Refining the $Woolly Apple Aphid$ Management Program

(*we are not there yet on making it cheaper*)

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Outline

- **Discussion of the early season and woolly apple aphid in early season**

- **2025 Results**
  - **ARDP Funded- Objective 1:** Compare early the effect of early season pyrethroids on woolly apple aphid populations

  - **Objective 2**: Understanding the influence of products on season-long WAA management
    - Insecticide review-- MOA

Why do early season treatments matter?

- Unpredictable rises in WAA populations → major grower frustrations
- Limited chemistries effective for WAA → need to better understand influences
- Pyrethroids are **broad spectrum** and impact all insects → Wiping out natural enemies (NE) → disrupts cycling of NE → likely promotes population expansion as desynchronized
- What are WAA doing in the early season?

In Orchard Life Cycle

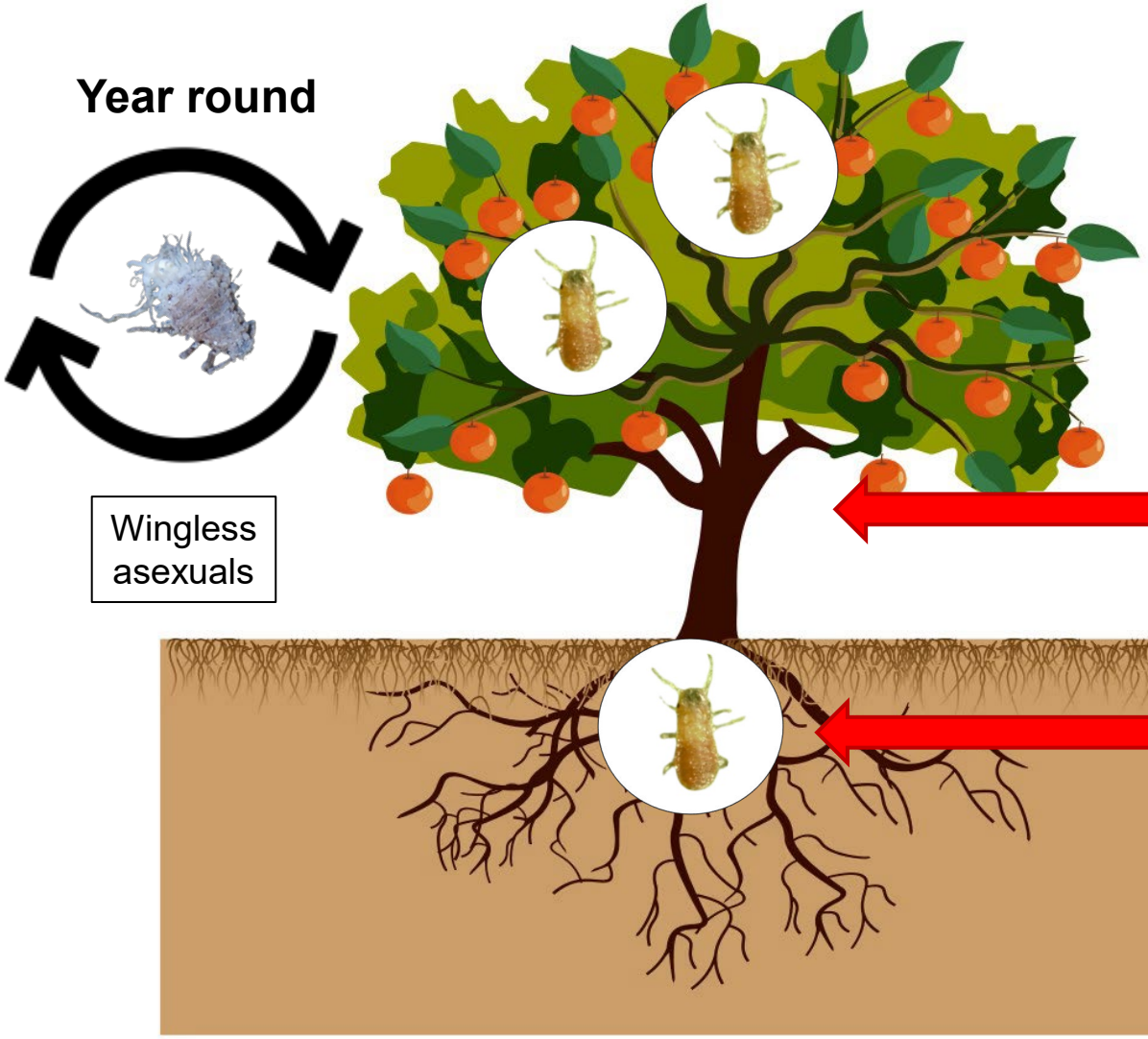
WAA Dispersal

Entry Into Orchard
- Winged Forms
- Wind

In tree movement
- Crawlers
- Winged Form

Between tree movement:
- Crawlers
- Wind blown
- Touching Branches/Leaves
- Winged Form

Year round

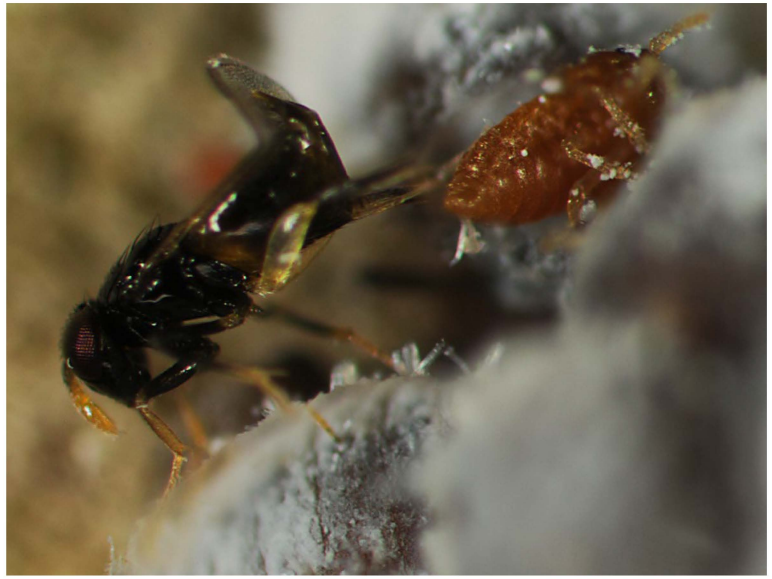


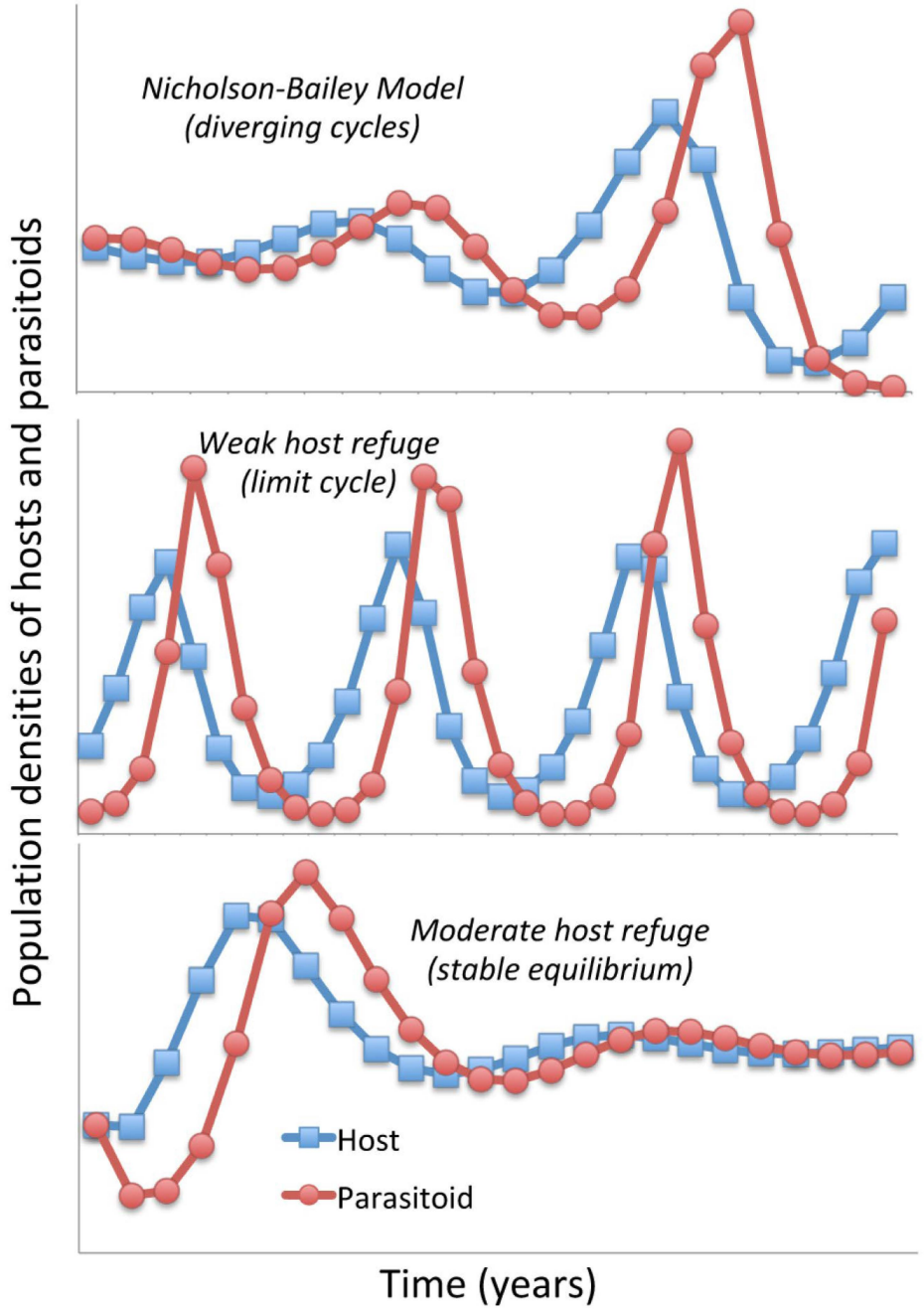
Wingless asexuals

Spring through Fall

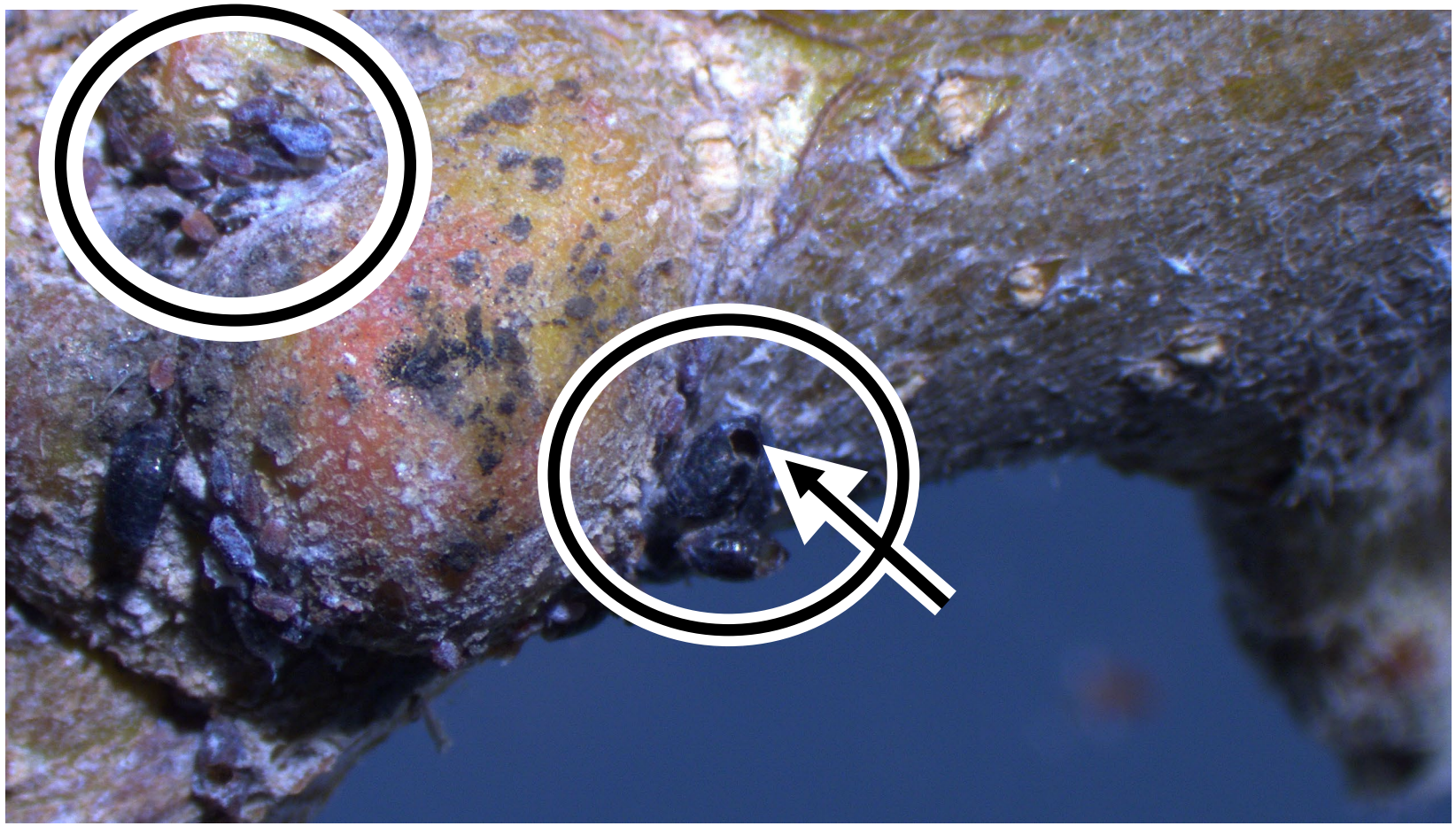
Some overwinter in crevices

Some on roots year round




Nicholson-Bailey Model
(diverging cycles)
Weak host refuge
(limit cycle)
Moderate host refuge
(stable equilibrium)
Host
Parasitoid
Population densities of hosts and parasitoids
Time (years)

Woolly Apple Aphid in Early Season



Objective 1: Pyrethroids (and others) Compared

Full/High Rate Applications of:

1. Warrior/Lamcap (Lambda-cyhalothrin)

2. Brigade (Bifenthrin)

3. Mustang Maxx (zeta-cypermethrin)

4. Asana XL (Esfenvalerate)

5. Besiege (Lambda-cyhalothrin + Chlorantraniliprole)

6. Esteem (Pyriproxyfen)

7. Avaunt Evo (Indoxacarb)

Not pyrethroids

6. Esteem (pyriproxyfen) → **NOT** a pyrethroid (juvenile hormone analog; IRAC 7C)

7. Avaunt Evo (indoxacarb) → **NOT** a pyrethroid (sodium channel blocker, but *not* a pyrethroid; IRAC 22A)

Special case (mixture)

5. Besiege (lambda-cyhalothrin + chlorantraniliprole)

Contains a pyrethroid (lambda-cyhalothrin) **and** a non-pyrethroid (chlorantraniliprole, IRAC 28)

Pyrethroids

1. Warrior/Lamcap (lambda-cyhalothrin)
2. Brigade (bifenthrin)
3. Mustang Maxx (zeta-cypermethrin)
4. Asana XL (esfenvalerate)

Objective 1: Pyrethroids+ Compared

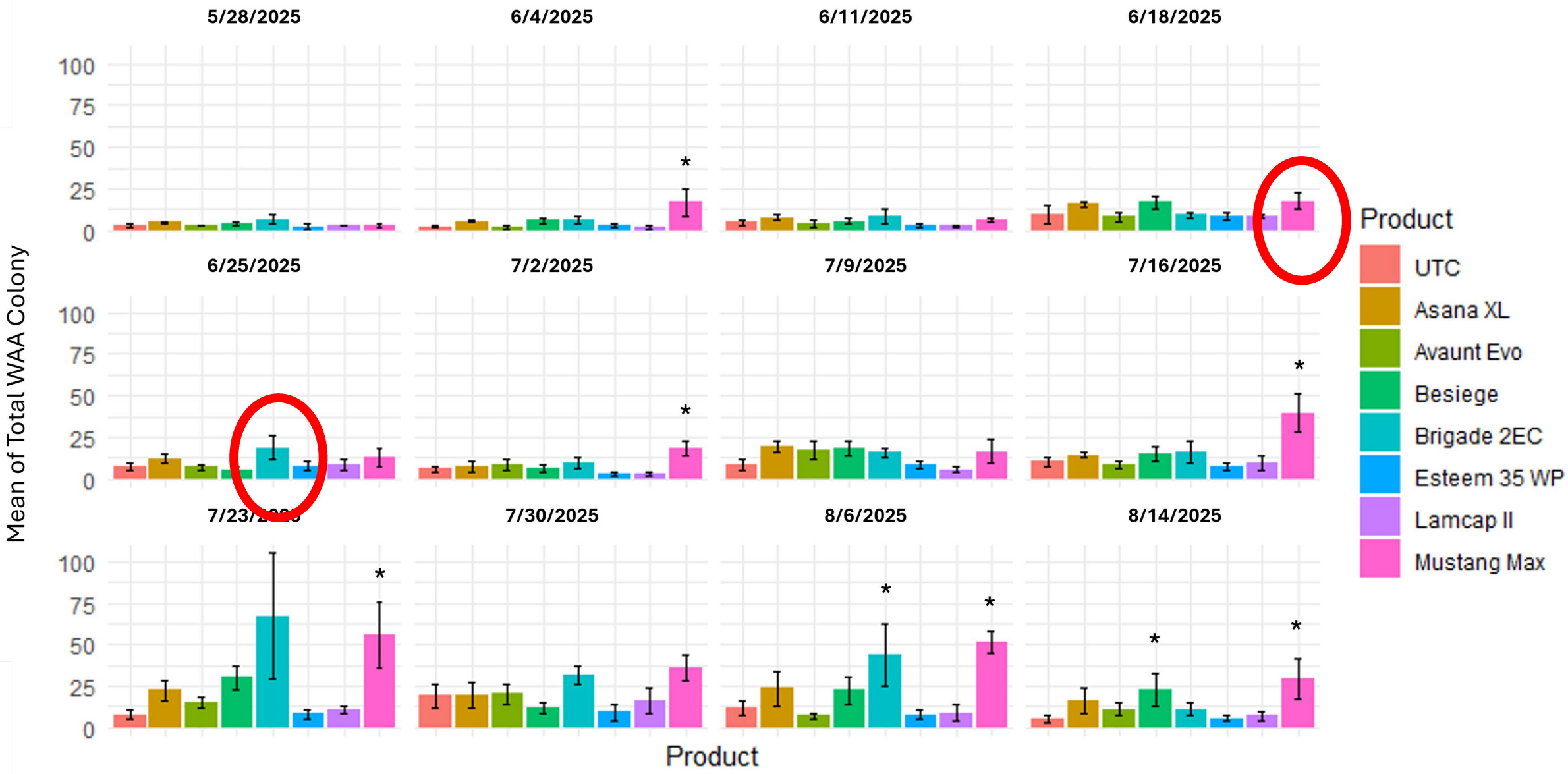
Springbrook Orchards

Semidwarf Idareds, MM106
16 Foot Row Spacing
272 Trees per acre
High WAA Populations since 2023

- Application 1: Tight Cluster (April 24, 2025)
- Application 2: Petal Fall (May 27, 2025)

- **Assessment:**
  - 2 minute count of colonies across whole tree

RESULTS: Objective 1: Pyrethroids Compared



Conclusions: Objective 1: Pyrethroids vs WAA

- **All pyrethroids are not equal in their impact to WAA flaring/natural enemies**

- **Mustang Max** should not be applied in the early season
  - **7, 35, 49, 56**, and **70 DAT Mustang Max** significantly HIGHER total colonies than UTC

- **Brigade 2EC** should also not be used in the early season but has less flare than MM

  - At **56 DAT** Brigade 2EC significantly HIGHER total colonies than UTC
  - At **70 DAT**, significant higher numbers of WAA colonies were detected in **Brigade 2EC**-treated trees in comparison with UTC-treated trees

- **Need another year of data/Does rate matter? Or is the highest rate the only rate that matters?**

Objective 2: Understanding the influence of products on seasonal WAA management

Springbrook Orchards

Semidwarf Idareds, MM106
16 Foot Row Spacing
272 Trees per acre
High WAA Populations since 2023

Half-Inch Green: April 18, 2025
Petal Fall: May 27, 2025
Petal Fall + 7 Days: June 3, 2025
28 Days after Last Application: July 1, 2025

Assessment:

2 minute count of colonies across whole tree

We tested the following product combinations at the following timings and **tracked populations from petal fall onward** (*slow start to 2025 population growth*):

Early Season Esteem Treatments

Esteem 35 WP – Half In Green (HIG)
Esteem 35 WP + .25% OR-009 – HIG
Esteem 35 EP + .4% OR-009 – HIG
Esteem 35 WP + OR 728 – HIG
Esteem 35 WP– HIG → Senstar – Petal Fall (PF)

Petal Fall Senstar Treatments

Senstar – Petal Fall
Esteem 35 WP– HIG → Senstar – Petal Fall

Post-Petal Fall Treatments

Aza-Direct → Petal Fall + 7 Days, 28 DALA

Sefina → Petal Fall + 7 Days, 28 DALA

Insecticide Review

Esteem → **pyriproxyfen** Group 7C

- Insect Growth Regulator – Disrupts Insect Development and Reproduction
- Works through contact and ingestion but primarily contact

Senstar → **pyriproxyfen (Group 7c) + spirotetramat** (Group 23)

- **spirotetramat** (also Movento)– lipid biosynthesis regulator, systemic– ingestion needed

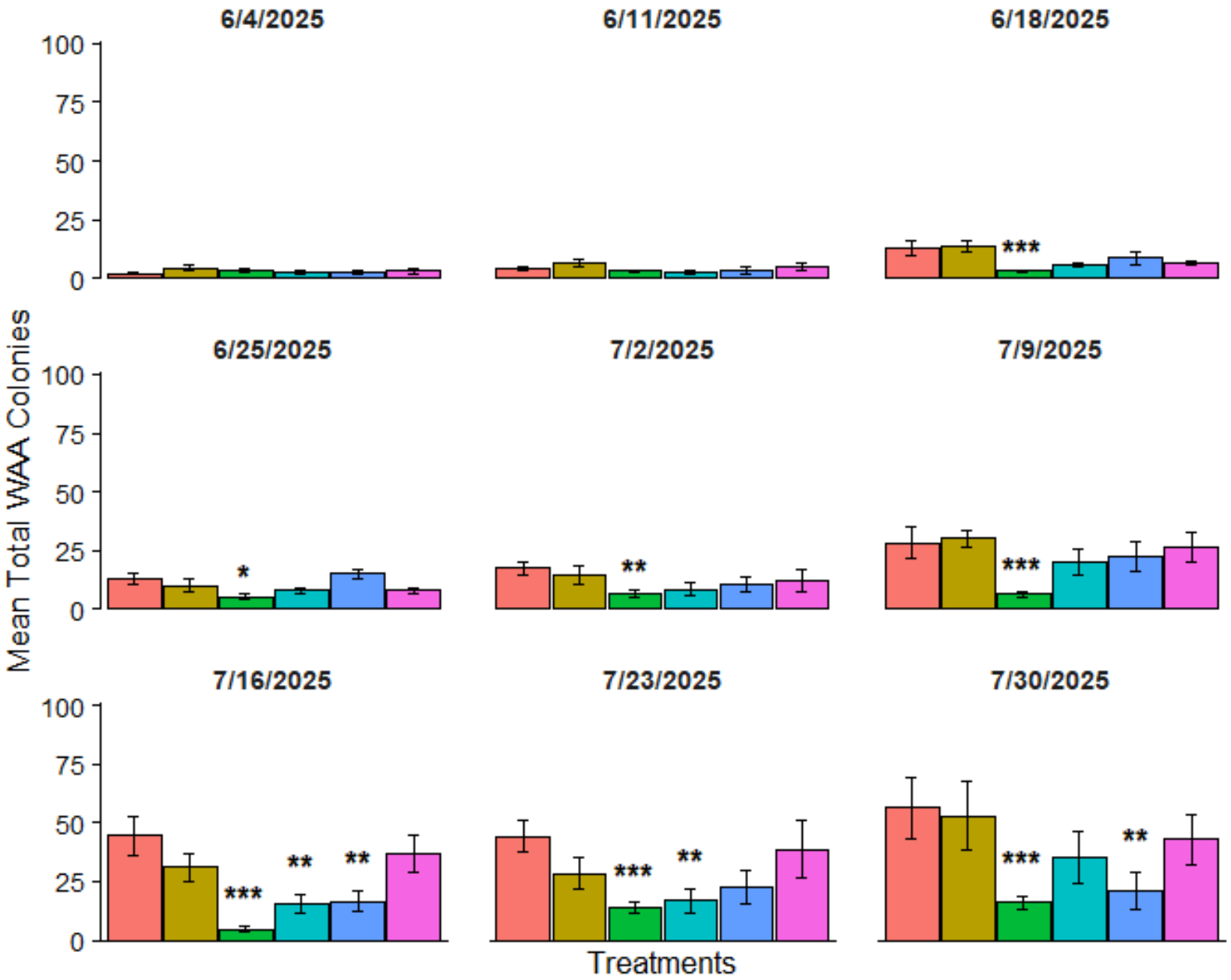
Aza-Direct → **azadirachtin (no group)**

- Works like an IGR- interrupts development but also is repellent and anti-feedant, likely both contact and ingestion

Sefina → **afidopyropen (9D)**

- Pyropene – disrupted the sensory system- interferes with chordotonal organs → cessation of feeding → death– primarily contact, some translaminar movement

Early Season Esteem Treatments



Conclusion: Esteem alone is not as good as Esteem followed by **Senstar** or with **Appeal** included.

Treatment_chr

- UTC
- Esteem 35 WP - HIG
- Esteem 35 WP - HIG + Senstar - PF
- Esteem 35 WP + .25% OR-009 - HIG
- Esteem 35 WP + .4% OR-009 - HIG
- Esteem 35 WP + OR-728 - HIG

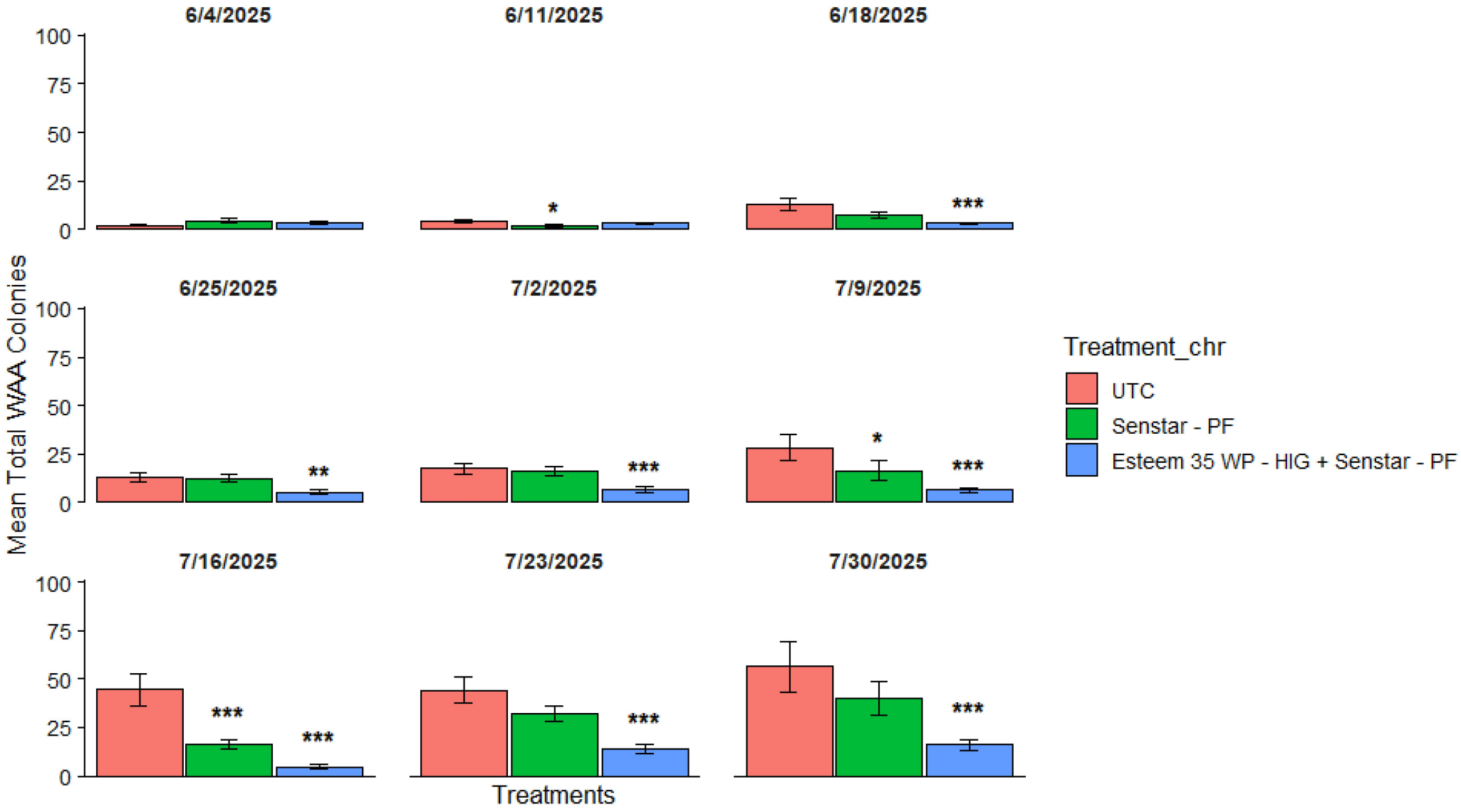
Botanical Additives

OR009 → Appeal Label Name → Orange Oil Based Product

OR728 → Research Product being tested

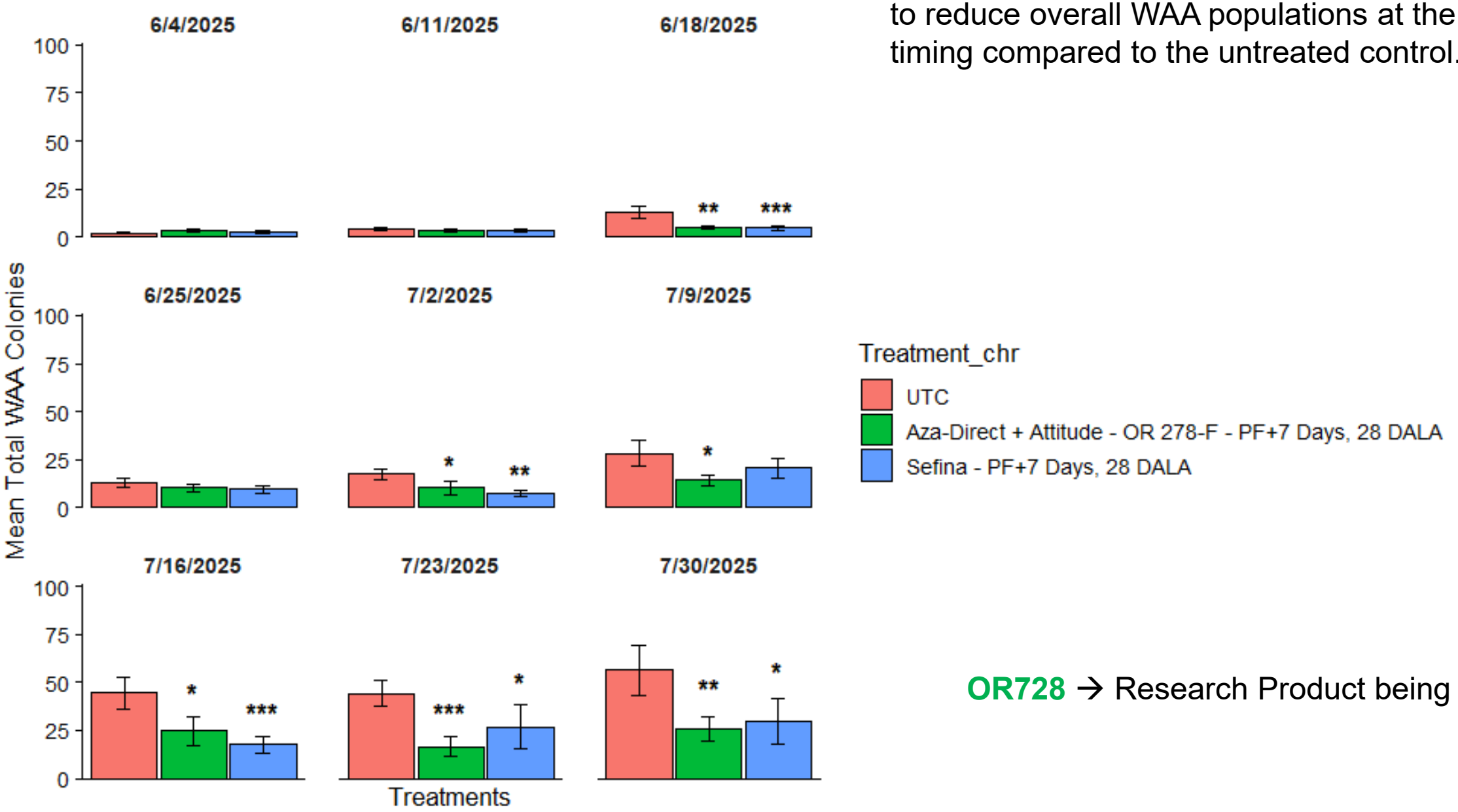
Petal Fall Senstar Treatments

Conclusion: **Esteem** followed by **Senstar** performs better than **Senstar** alone.



Post-Petal Fall Treatments

Conclusion: **Aza-Direct** and **Sefina** work similarly to reduce overall WAA populations at the petal fall timing compared to the untreated control.



OR728 → Research Product being tested

Synthesis and Recommendations for 2026

Do Not:

- Do not use **Mustang Max** or **Brigade 2EC** in areas with WAA populations
- *Would not recommend / Use Caution* applying products tank mixed with other things – ex: adding to fungicide treatment

Consider Implementing:

- Use of **Esteem** at Half Inch Green
- Follow **Esteem** application with Senstar/Movento at Petal Fall
- Continue use of **Sefina** / **Aza-Direct** Post- Petal Fall

Future Research Directions

how can we maybe start to save $ and have better control.

We need to figure out timings –

Stop thinking Calendar, **Start thinking SCOUTING**.

We need a better understanding **of how to target different stages for better outcomes**

Think San Jose Scale, not Rosy Apple Aphid

No silver bullet when it comes to late season, preharvest treatments.