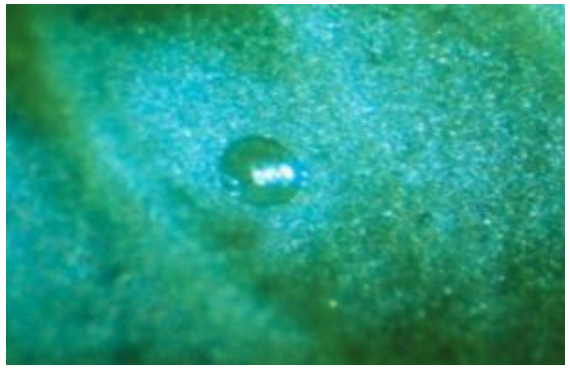
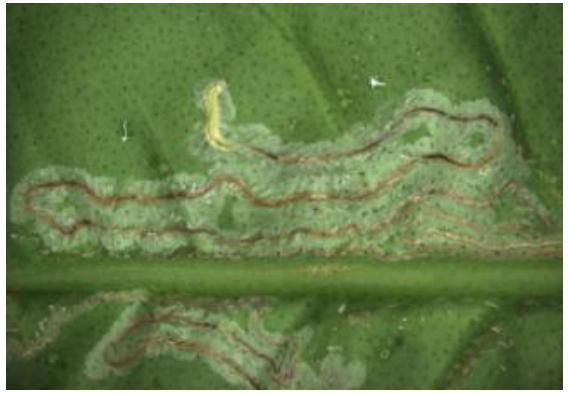
General mite management review

- Know your pest!
  - What mite(s) you are working with
  - Seasonality (probably needs to be worked out for N Florida)
- Biological control may be sufficient (monitor populations)
- Chemical management
  - Fresh market fruit in FL get treated 3-4x per year; Processed 1 or less
  - **ROTATE!!!!!!!** DO NOT USE THE SAME CHEMISTRY MORE THAN ONCE/YEAR (exception: petroleum oil)






Citrus leafminer (CLM)- *Phyllocnistis citrella*

Citrus leafminer (CLM)

- CLM are present year-round, populations start building in late spring/early summer
- Can devastate young trees by severely limiting photosynthetic capacity
- Adults very small, hard to see in orchards, larvae are apparent once they start to feed in leaves
- Damage from larval feeding creates opening that enable canker easy entry into leaf tissue

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Choice & Timing of Pesticide Applications (current IFAS recommendations)

Non-bearing/young citrus

- soil-applied imidacloprid application is the best option for preventing CLM damage (current UF/IFAS recommendation)
- applications should be made 10-14 days prior to anticipated flush
- expect about 8 weeks of control
- soil-applied imidacloprid just prior to summer flush and again just prior to the fall flush should provide control of CLM during this peak time for CLM damage
- may also provide control of Asian citrus psyllid during these times as well

Choice & Timing of Pesticide Applications
(current IFAS recommendations)

Bearing citrus

- preventing damage on bearing trees for canker management much more difficult
- must rely on foliar applications if control warranted
- there are no soil-applied systemic insecticides available for CLM control on large, bearing trees

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Biological Control of Citrus Leafminer

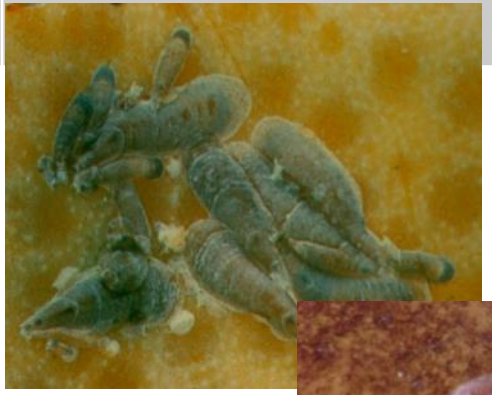
Ageniaspis citricola: Imported into Florida from Australia in 1994

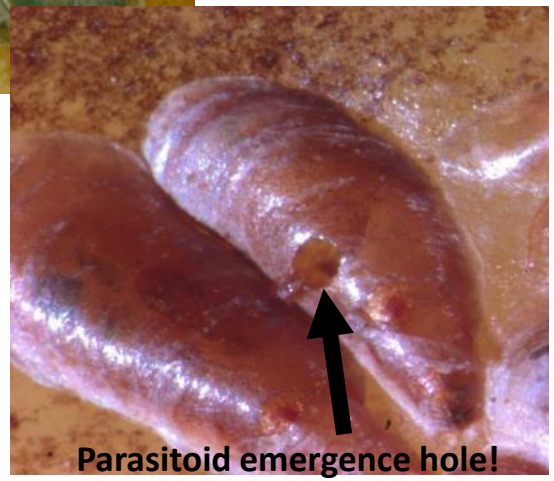
BEFORE intense ACP management, parasitism rates up to 86% were observed late in the season.

NOW-?

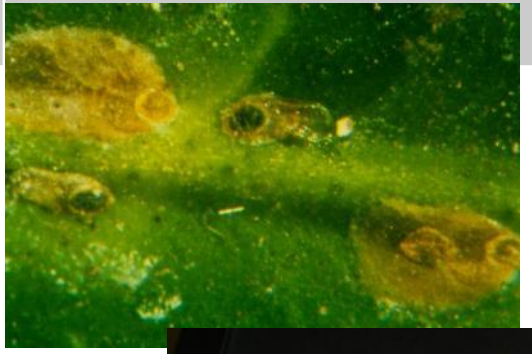
Scales- Direct Fruit Damage

Florida red scale *Chrysomphalus aonidum*	Purple scale *Lepidosaphes beckii*	Chaff scale *Parlatoria pergandii*
-Feeds on: leaves, twigs, fruit -Damage: discoloration at feeding site	-Feeds on: fruit, leaves, and twigs -Populations are highest in late spring/early summer -Parasitoid (*Aphytis lepidosaphes*) introduced in 1950s to manage	-Found on trunk and inner canopy -Fruit feeding causes spotting -Slow rate of reproduction + parasitoid *Aphytis hispanicus* historically kept populations low



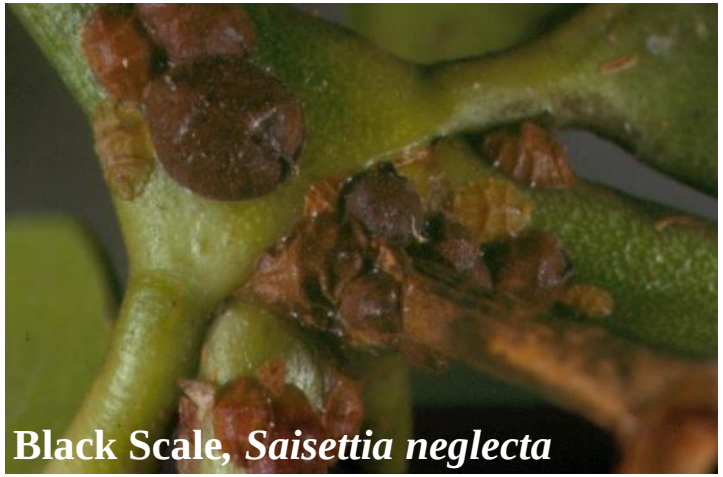


Parasitoid emergence hole!



Scales- Sooty mold promoters

- Soft scales -> make a lot of honeydew


Black Scale, *Saisettia neglecta*


Green scale, *Coccus viridis*


Cottony Cushion Scale, *Icerya purchasi*


Brown Soft Scale, *Coccus hesperidum*

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Other sooty mold promoters – Aphids

- Depend on newly expanding leaves for development
- Cause leaf curling
- Present in higher numbers when large amounts of flush are present (late spring/early summer)
- Consumed by a variety of natural enemies
- Treatment warranted on young trees when >50% of new foliage is infested
  - Suggested materials in chapter 22 of 2018-19 Production Guide


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Other sooty mold promoters - Whiteflies

- Normally present in low numbers, unless high populations present, do not generally require management actions
- Historically controlled by natural enemies:
  - Parasitoids
  - Predatory insects/spiders
  - Fungi

Citrus whitefly nymphs-controlled by parasitoid

Cloudy-winged whitefly with entomopathenogenic fungus

Remnants of parasitized woolly whitefly (CREC Nov. 2018)

General Scale, Aphid, Whitefly Management

- Non-chemical management
  - Natural enemies: parasitoids, predatory insects, entomopathenogenic fungi

- Chemical management
  - Nothing specific to these pests
  - Most materials for these pests are also used for ACP, try to manage multiple pests with one application to reduce overuse of insecticides and the potential for resistant pest populations to occur

Thrips

- Several species present in citrus
- Management challenges
  - Migrate between hosts, complicated life cycle
  - Most active when honeybees are present
- Treatment threshold for <u>orchid thrips</u> in <u>grapefruit</u> only:
  - 20 or more thrips per sample
  - Sample methods per 10 A, page 102 of 2018-19 Citrus Production Guide


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Thrips Damage

- Early feeding in flower -> “halo” on fruit

- Cause rind blemishes on developing fruit, in particular “ring spotting”
- Develop in protected areas (under calyx, between touching fruit)

Image courtesy of Brad Turner

Questions?

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