

Incorporating newer pest challenges into a multi-pest management approach to citrus

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Impacts of Asian citrus psyllid and HLB on insect in Florida citrus

- Increased insecticide inputs for insect management from late 1990s through 2017/2018
- New data supported flush-timed management for ACP, reduced insecticidal inputs
- Heavy insecticide use followed by drastic reduction opened the door for other pests



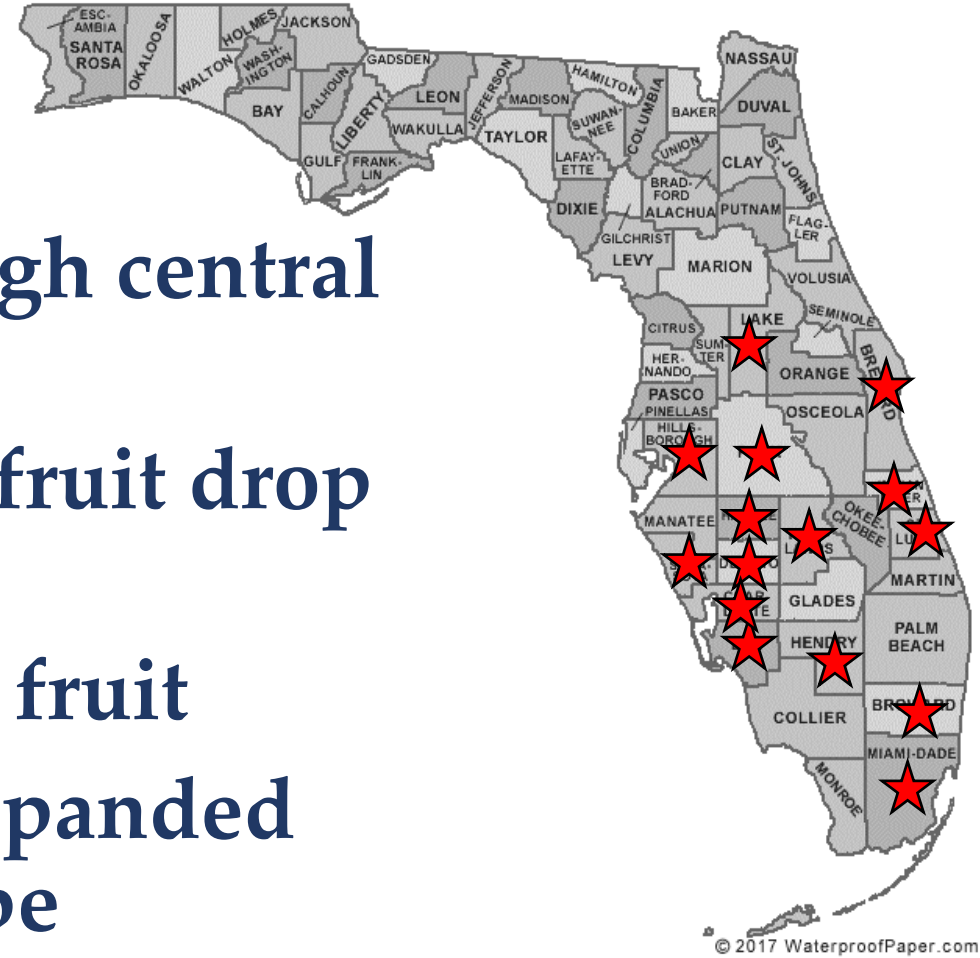
Old pest resurgences

- Citrus leafminer
 - Parasitoids not commonly found after decades on intense management
 - Populations of CLM kept in check by ACP sprays until recently
 - Now problematic for all resets in open fields
- Diaprepes
 - Populations likely kept in check as a by-product of ACP management
 - Now becoming problematic again in some regions



New pest challenge: Lebbeck mealybug

- Found in 2019, now spread through central and south Florida
- Early season infestation leads to fruit drop
- Infestation while later in fruit development can cause distorted fruit
- Infestation once fruit are fully expanded won't distort fruit but fruit will be unmarketable



Fruit damage by infestation timing related to fruit development



Post bloom/
fruit set



Infestation during fruit
growth/expansion

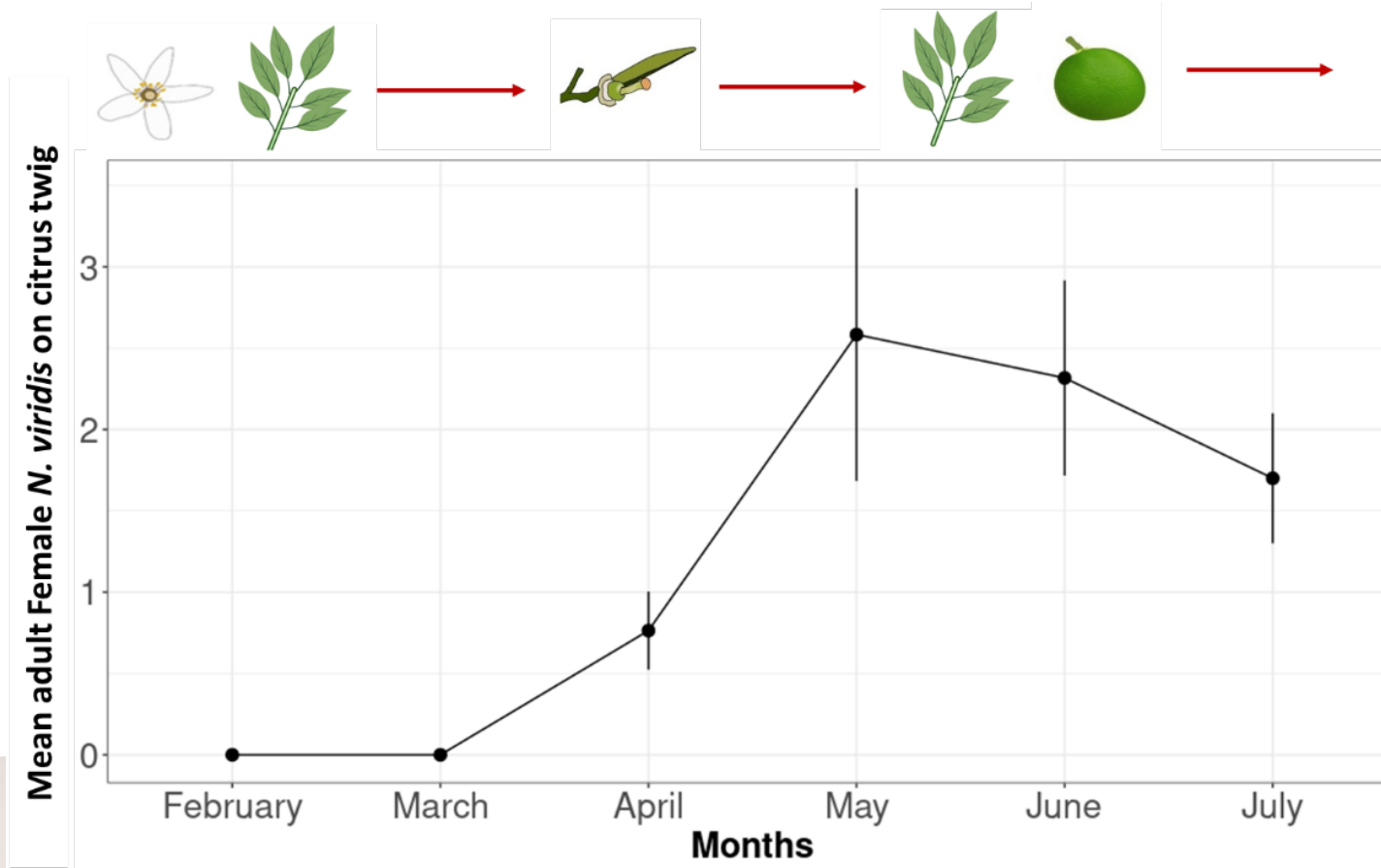


Infestation once fruit growth
is complete, before color

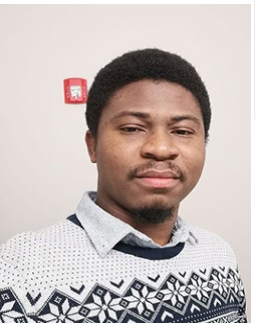


Lebbeck mealybug population growth. January - July 2021

- Graph is of adult females /reproductive

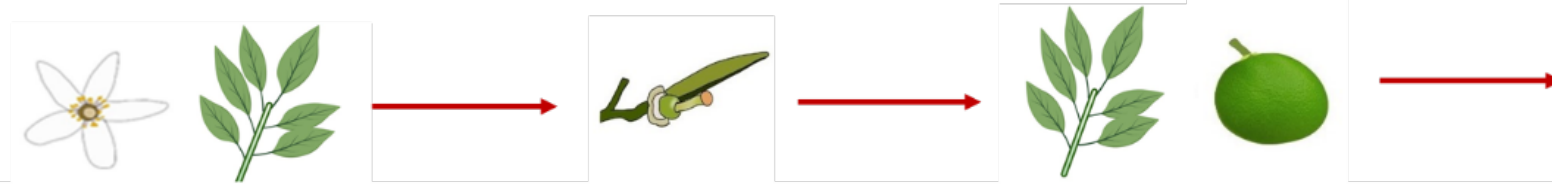


- DO NOT require males to reproduce
- Juvenile numbers higher, peaked in June
- Population timed with FRUIT development (early season)

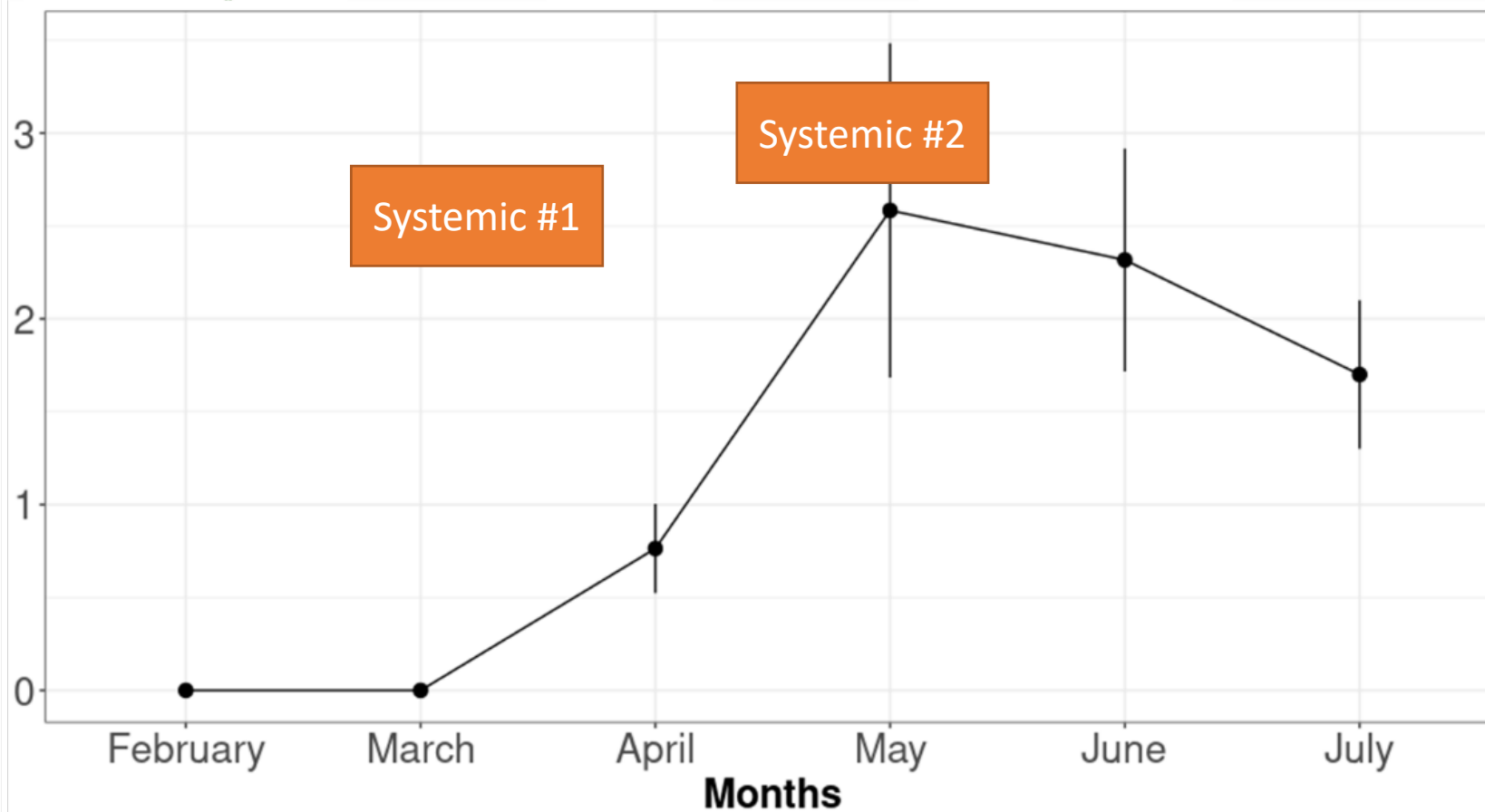


David Olabiyi,
Dissertation research

Managing to minimize loss



Mean adult Female *N. viridis* on citrus twig



- Target developing populations
- Systemic materials will reduce offspring by killing females
- Systemics have fewer impacts on predators

Are there predators to consider?

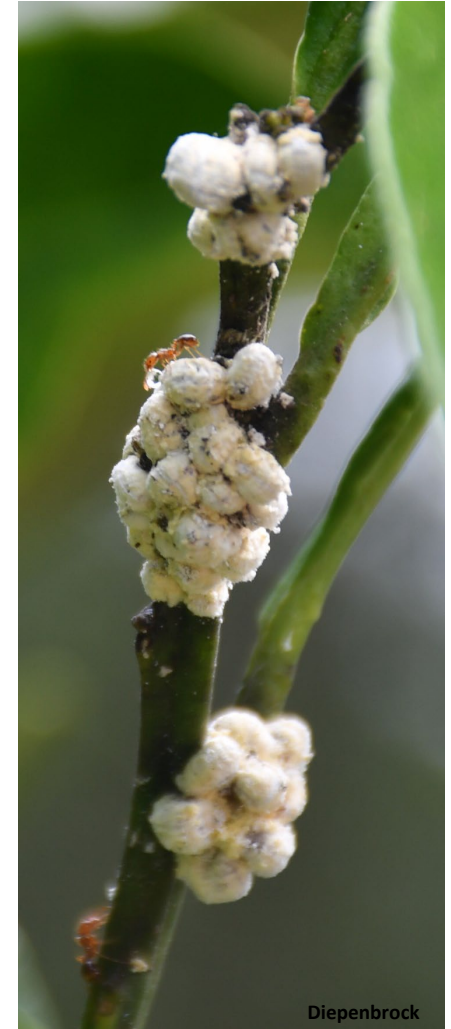
- There is a suite of predators present in our groves!
- Need to include these in management plans



Dr. Eric Middleton
Postdoctoral Researcher

How to keep lebbeck mealybug predators in our groves

- Minimize use of broad-spectrum materials when active
 - Knockdowns in winter, less predator activity
- Fire ant control
 - More predators present when fire ants colonies are reduced
 - Fire ants are aggressive mealybug farmers
 - Mealybug honeydew = easy food for ants, will protect from predators
 - Baits work best for fire ants



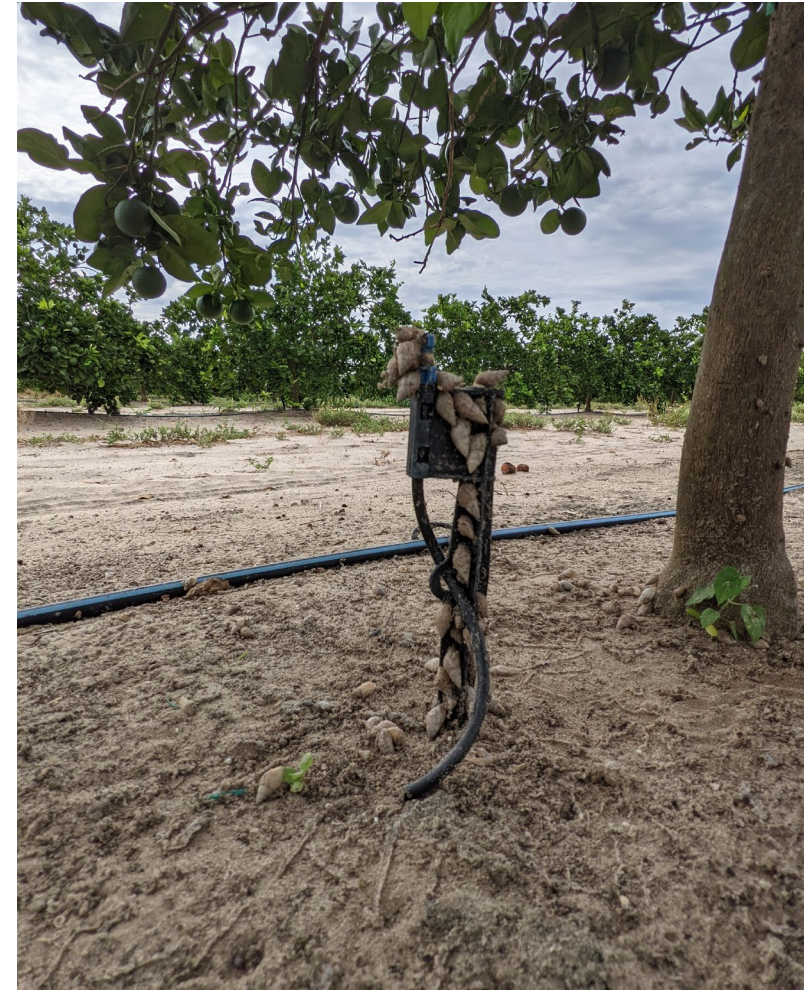
Diepenbrock



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New pest challenge: *Bulimulus* snails

- First found in Duval County in 2009
- Now present in Florida, Georgia, Mississippi, Louisiana, Texas, and Kentucky
- Wide range of impacted crops
- Damage to citrus:
 - Impacts irrigation
 - Feeding on young trees in IPCs
 - Adding to existing damage (ex: freeze damage to trunks)



What do we know about them?

- Present in groves year-round
- Attracted to moisture
- Attracted to dead, damaged, and decaying plant material
- Activity periods tied to times when habitats are moist, less hot
- **CANNOT KILL WITH INSECTICIDES**



Laboratory bait assays

Product	Active ingredient	Labelled Rate(assay rate)	Mortality 7 Days after application
Sevin XLR Plus	Carbaryl	3 qt/a	0%
Celite 610	Silicon Dioxide	10% V/V in water	30%
Deadline GT	Metaldehyde	3.33lb/a (100x)	90%
Deadline MP	Metaldehyde	40 lb/a (100x)	96%
Ferrox	Sodium Ferric EDTA	0.5 tsp/sq yd (100x)	100%
Imidan	Phosmet	3 lb/a	0%
Ironfist	Sodium Ferric EDTA	1lb/1000 sq ft	92%
Sluggo	Iron Phosphate	1 tsp/sq yd (100x)	92%
control	na	na	20%



How do we manage these snails in groves?

- Needs research to develop biologically relevant management
- Some citrus growers have had short term success with a Deadline GT- metaldehyde active ingredient with attractive odor
 - Not a long-term control option
- Limit spread on people and equipment



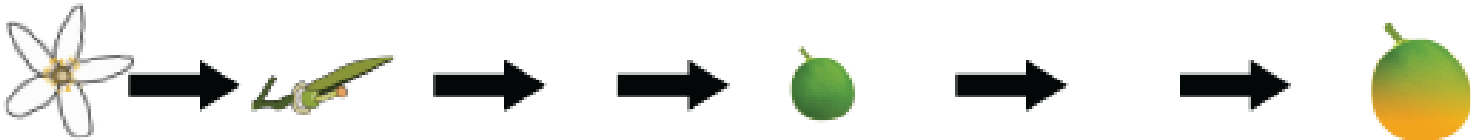


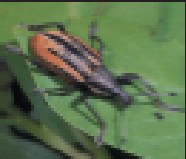
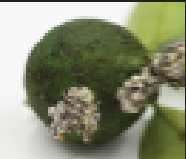

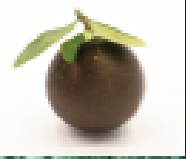
Transport on a human



Farm equipment

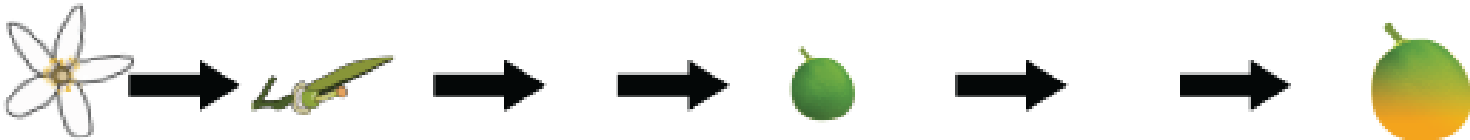


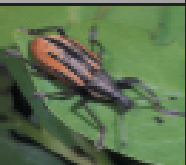
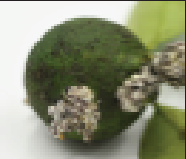


How do we incorporate resurgences of older pests and new pests into our management plans?



CITRUS PEST													
		JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
Asian Citrus Psyllid													
Citrus Leafminer													
Diaprepes Root Weevil													
Lebbeck Mealybug													
Bulimulus snail													
Citrus Rust Mite													

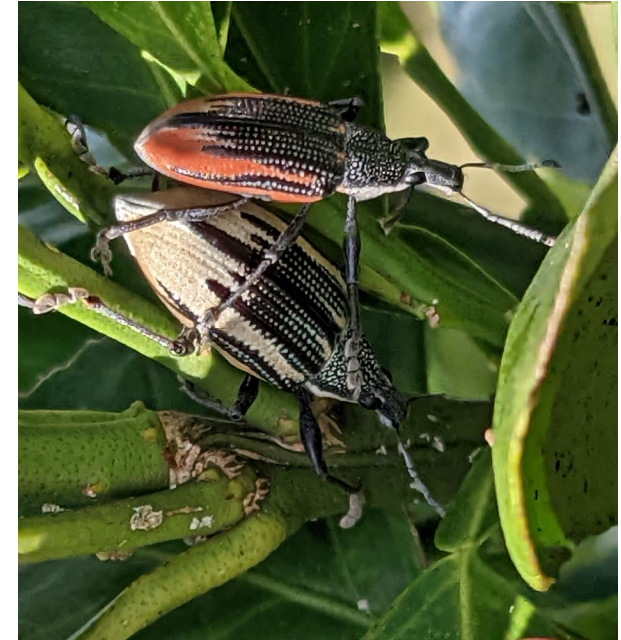
Print outs available at the UF IFAS booth

Targeting multiple pests with appropriately timed insecticide applications

CITRUS PEST													
		JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
Asian Citrus Psyllid													
Citrus Leafminer				Target ACP, CLM, and lebbeck mealybug						Target ACP, CLM, and lebbeck mealybug			
Diaprepes Root Weevil													
Lebbeck Mealybug													
Bulimulus snail				Apply baits for snails if needed									
Citrus Rust Mite													

If you have high Diaprepes pressure:

- Best management includes control of larvae
 - Prevent access to roots by barrier insecticide
 - Prevent access to roots using tightly woven ground cloth
 - Nematodes*
- And adult population reduction
 - Several broad-spectrum materials have documented efficacy (see production guide)



Towards developing a multi-pest approach to managing insect, mite, and molluscan pests in Florida:

Key points

1. Know when to manage pests for optimal control
2. Choose management options that work for multiple pests when possible
3. Sanitization helps reduce movement of unwanted organisms

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Questions?

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