Refining the apple IPM program for internal lepidopterans with mating disruption and woolly apple aphid by comparing new and soft insecticides

Monique J. Rivera

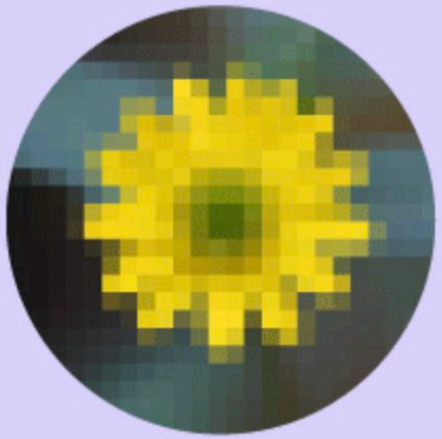
Assistant Professor

Cornell AgriTech

Overview

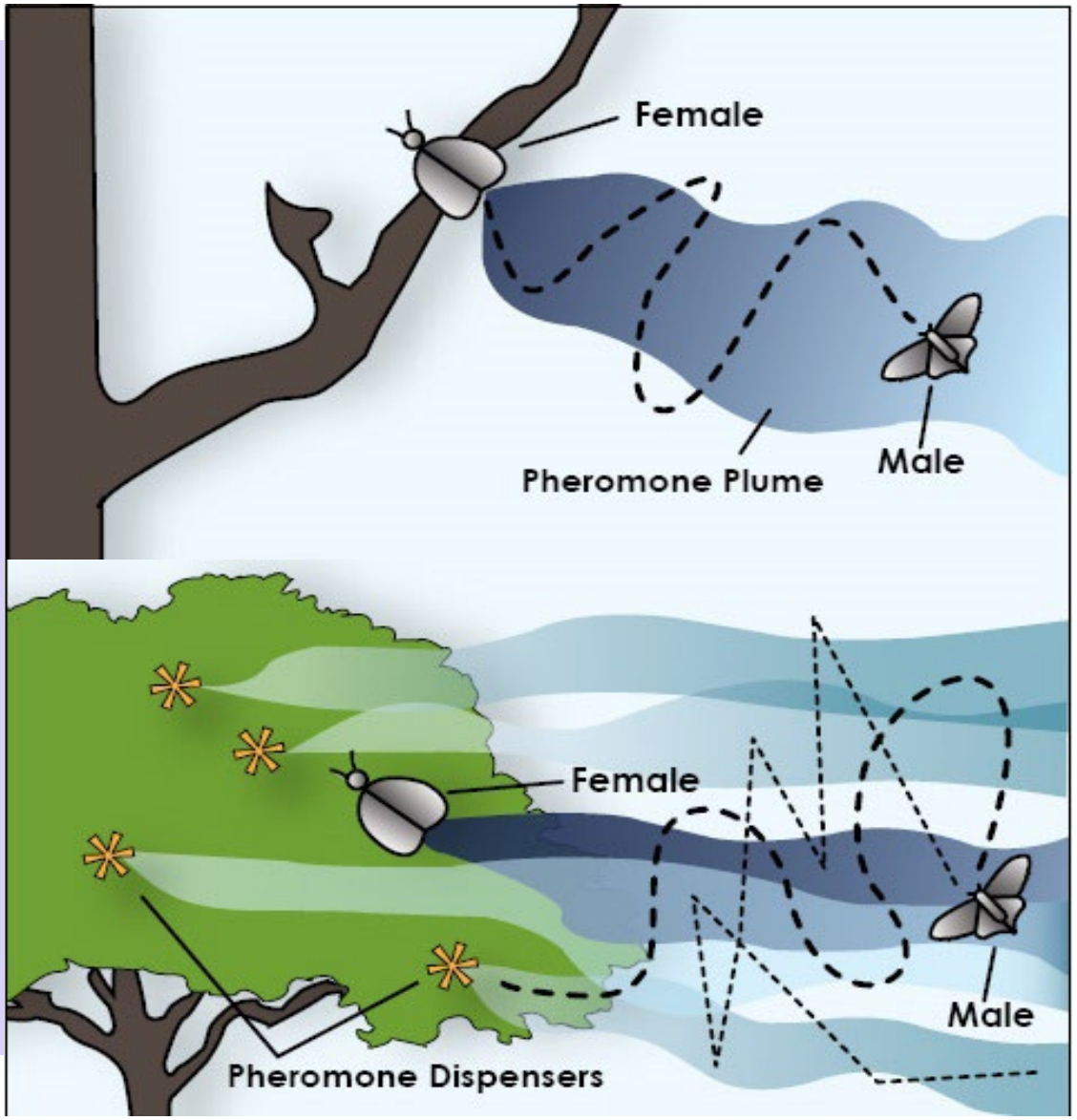
- Introduction to **Mating Disruption (MD)**
    - 2024 Results & Conclusions MD Trial
- Introduction to **Woolly Apple Aphids (WAA)**
    - 2024 Results & Conclusions WAA Trial

What is mating disruption?



Insect Vision

Human Version

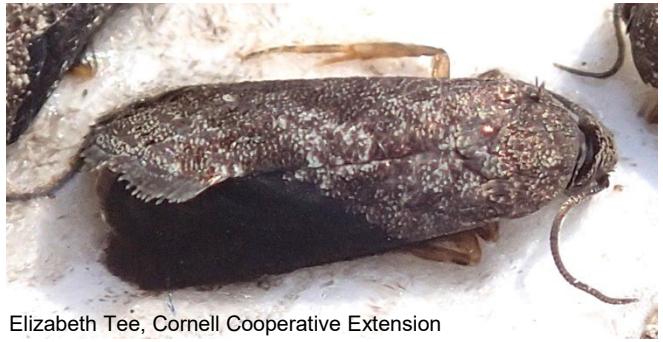


Key Lepidopteran Pests

Scott Bauer, USDA Agricultural Research Service, Bugwood.org

Codling moth

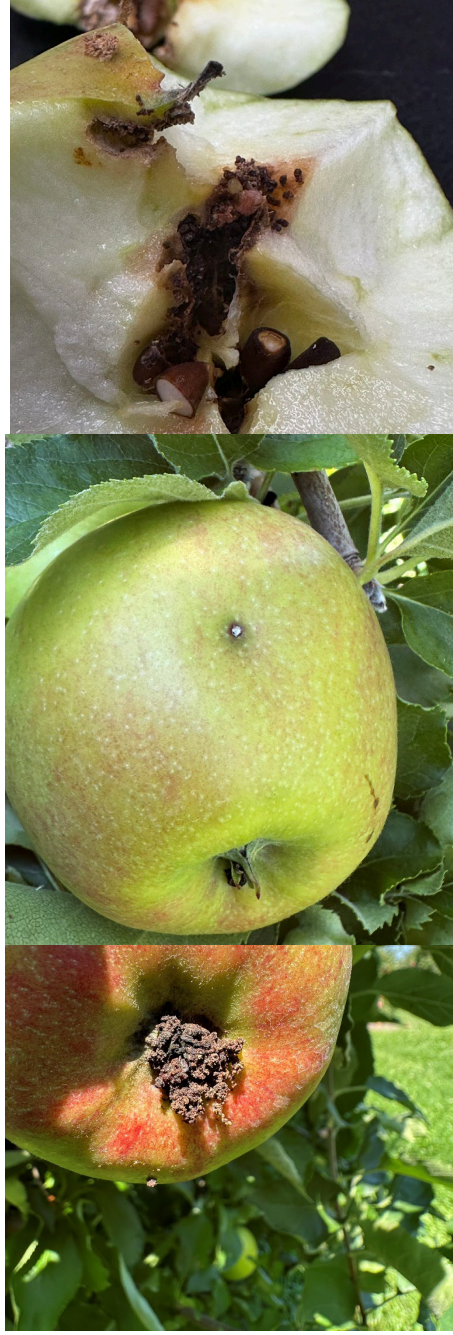
- Overlapping generations
- 2-3 generations/year
- Overwinter in soil or under bark
- Summer larvae feed on seeds



Elizabeth Tee, Cornell Cooperative Extension

Oriental Fruit Moth

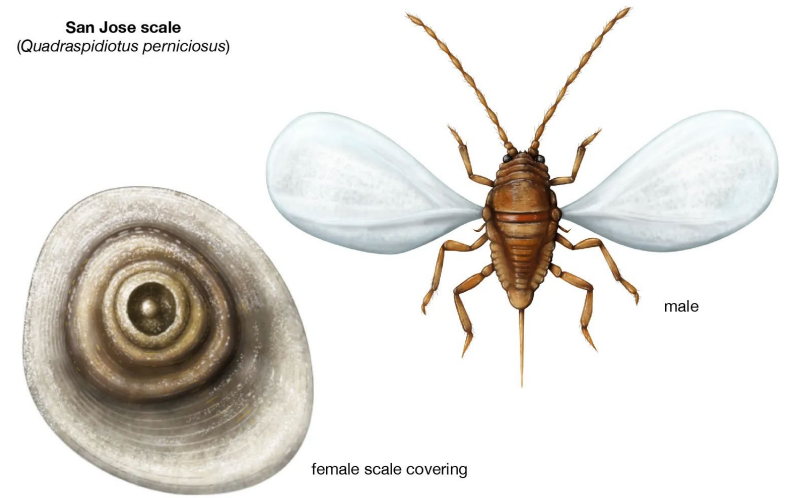
- Overlapping generations
- 3-4 generations/year
- Overwinter under bark
- Tunnel into fruits – no seed feeding



Manipulate populations using species-specific pheromones

Other apple pests with MD tools

- Oblique Banded Leafroller
- Dogwood Borer
- San Jose Scale
  - *In development*



Dispensers Tested

Trece Mesodispensers (OFM/CM)

- passive release of product
- hand applied
- 32-38 per acre/ $125-130 / acre
- more point sources

Suterra Puffer (OFM/CM)

- active release of product
- hand applied
- 1 per acre/ $125-130 / acre
- emits every 30 minutes during moth activity

2023 Treatments

Meso Grower Standard (MGS)

Meso Limited Spray (MLS)

Puffer Grower Standard (PGS)

Puffer Limited Spray (PLS)

Control

2024 Treatments

Sites

- **Average Acreage per Site**: 8.57 acres

- **AgriTech**– smaller acreage (5 acres average)

- **Grower sites** about 1 acre larger than average

Deployment

- **Mesodispensers:**
  - Longer learning curve
  - ~40-50min / acre to deploy

- **Suterra Puffers:**
  - ~10min / acre to deploy

Results

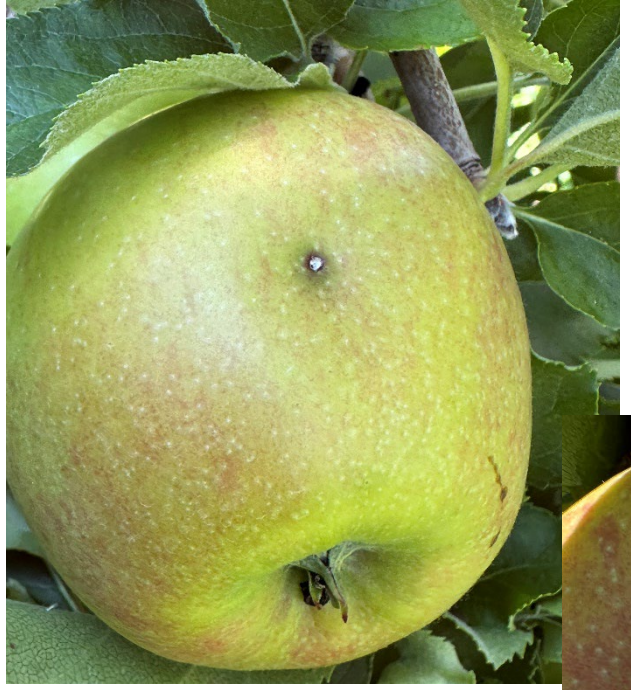
We assessed:

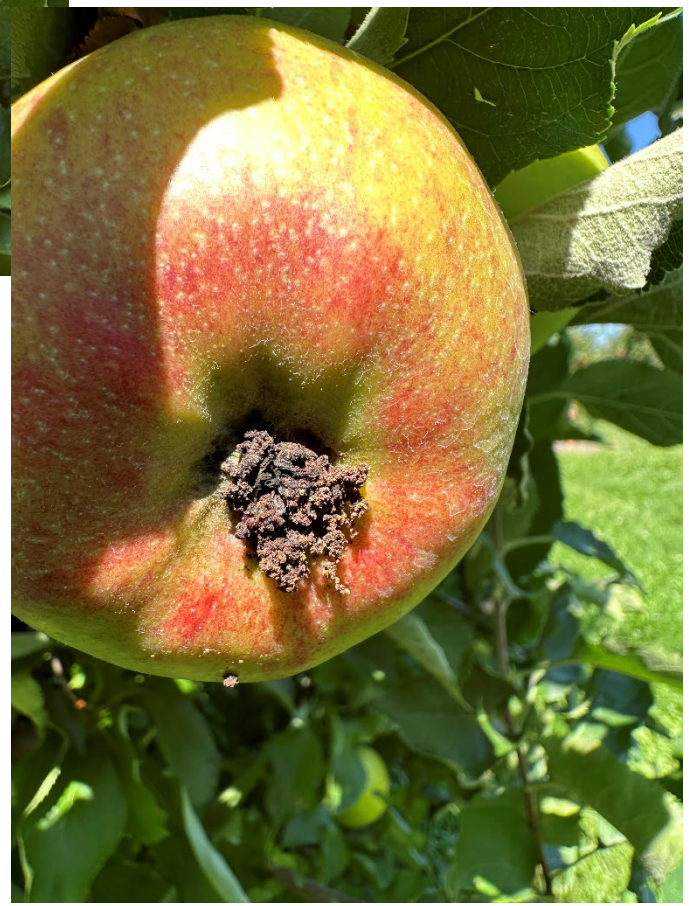
Damage to fruits:

- 100-200 apples per tree
- 15-25 trees per block

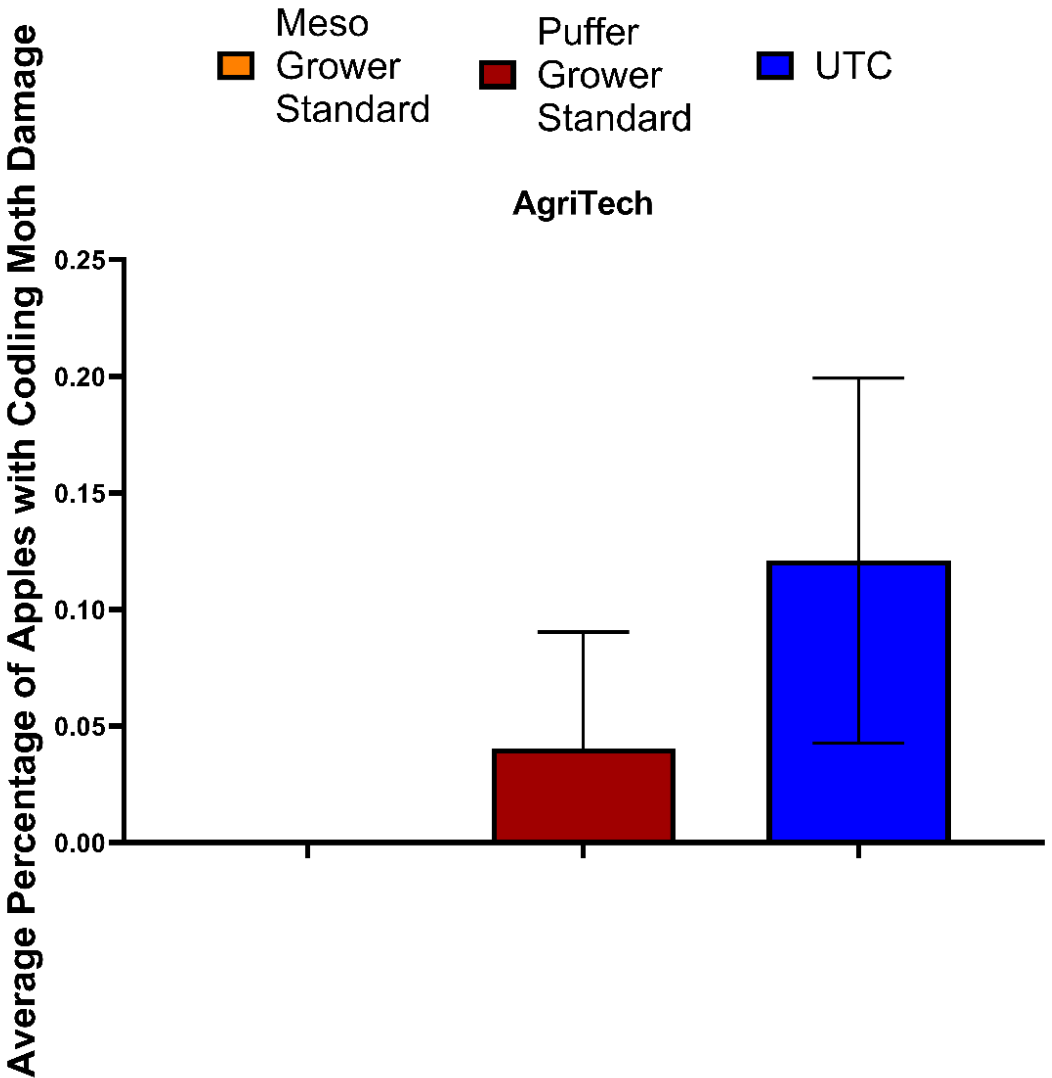
Monitoring trap catch numbers

- CM L2 and OFM L2
- CM Mega and OFM combo

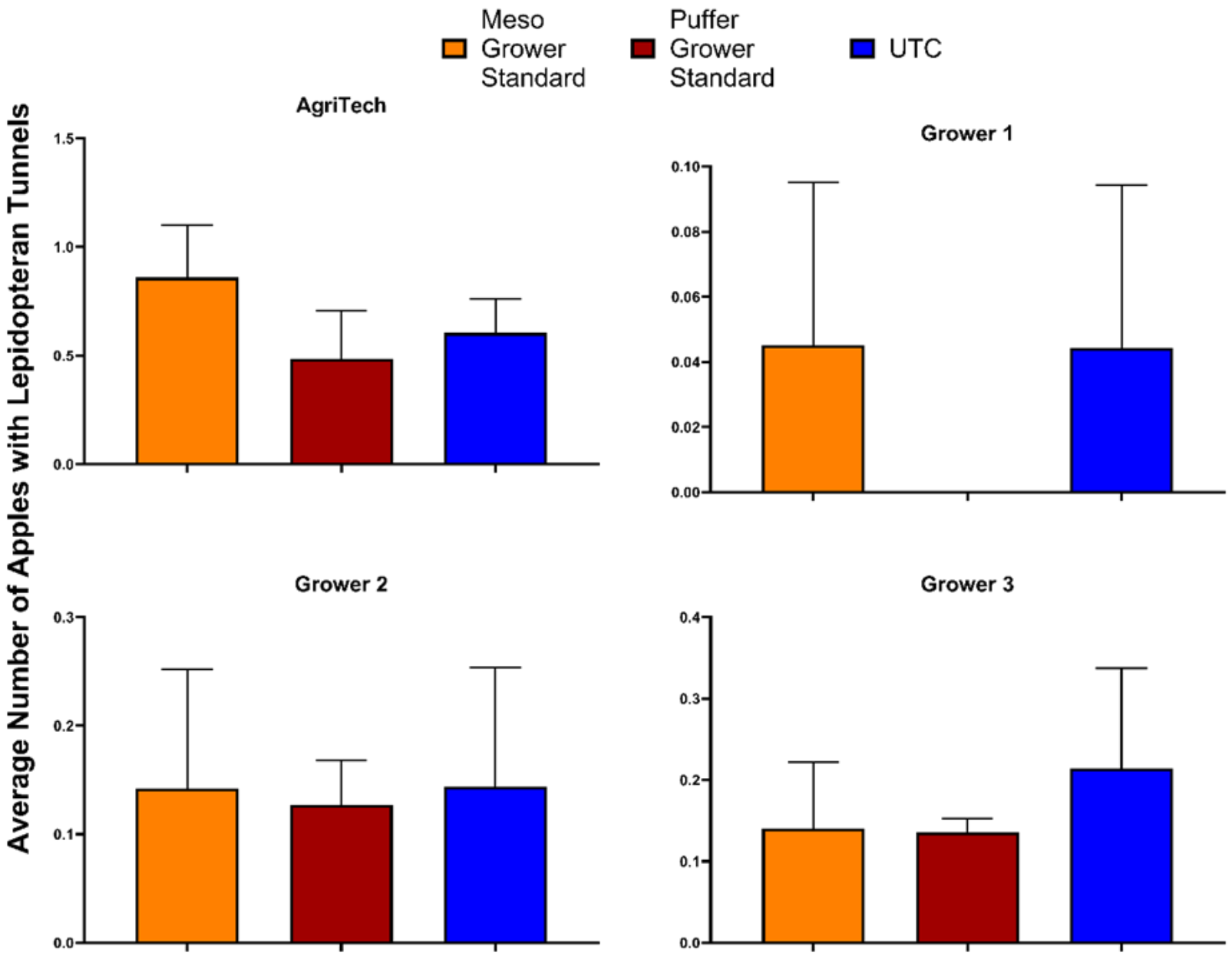




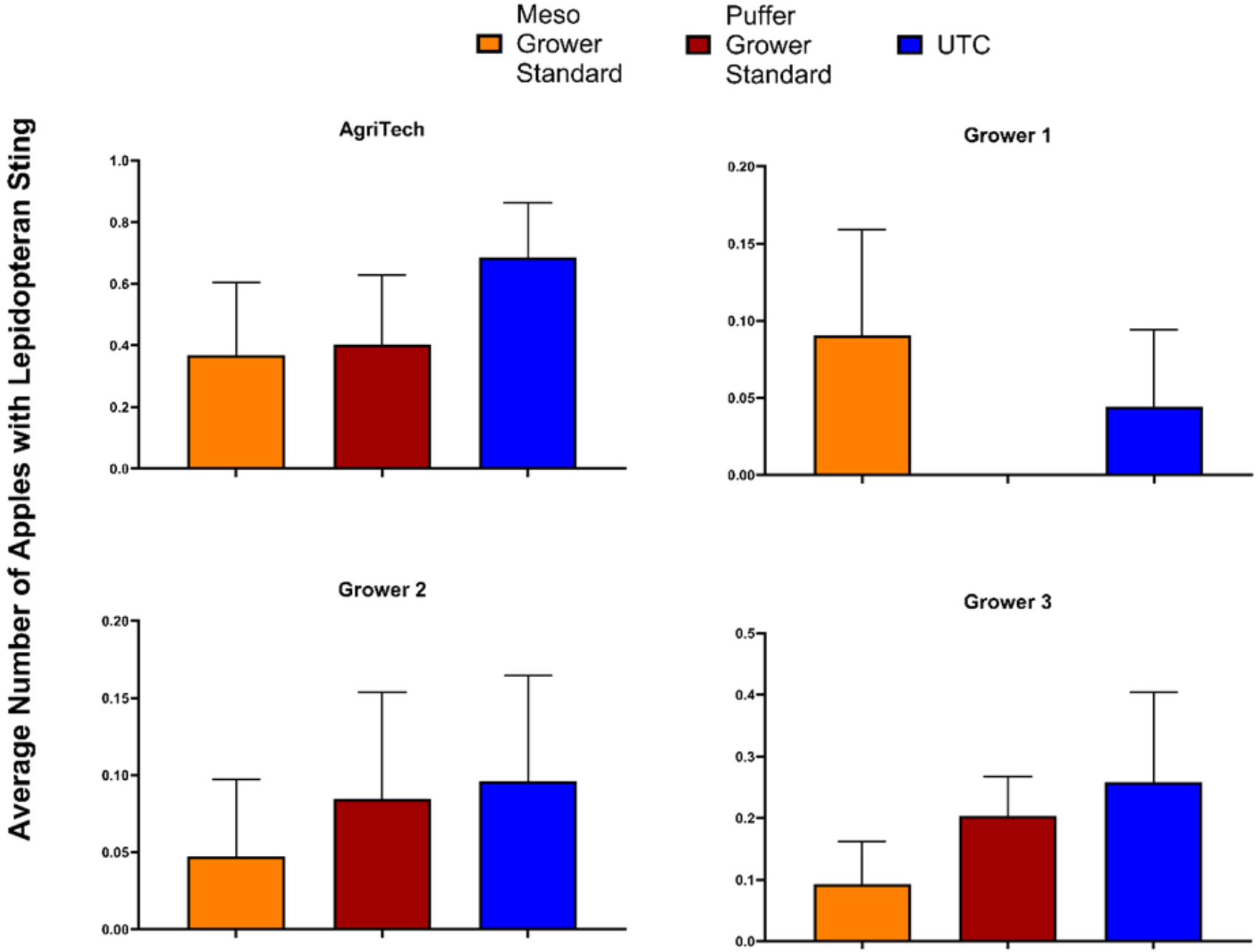
Results Fruits with CM damage (found caterpillar (left) or seed feeding (right))

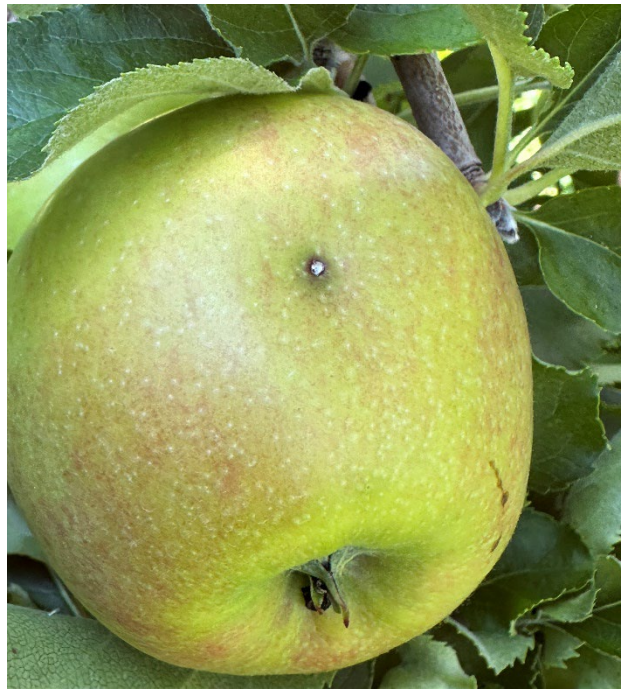


Results Fruits with lep tunnels

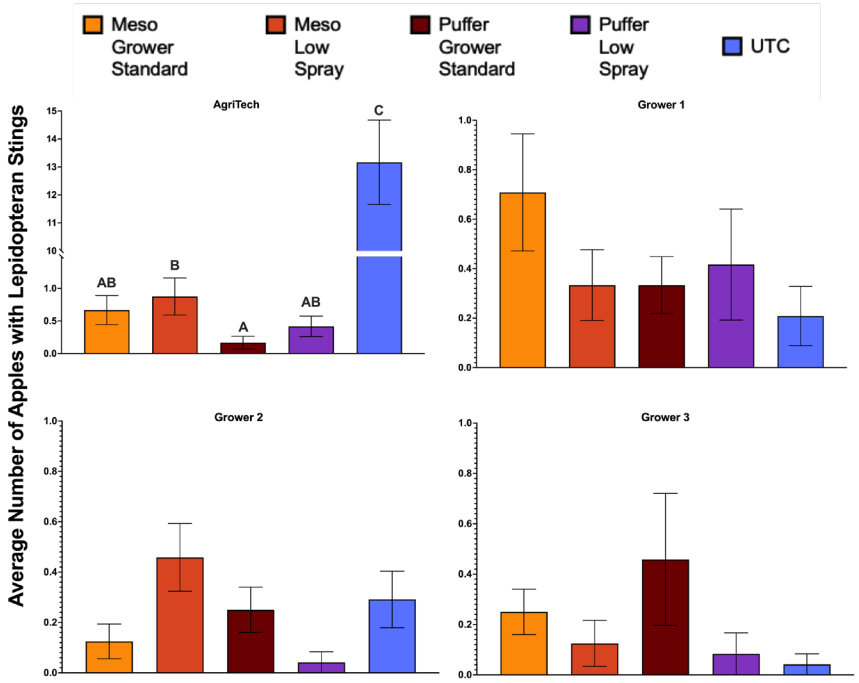


Results Fruits with Lep ‘sting’





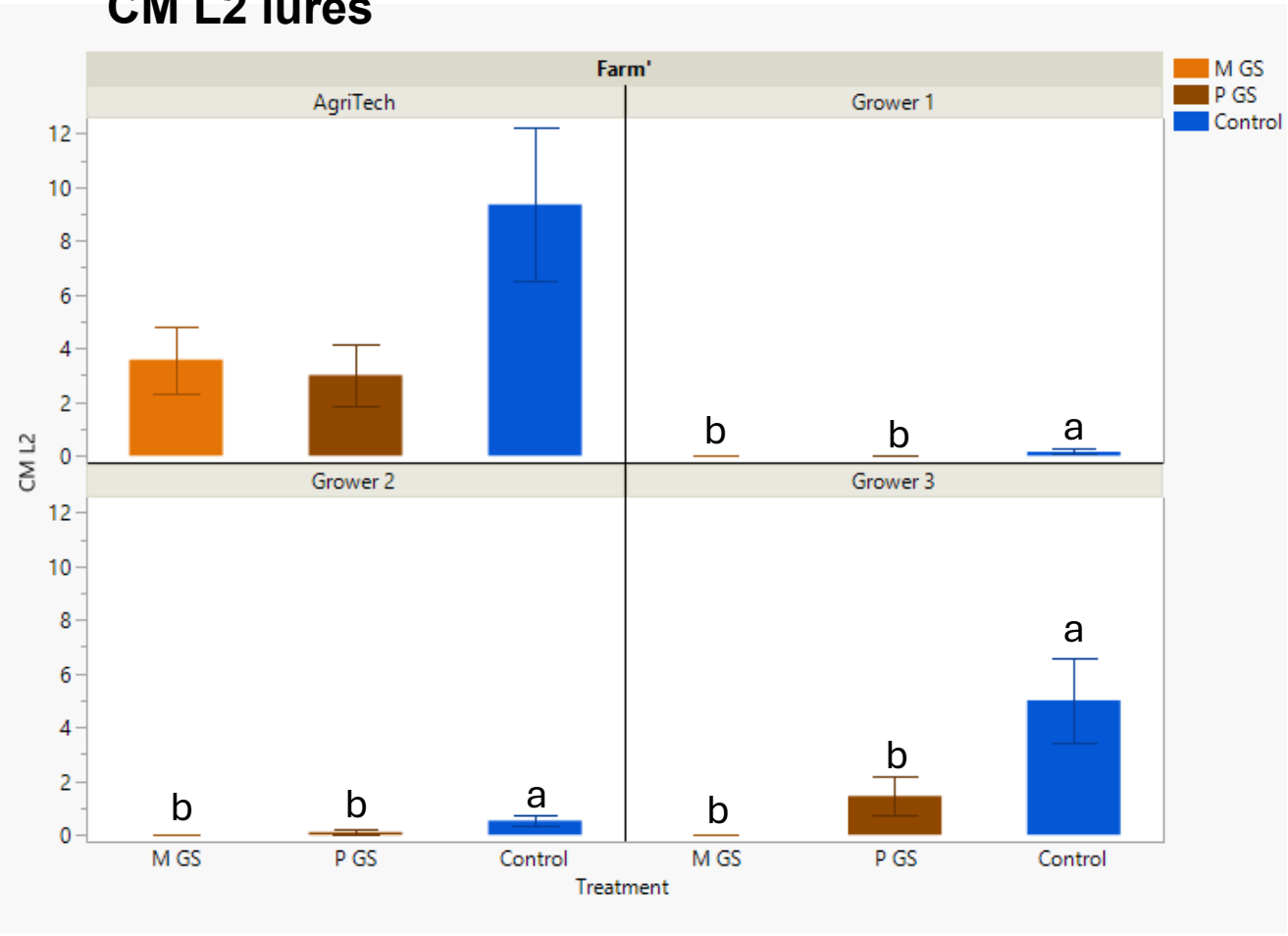
How does this compare with last year's results?



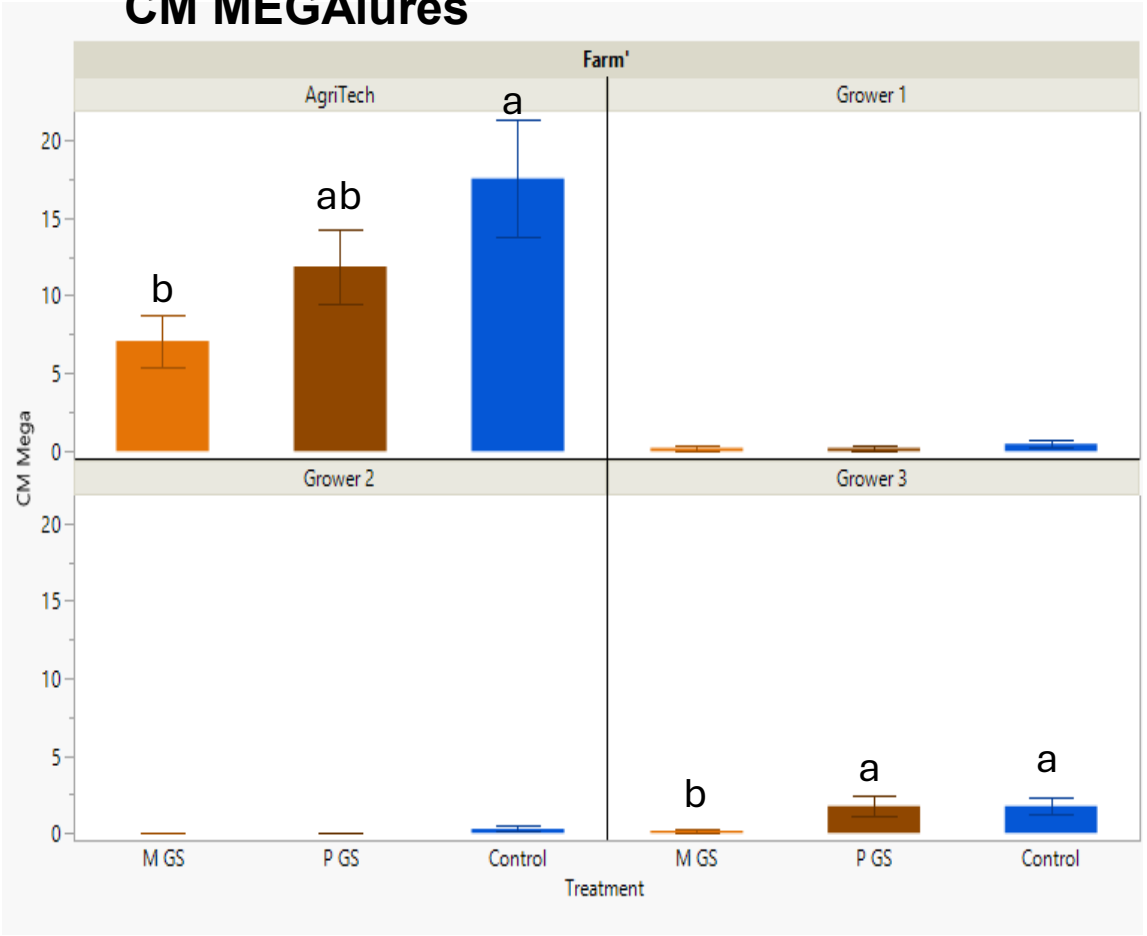
- **All significant results were in comparison to a fully unsprayed block** (AgriTech)
- **CM**: Full damage shutdown in puffer block
- **OFM**: damage shut down in puffer block
- **Sting**: all treatments less damage than control
- **Tunneling No Seed Feeding**: All treatments reduce damage significantly
- **Tunneling with Seed Feeding**: All treatments reduce damage significantly

Results Trap catch – Codling Moth

CM L2 lures

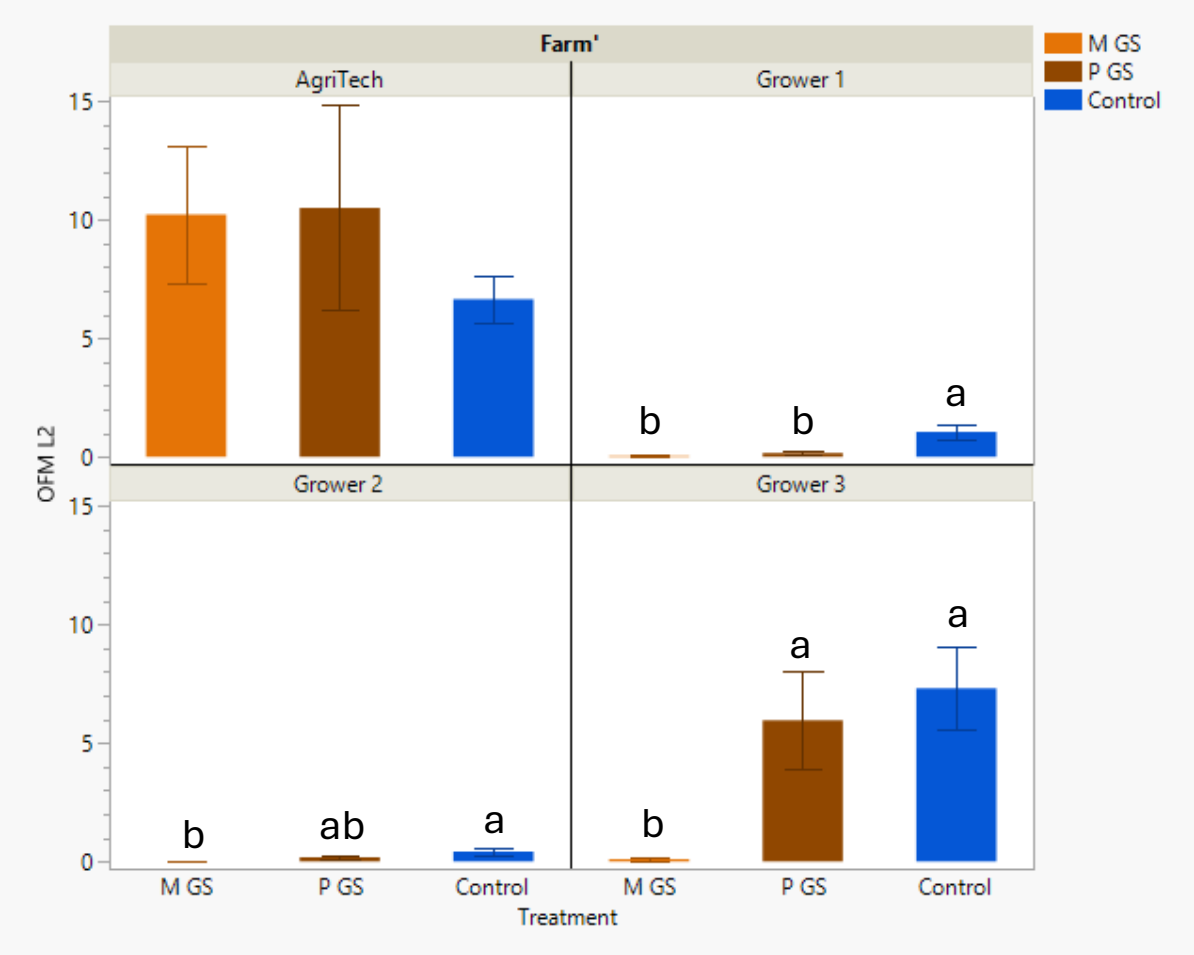


CM MEGAlures

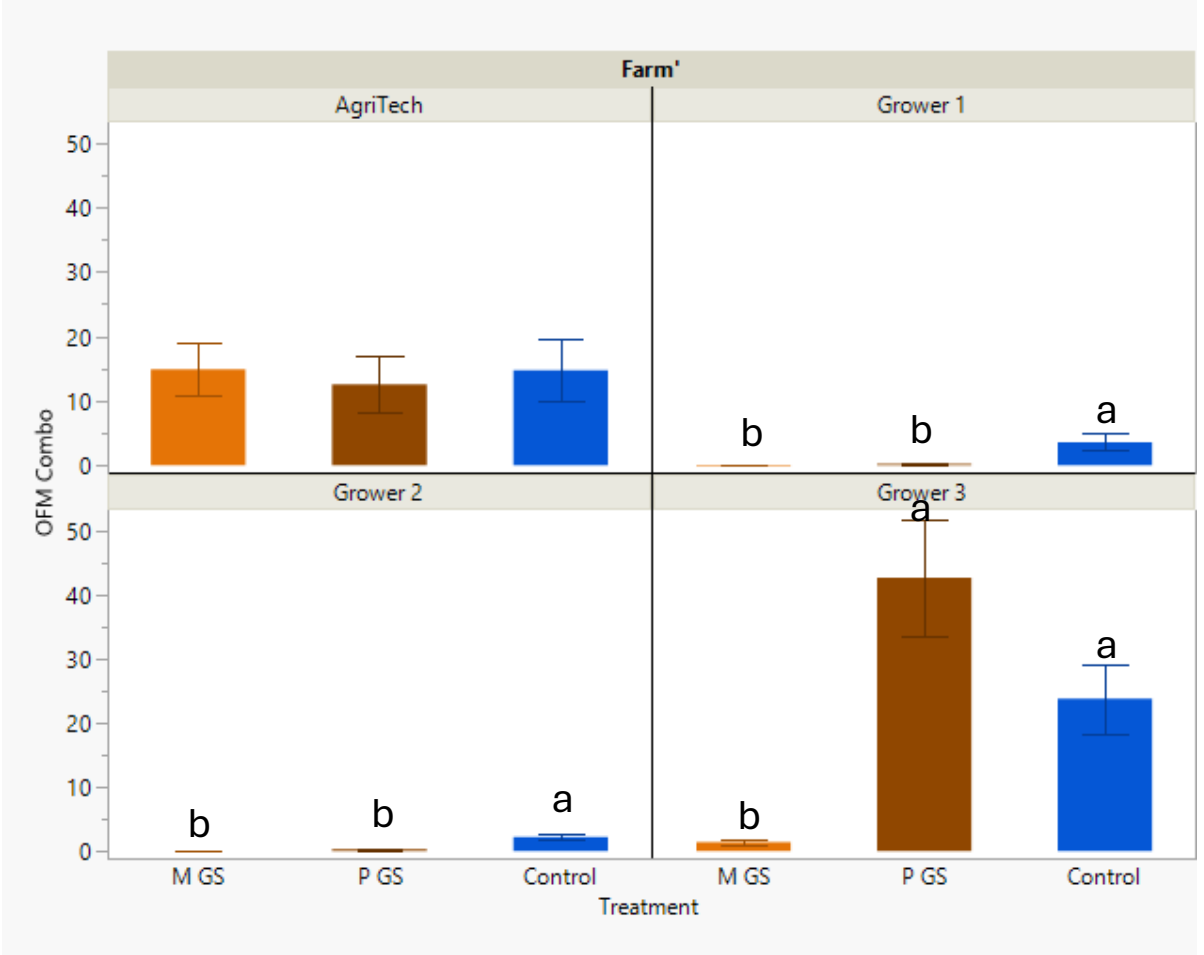


Results Trap catch – Oriental Fruit Moth

OFM L2 lures



OFM Combo lures



Trap Catch Takeaway Messages

- There can be hotspots in an orchard (Grower 3)
- Puffers should be used with caution in hilly fields
- Damage doesn’t always correlate with trap captures, but trends are similar

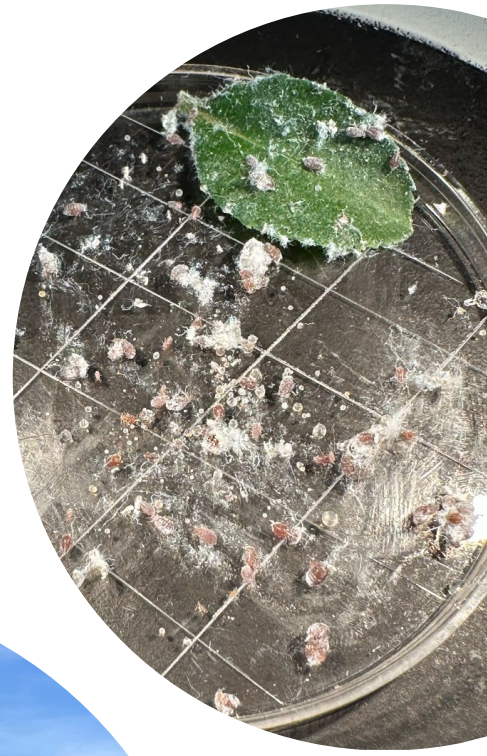
Conclusions and Future Directions

- Mating disruption is an investment in future “disruption” in available chemistries
- Mating disruption can **reduce damage** in tandem with insecticides

- **WHAT’S NEXT?**
  - Optimizing timing and synergizing tools– can we implement sprayable pheromones effectively? Can we time the placement of MD tools for greater effect?

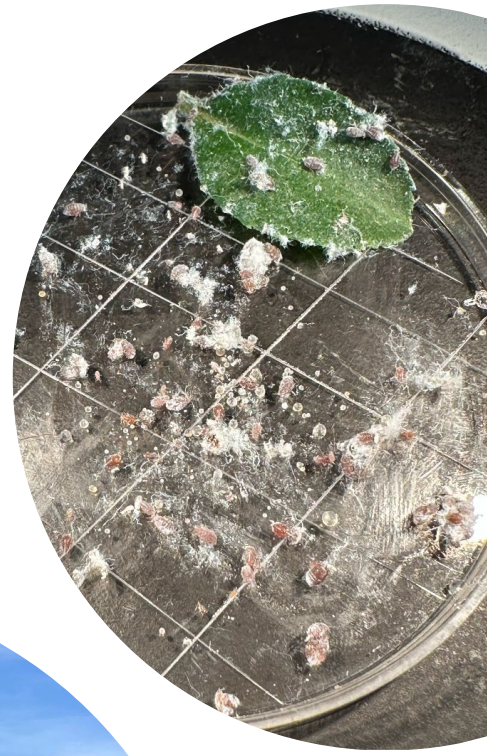
2024: Woolly Apple Aphid Trial

- Goals:
  - 1. Assess adjuvants
  - 2. Assess water volume at application (gallons per acre)



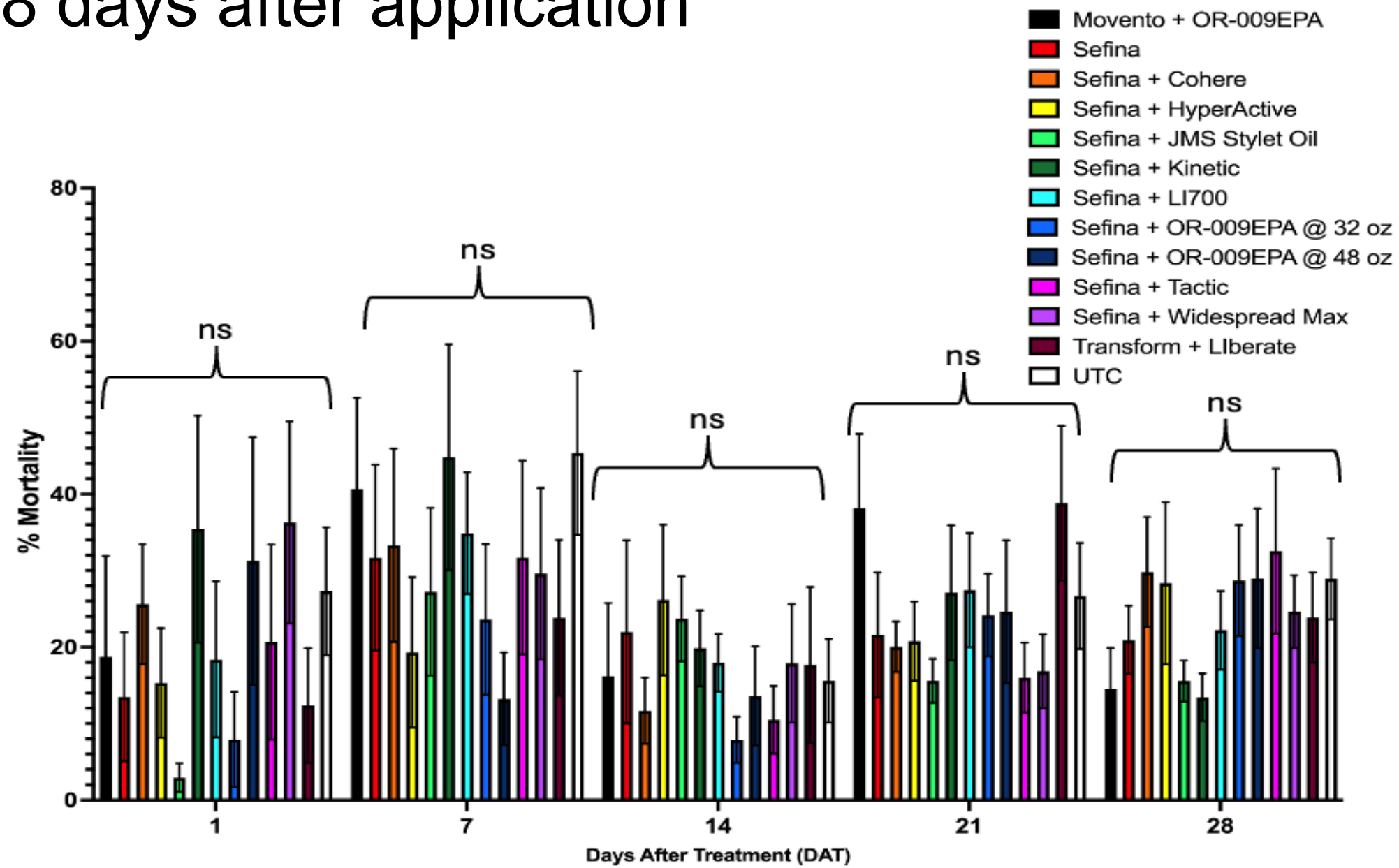
Collections

- 27 year old Jonagold block
- 16’ row spacing, 10’ tree spacing
- Applied with Three-point hitch tower airblast sprayer @ 3.8 MPH
- Treatments applied in two tree blocks
- Three colonies per tree were collected



Treatment Number	Treatment	Treatment Rate (fluid ounces/acre)	Adjuvant (fluid ounces/100 Gallons)	Application Timing
1	Untreated Control	0	0	n/a
2	Sefina	7	n/a	1st and 2nd Cover
3	Sefina	7	Cohere (16)	1st and 2nd Cover
4	Sefina	7	Hyper-Active (16)	1st and 2nd Cover
5	Sefina	7	Kinetic (16)	1st and 2nd Cover
6	Sefina	7	Widespread MAX (12.8)	1st and 2nd Cover
7	Sefina	7	LI-700 (32)	1st and 2nd Cover
8	Sefina	7	Tactic (16)	1st and 2nd Cover
9	Sefina	7	JMS Stylet Oil (1 gallon/Acre)	1st and 2nd Cover
10	Sefina	7	OR-009EPA (32)	1st and 2nd Cover
11	Sefina	7	OR-009EPA (48)	1st and 2nd Cover
12	Movento	9	OR-009EPA (32)	1st and 2nd Cover
13	Transform	2.75	Liberate (25)	1st and 2nd Cover
14	Senstar	18	Widespread Max (12.8)	Petal Fall
15	Senstar	12	Widespread Max (12.8)	Petal Fall

Adjuvants had no significant effect on WAA mortality up to 28 days after application

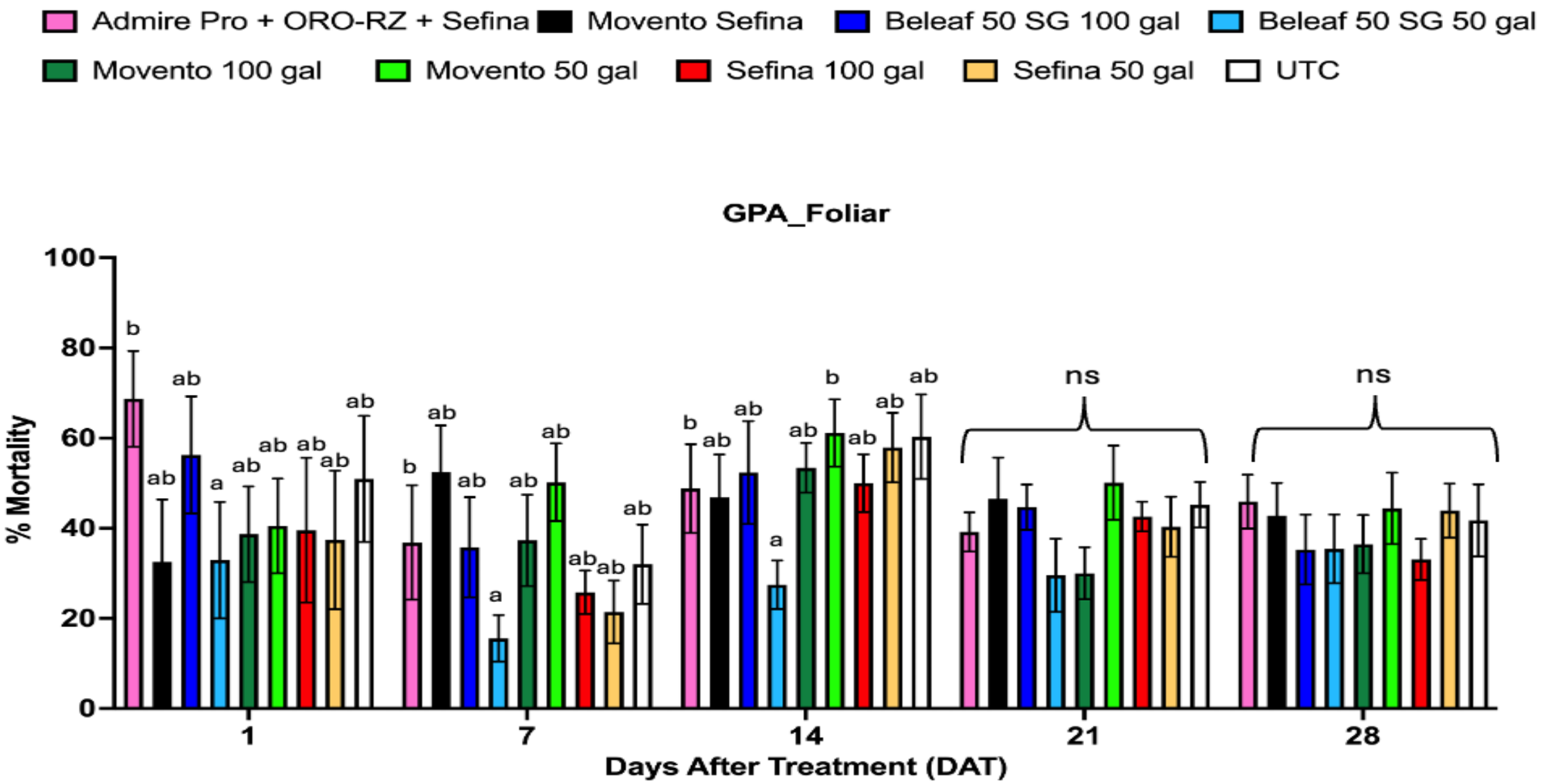


Some notable combinations

- Sefina + Kinetic @ 7 Days
- Movento + OR-009EPA @ 7 & 21 days
- Sefina + LI700 @ 7 & 21 days
- Sefina + Tactic @ 28 days

Treatment Number	Treatment (Rate)	Treatment Timing	Application Water Volume (GPA)	Treatment Type
1	Untreated Control	n/a	n/a	n/a
2	Movento (9 fl oz/acre)	First Cover	50	Foliar
(Adjuvant)	Widspread Max (13 fl oz/100 gallons)	First Cover	50	Foliar
3	Movento (9 fl oz/acre)	First Cover	100	Foliar
(Adjuvant)	Widspread Max (13 fl oz/100 gallons)	First Cover	100	Foliar
4	Sefina (7 Fl oz/acre)	First Cover	50	Foliar
(Adjuvant)	Widspread Max (13 fl oz/100 gallons)	First Cover	50	Foliar
5	Sefina (7 Fl oz/acre)	First Cover	100	Foliar
(Adjuvant)	Widspread Max (13 fl oz/100 gallons)	First Cover	100	Foliar
6	Beleaf 50 SG (2.8 oz/acre)	First Cover	50	Foliar
(Adjuvant)	Widspread Max (13 fl oz/100 gallons)	First Cover	50	Foliar
7	Beleaf 50 SG (2.8 oz/acre)	First Cover	100	Foliar
	Widspread Max (13 fl oz/100 gallons)	First Cover	100	Foliar
8	Admire Pro (10.5 fl oz/acre)	Petal Fall	100	Soil Drench
(Adjuvant)	ORO-RZ (64 fl oz/acre)	Petal Fall	100	Soil Drench
9	Admire Pro (10.5 fl oz/acre)	Petal Fall	100	Soil Drench
(Adjuvant)	ORO-RZ (64 fl oz/acre)	Petal Fall	100	Soil Drench
	Sefina (7 Fl oz/acre)	First Cover	100	Foliar
	Sefina (7 Fl oz/acre)	Second Cover	100	Foliar
(Adjuvant)	Max (13 fl oz/100 gallons)	First, Second Cover	100	Foliar
10	Movento (9 fl oz/acre)	First Cover	100	Foliar
	Sefina (7 Fl oz/acre)	First Cover	100	Foliar
	Sefina (7 Fl oz/acre)	Second Cover	100	Foliar
(Adjuvant)	Widespread Max (13 fl oz/100 gallons)	First, Second Cover	100	Foliar

No long-term effect of GPA



Conclusions and Future Directions

- At best, softer chemistries provide **40-60% control**
  - Work in tandem with beneficials– no beneficials, runaway populations

- **Water volume** does not appear to a driving factor in control – in some cases 50 GPA more efficacy

- **Adjuvants** do not appear to enhance efficacy overall but some potentially good options

- **WHAT'S NEXT?**
  - How can we optimize conditions for natural enemies to ensure success with softer chemistries → pyrethroid optimiziation

BF224 Online Course

Anna Wallis
Fruit IPM Coordinator
aew232@cornell.edu

Tree Fruit Scouting

Biology, identification, and monitoring of

Key orchard pests

Wednesdays 6:30-8:00 PM, Feb. 26 – Mar. 26

- **Week 1: IPM Fundamentals + Tools**
- **Week 2: Insects: Part 1**
- **Week 3: Insects: Part 2**
- **Week 4: Diseases**
- **Week 5: Weeds, Wildlife, + Wrap-Up**

https://smallfarmcourses.com/

Monitoring Network

- **22 Locations** around the state (extension, farmers, consultants)
- **5 Target pests**
  CM, OFM, OBLR, AM, DWB
- **Weekly blog posts**
  summarizing trap captures & trends
- **Real time map & spreadsheet**
  developed with Dan Olmstead

https://blogs.cornell.edu/treefruitpests/

Opportunities

- Scout Training
- Scaffolds

Cohort Training

Data Collection

Reporting Information

scaffolds

A New York State Apple Industry Podcast

Thank you!
And please give us feedback on Scaffolds!