# Lebbeck mealybug management

Citrus Insect Management Workshop 2025

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# *Nipaecoccus viridis* in Florida

- Naming conventions
  - Most of the world: Spherical mealybug
  - Entomological Society of America: Hibiscus mealybug
  - Florida Depart of Plant IndustryLebbeck mealybug
- Finds prior to establishment
  - Intercepted thousands of times at port on various crops
- First established population causing damage in Florida
  - December 2018, quickly spread thereafter

# Impacts on tree health

- Leaf chlorosis and death
- Sooty mold reduces photosynthesis
- Branch dieback
- Death of young trees





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# Fruit damage by infestation timing in relation to fruit development

Post bloom/ fruit set

Infestation during fruit growth/expansion

Infestation once fruit growth is complete, before color

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# How can we manage to minimize loss?

- Lebbeckmealybug is established, but will require management to sustain production
- Take advantage of seasonal biology when designing management program
- Use chemistries appropriate to life stages



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*Photo credit: L. Diepenbrock*

# Developing IPM for spherical mealybug in Florida citrus

- Population biology and general biology of the organism
- Chemical control options
- Reducing spread
- Biological controls (Dr. Quinn)
  - Managing ants to support biological control

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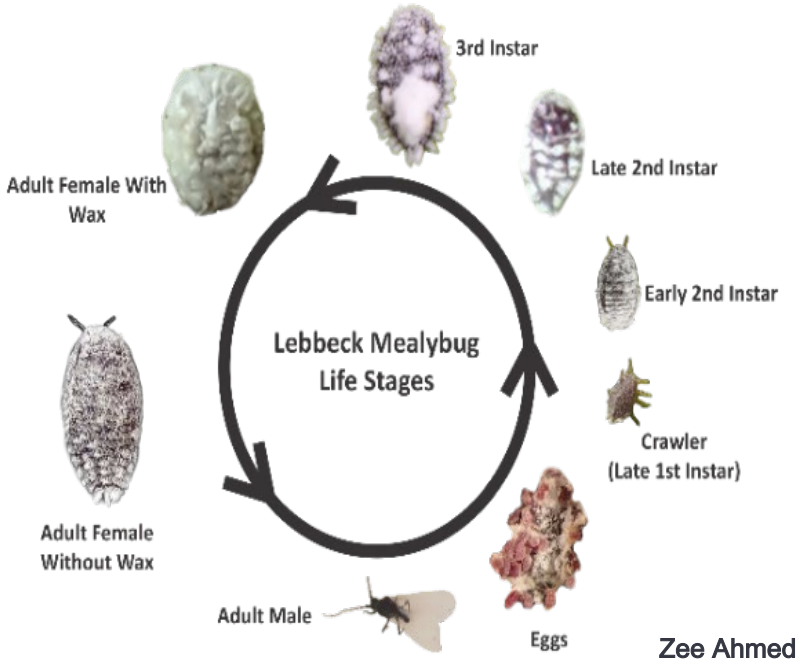
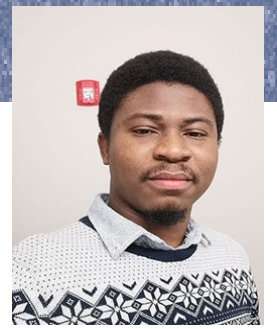
# Basic biology of *Nipaecoccus viridis*

- Highly polyphagous
- Development time 2-3 weeks in Florida citrus
- Sexual and asexual reproduction
  - Unmated females: 400-600 eggs
  - Mated females: 1,000+ eggs
- Continuous reproduction under optimal conditions



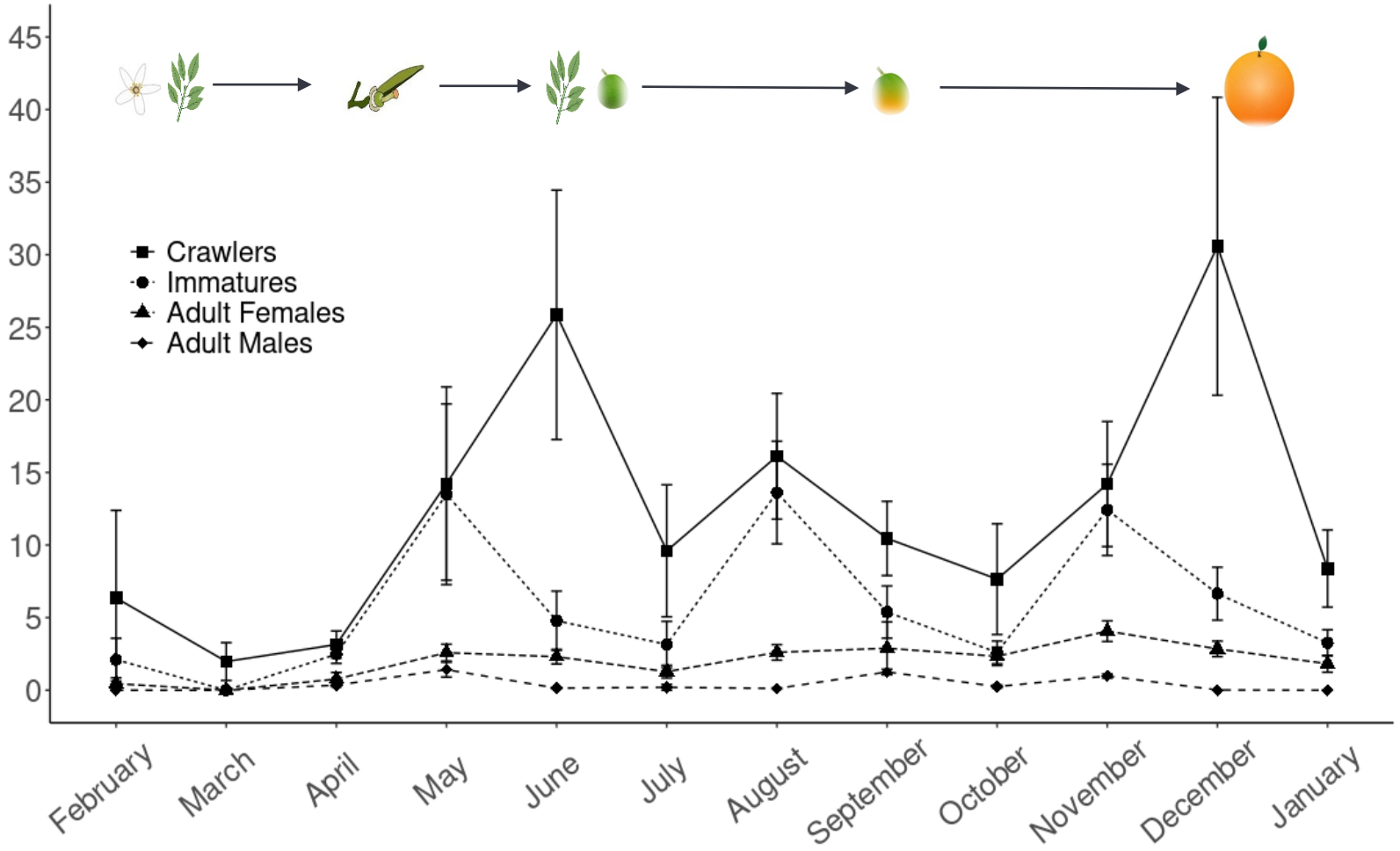

Zee Ahmed

# Seasonal phenology in commercial groves



Dr. David Olabiy

20 cm infested branch

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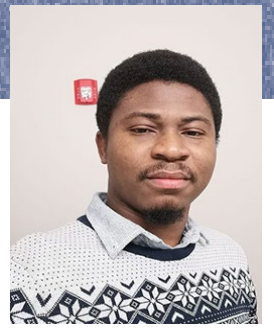
# Population structure in commercial groves



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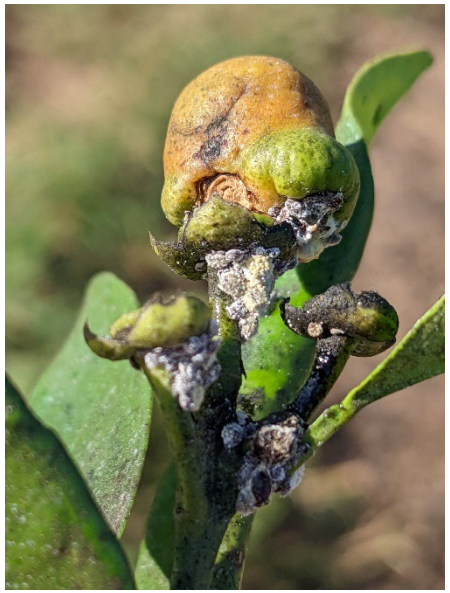

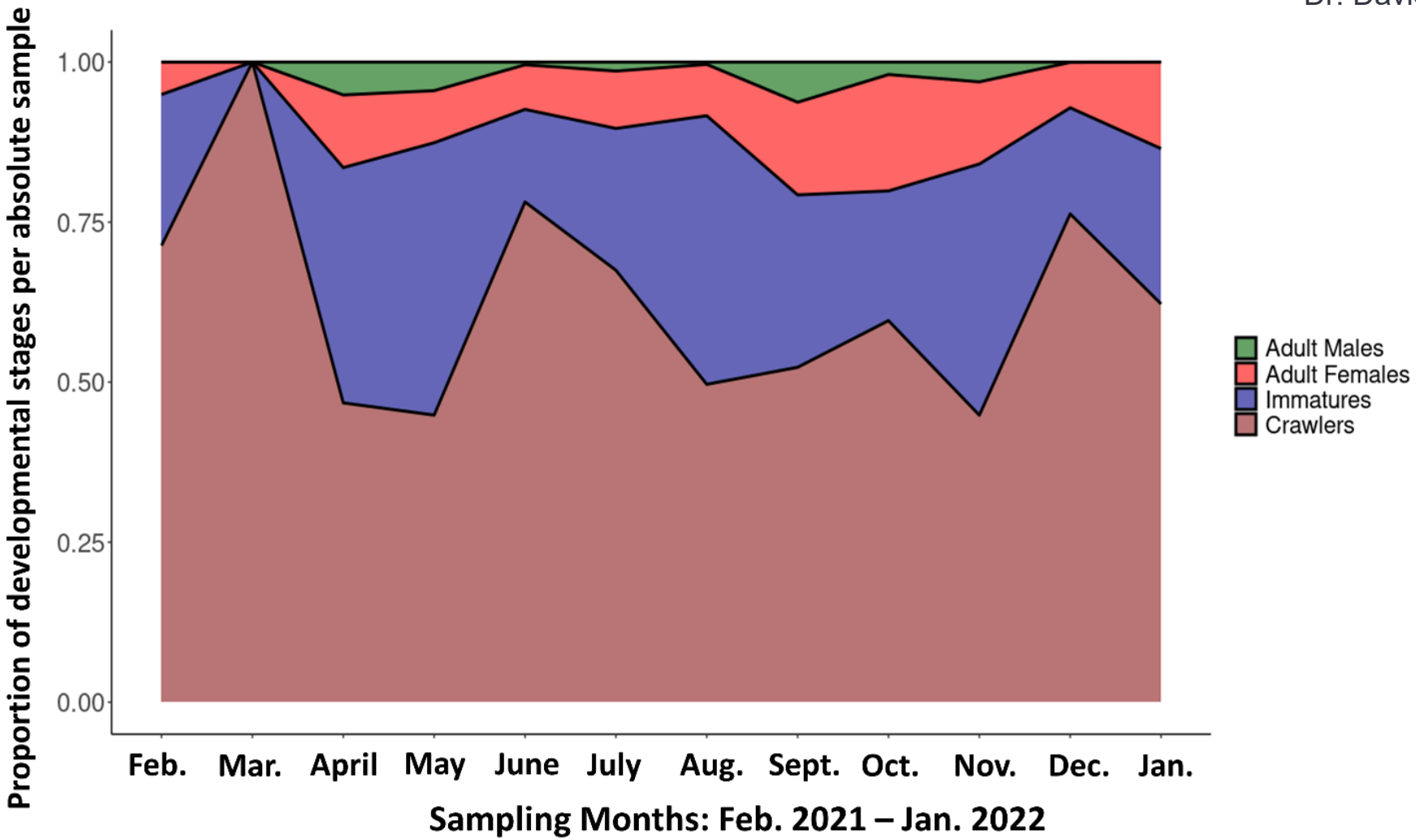


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# Targeting chemistries by life stage

- Screened 24 commonly used materials with mealybugs on their label for efficacy on 2nd-3rd instar nymphs
- Lab screening[1]:
  - carbamates, organophosphates, butenolides good contact kill
  - pyrethroids not effective
- Field testing (field aged, lab assay):
  - Soil applied chemistries[2]: 50% or greater mortality for 6 weeks after application for imidacloprid and aldicarb (carbamate)
  - Foliar:
    - Best contact options[3]: thiamethoxam + abamectin and sulfoxaflor, activity lost after 1 week

[1]Diepenbrock, L.M. 2021. Laboratory screening of conventional insecticides for the control of *Nipaecoccus viridis*, an invasive pest in Florida citrus. Arthropod Management Tests

[2]Middleton, E.G. and Diepenbrock, L.M. 2022. Efficacy of soil-applied insecticides against *Nipaecoccus viridis* instars. Arthropod Management Tests

[3]Demard, E. and Diepenbrock, L.M. *Accepted*. Semi-field screening of insecticides for the control of Nipaecoccus viridis, and invasive pest in Florida citrus, 2022. Arthropod Management Tests

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# Incorporating biology into management

| Life stage | Does it feed? | Is it mobile? | Contact Insecticide | Systemic Insecticide |
|---|---|---|---|---|
| Egg | No | No | | |
| Crawler | ? | Highly mobile | | |
| 2nd-3rd instars | Yes | Yes, but don't move too far unless provoked | | |
| Adult female | Yes* | No | | |
| Adult male | No | Yes, but doesn't cause new infestations | | |

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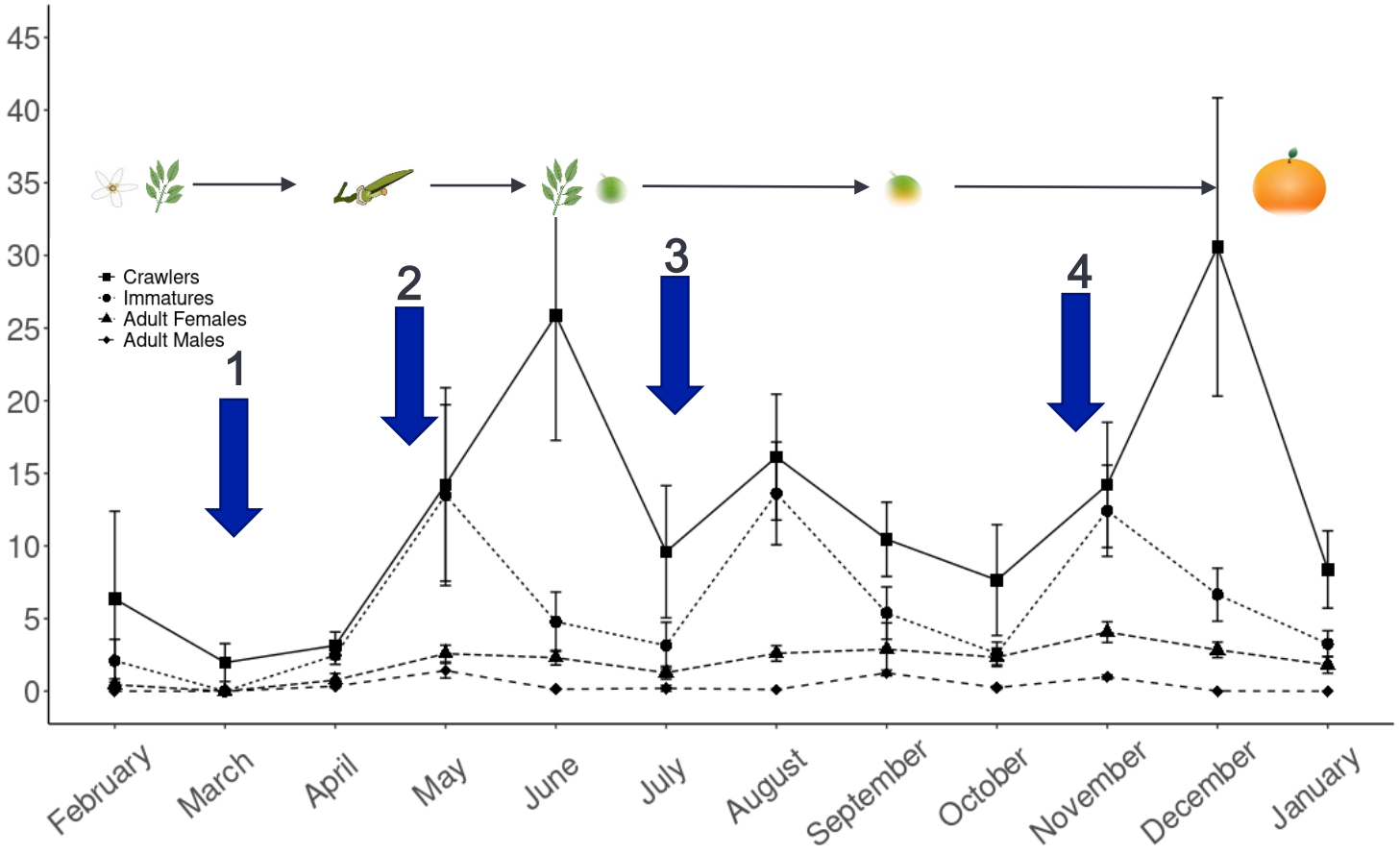
# Incorporating biology into management

| Life stage | Does it feed? | Is it mobile? | Contact Insecticide | Systemic Insecticide |
|---|---|---|---|---|
| Egg | No | No | Material unlikely to be delivered to eggs | |
| Crawler | ? | Highly mobile | + | - |
| 2nd-3rd instars | Yes | Yes, but don't move too far unless provoked | + | + |
| Adult female | Yes* | No | Pre-Ovisac: +<br>With Ovisac: - | +* |
| Adult male | No | Yes, but doesn't cause new infestations | + | - |

# Incorporating biology + insecticides for management




1. Before fruit set/bloom
   - Spirotetramat
2. Fruit set, crawler population increasing
   - Contact knockdown
3. Second major flush
   - Use material also with efficacy on ACP
4. Fruit maturation
   - Material with efficacy also on rust mites
5. Crawlers smother/killed easily most chemistries/ adjuvants will impact populations

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# Developing IPM for spherical mealybug in Florida citrus

- Population biology[1] and general biology of the organism
- Chemical control options
  - Describing feeding interactions (EPG)*
- Reducing spread[2]
- Biological controls
  - Endemic predators[3,4]
  - Managing ants to support biological control[5]


[1]Olabiyi et al. *In Press* Florida Entomologist
[2]Middleton and Diepenbrock. 2022. Journal of Economic Entomology.
[3]Gaines et al. 2022. Journal of Economic Entomology
[4]Middleton et al. *In Press* Florida Entomologist
[5]Middleton et al. 2023. Journal of Applied Entomology
*Demard et al. In *Progress!*

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# Questions?

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