

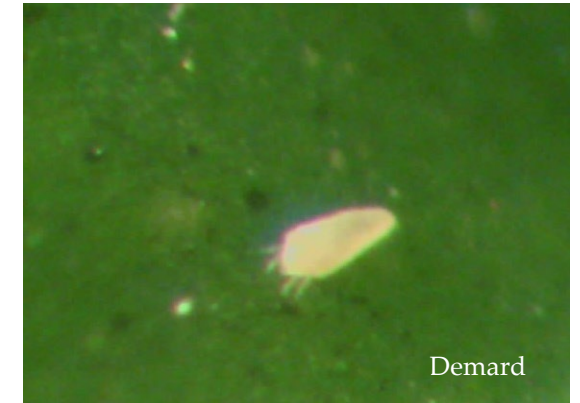


Rust Mites in Citrus

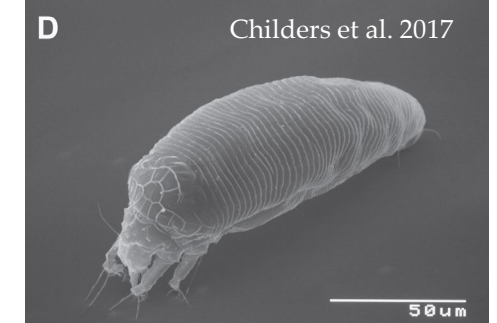
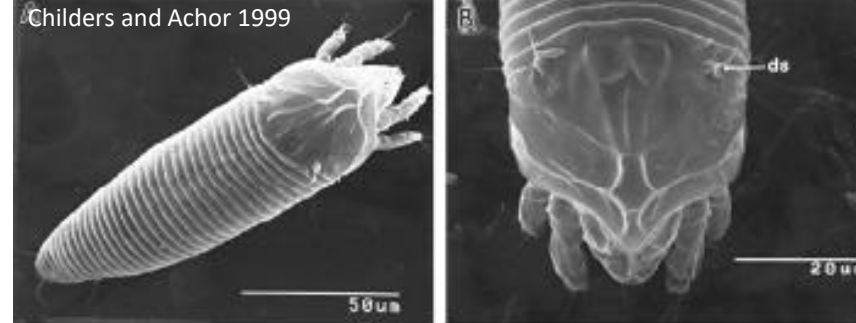
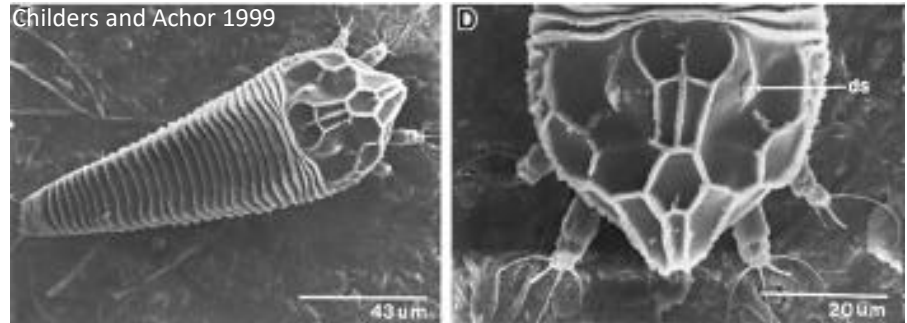
Emilie Demard, UF/IFAS CREC

What are rust mites?

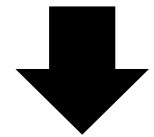
- Acari, Eriophyidae
 - Only 2 pair of legs
 - Extremely tiny $\approx 150 \mu\text{m}$ \rightarrow hand lens
- Physical characteristics
 - Slow movers
 - White, yellow, pink to light brown
- Economic damage mainly caused on fruit
- Two species of economic importance in Florida



Rust mites: species complex



Diptilomiopus floridanus



First discovered in 2008,
Still poorly studied



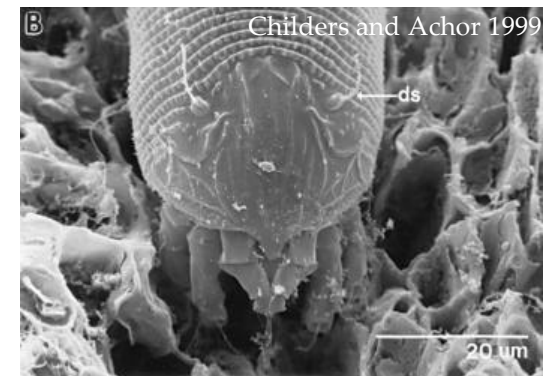
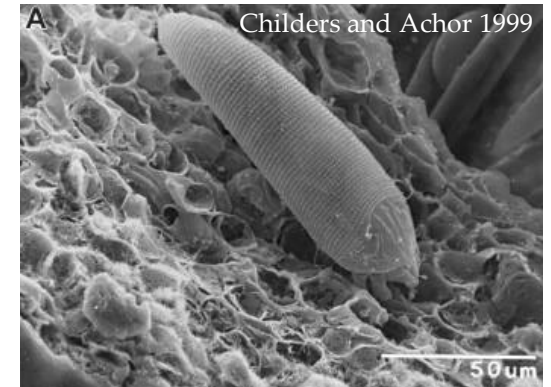
The citrus rust mite (CRM)
Phyllocoptruta oleivora



The pink citrus rust mite (PCRM)
Aculops pelekassi

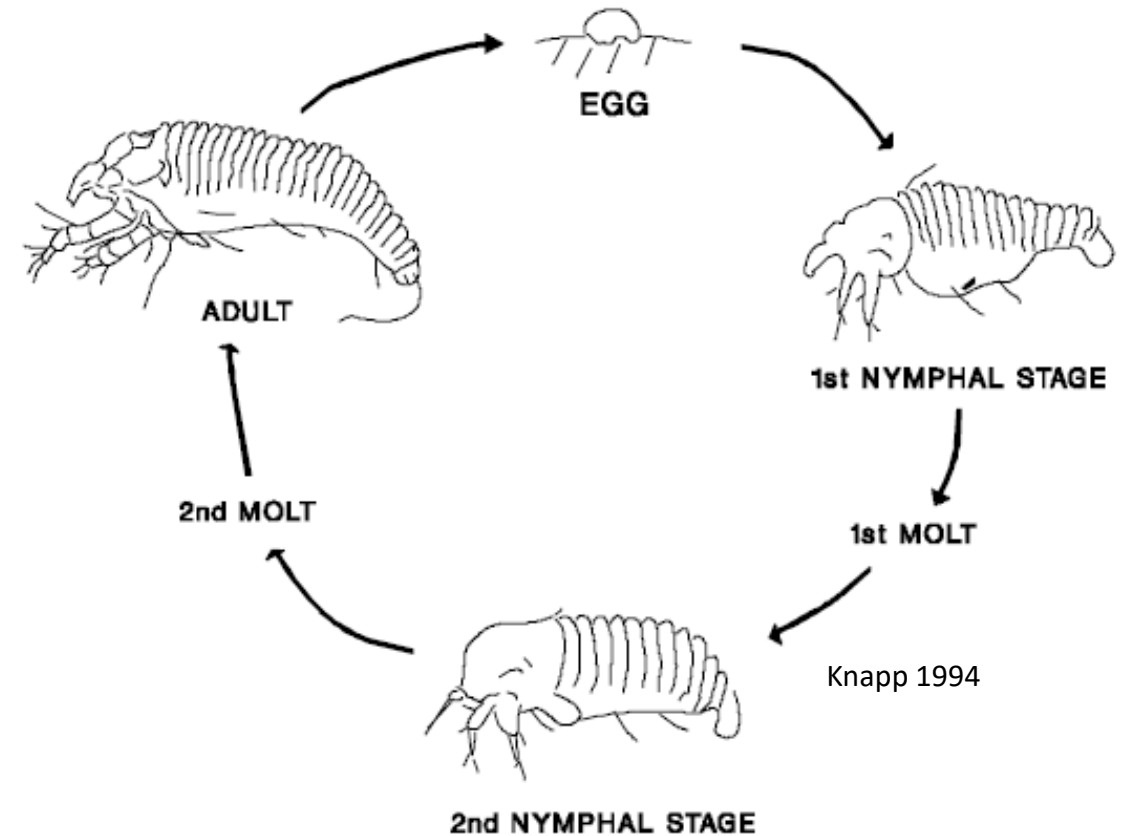
The citrus bud mite: *Aceria sheldoni*

- Not considered of economic importance in Florida
- Description: White in color
- Location: under the calyx of fruit, on buds, at petiole bases, in developing blossoms
- Damages: Distorted leaves, twigs, or fruits
- Can increase in September-February



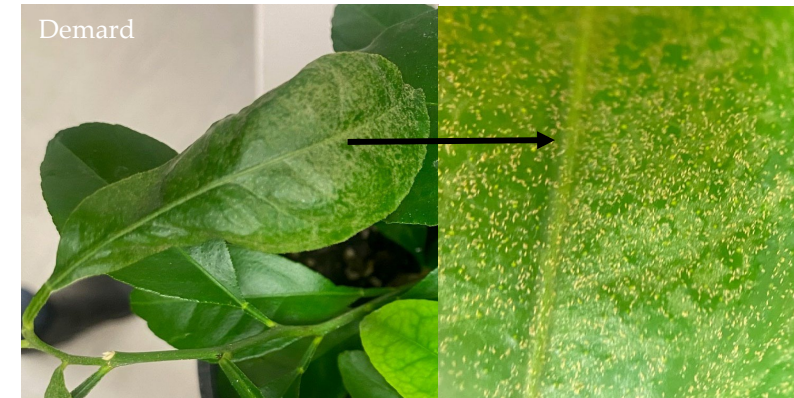
Biology of rust mites

- During summer, 10 days to go from egg to adult
- Up to 30 generation/year for CRM
- PCRM: Starts April-May and peaks in June-July
- CRM: Starts in May-July and peaks in August
- Estimated proportion of rust mites in Florida citrus groves: 75% CRM and 4-22% PCRM



Damage

- On leaves
 - Upper surface: bronze-like damages, yellowish discoloration
 - PCRM: Leaf distortion and curling of leaf margins
- On fruit
 - Immature fruit: destruction of epidermis cells resulting in russeting (*sharskin*)
 - Mature fruit: polish appearance (*bronzing*)
- Increase in fruit drop and water loss, reduce juice quality



How to monitor for rust mites?

- When?
 - Scout leaves in spring (April-May) and fruit early summer
 - Monitor throughout summer until fall (October)
- How often?
 - Every 10-14 days from April-September
- How?
 - With a hand lens (X10)
 - Count the number of mites in one lens field (1 lens field=1.53 cm²)



Threshold for pesticide intervention

- 6 rust mites/cm² for processed fruit
- 2 rust mites/cm² for fresh fruit

How to monitor for rust mites?

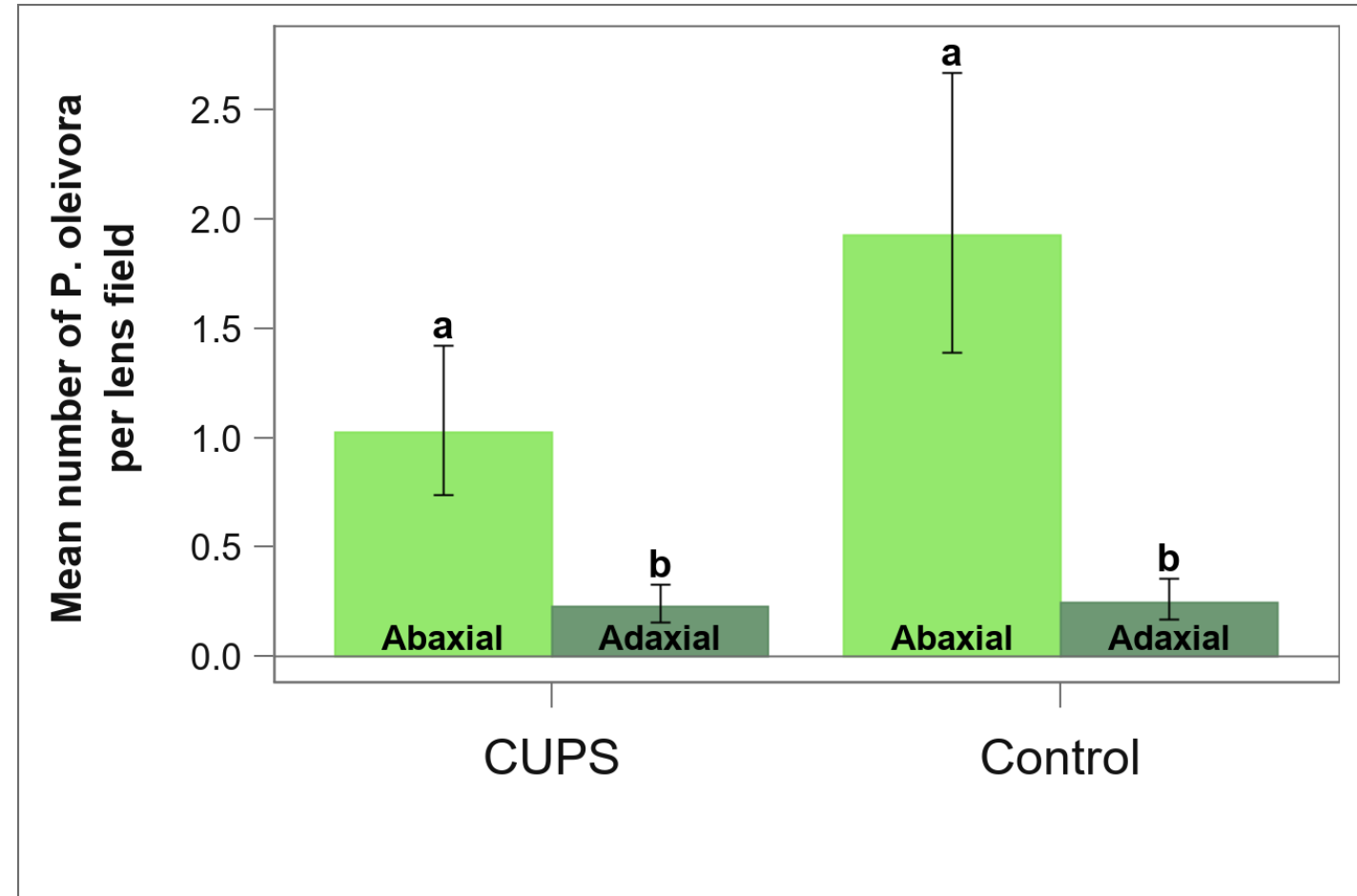
- Where?
 - Select leaves and fruit midway in canopy
 - Fruit: between shade and sun
 - Leaves: prefer abaxial surface (lower side)



Abaxial surface

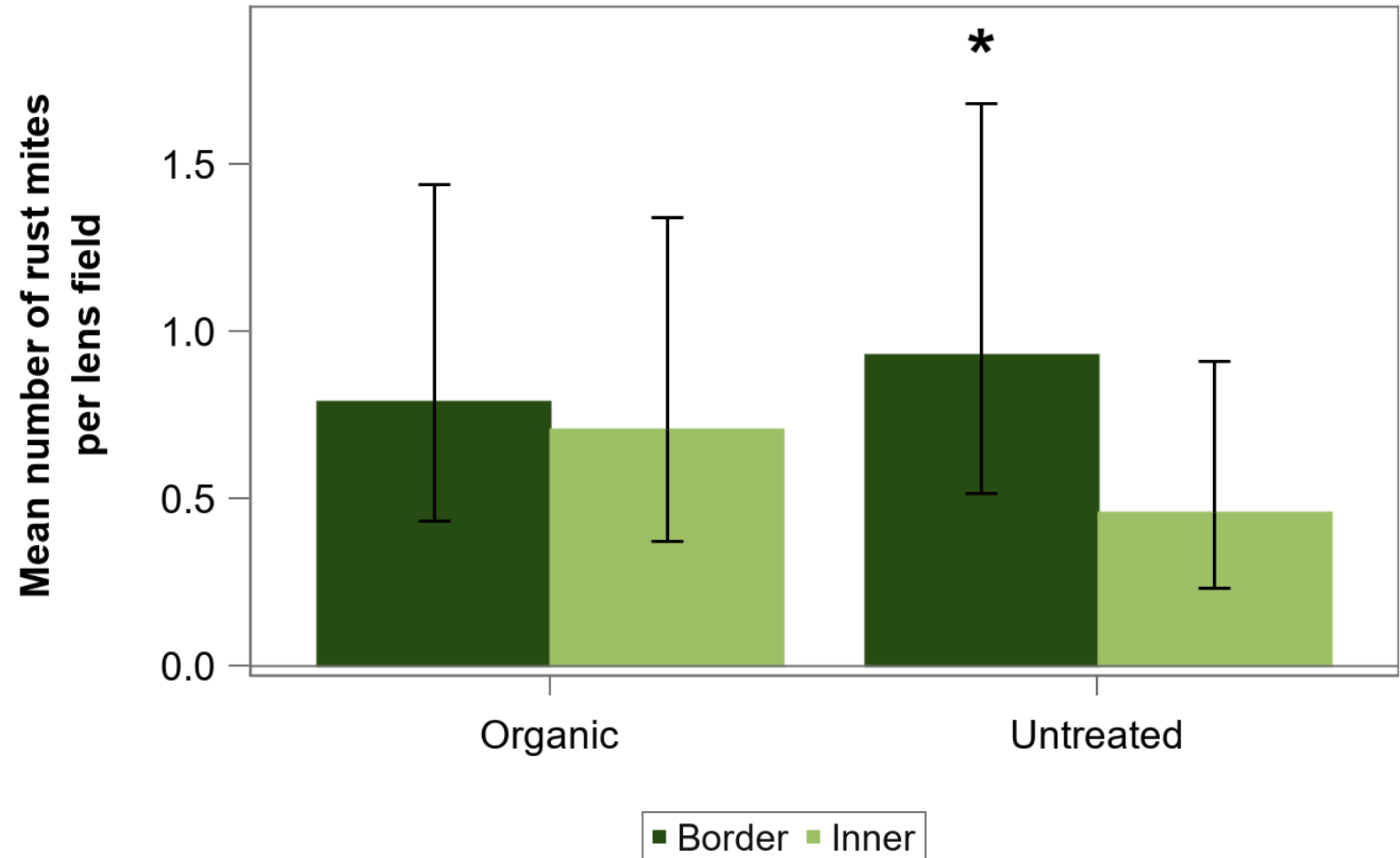


Adaxial surface



How to monitor for rust mites?

- Where?
 - North bottom quadrant of tree is preferred
 - Border effect: higher density on trees located at the edge of the grove



Natural enemies

- Predatory mites
 - Phytoseiidae
 - Stigmaeidae (*Agistemus floridanus*)
 - Iolinidae (*Pronematus ubiquitousus*)?
- Insects
 - Cecidomyiidae (*Feltiella* n. sp and *Lestodiplosis*)
- Entomopathogenic fungi
 - Ex: *Hirsutella thompsonii*, *Beauveria bassiana*



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Chemical control of rust mites

Chemicals registered for use in Florida citrus groves

Active ingredient	Brand name	IRAC MOA
Diflubenzuron	Micromite	15
Spirotetramat	Movento	23
Tolfenpyrad	Apta	21A
Pyridaben	Nexter	21
Abamectin + Thiametoxam	Agri-Flex	4A+6
Abamectin	Agri-Mek	6
Fenbutatin-oxide	Vendex	12B
Spirodiclofen	Envidor	23
Propargite	Comite	12C
Horticultural oil	-	Unknown
Sulfur	-	Unknown

Chemical control

- Resistance documented
 - Dicofol, zineb, fenbutatin oxide, diflubenzuron
 - Tolerance to abamectin (e.g. Agri-mek)
- Negative effect on natural enemies
 - Abamectin, fenbutatin oxide, pyridaben and copper → reduced the abundance of phytoseiids



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Summary

- Two species of economic importance
- Major pest in CUPS
- Scout leaves and fruits every 10-15 days during summer
- Chemical control is a fast solution, but resistance development is a concern
- Rotate Mode of Action
- Few natural enemies available





References

- Childers, C., C., Rogers, M., E., Ebert, T., A., Achor, D., S., 2017. *Diptilomiopus floridanus* (Acari: Eriophyoidea: Diptilomiopidae): Its distribution and relative abundance with other Eriophyoid species on dooryard, varietal block, and commercial citrus in Florida. Florida Entomologist 100, 325-333.
- Childers, C.C., Achor, D.S., 1999. The eriophyoid mite complex on Florida citrus (Acari: Eriophyidae and Diptilomiopidae). Proceedings of the Florida State Horticultural Society 112, 79-87.
- Knapp, J.L., 1994. Citrus rust mite fact sheet ENY619. University of Florida (IFAS) Florida Cooperative Extension Service, Gainesville, FL.
- Qureshi, J.A., Stelinski, L.L., Martini, X., Diepenbrock, L.M., 2021. Florida Citrus Production Guide: Rust mites, spider mites, and other phytophagous mites. EDIS publication CG002/ENY-603, University of Florida, Gainesville, FL, pp. 125-131.



Thanks for your attention!

Any questions?

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