Comparison of Navel Orangeworm Attractants

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Background

- Mating disruption for NOW causes near-complete shutdown of pheromone traps up to 2 miles from fields under mating disruption.
- Previous research under this project compared attractants for monitoring NOW under mating disruption. Phenyl propionate (PPO) provided greater efficacy for monitoring, both orchards under mating disruption and in orchards in the vicinity of but not under mating disruption. PPO has greater detection sensitivity when used in combination with a pheromone lure.
- In 2019 we examined the impact of trap types on detection of NOW in and near mating disruption using PPO by itself or in combination with a pheromone lure. We also compared monitoring and detection of NOW un orchard under mating disruption between PPO and egg traps or female bait lures.

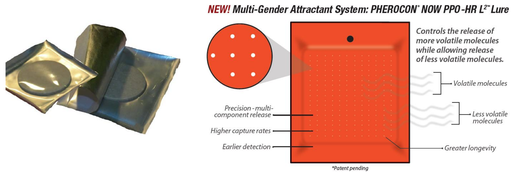
Findings

- Wing traps baited with PPO captured more NOW than delta traps with the same bait. Presentation of a pheromone lure in addition to a PPO dispenser improved performance of both wing and delta traps.
- Modification of delta traps (opening the sides) also improved detection of NOW using PPO, and the improvements from addition of a pheromone lure and modification of the delta trap were additive.
- Standard delta traps baited with PPO and pheromone captured small numbers of NOW adults in mating disruption under conditions under which traps baited with meal often captured few or no eggs or adults.

Conclusion

These findings provide a basis for pest managers to determine a monitoring strategy in or near mating disruption based on preferences with respect to ease of use, materials costs, and risk of "false negatives".

Attractants:



Monitoring lures containing PPO are available from Alpha Scents (left), and Trécé (right).

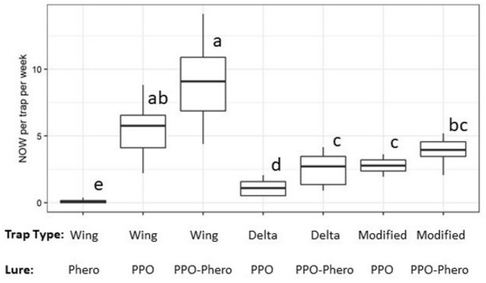
Traps using ground nuts as bait: standard egg trap (left), and ovipositional bait traps for capturing females (right) (Peterson trap, Peterson Trap Company).

Trap Types:

Trap designs compared in 2018. The "modified delta trap" to the right was a user modification; a trap with this design is not currently sold commercially. While a white wing trap is depicted here, red wing traps were used in most of these experiments.

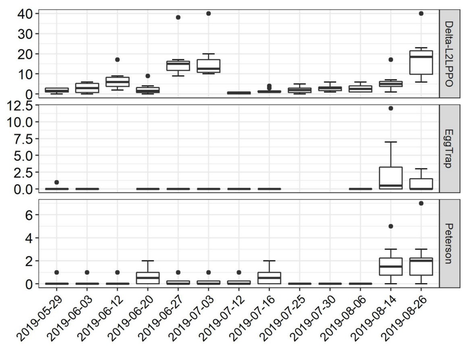
Results

Experiment 1



Wing traps baited only with PPO captured more NOW adults than delta traps regardless of addition of pheromone traps or modification (as determined by multiple range tests). Stock delta traps baited with PPO nonetheless captured more NOW adults than a wing trap with only a pheromone lure (negative control under mating disruption). Either addition of a pheromone lure along with the PPO dispenser or modification of the delta trap (as depicted above) improved detection with PPO-baited delta traps under mating disruption. These improvements proved additive when the trap modification and addition of a pheromone lure were both used with a delta-PPO trap.

Experiment 2



Under the conditions for experiment 2, no eggs and few females were detected between June 3 and August 6. Typically, the hullsplit period (mid-June to early July) is of particular importance for monitoring NOW in almonds.

Methods

General Procedures

The experiments were conducted in diagonally adjacent 160-acre quarter sections in a larger orchard in western Fresno County under commercial aerosol mating disruption. Traps containing attractants were placed in orchards under mating disruption midway between mating disruption dispensers, with orchard rows serving as replicates in a randomized complete block arrangement. There were approximately 45 m between treatments within replicate blocks, and 90 m between the 8 replicate blocks. Traps were monitored data was collected each week. Liners were replaced if dirty, or if any adults were captured. Lures were replaced at 6-week intervals.

Experiment 1

An experiment from May 17 to July 10 compared the impact of attractant and trap design on cumulative capture over that period (see figure to left for specific treatments). PPO dispensers were experimental pouches used in studies in previous years, and commercial pheromone lures were used. Differences in mean cumulation trap count over this period were examined using generalized linear mixed model analysis. Trap/attractant combinations were the fixed effect, replicate blocks were the random effect, and negative binomial error distribution was used. The Tukey multiple comparison procedure was used with an experiment-wise alpha of 0.05.

Experiment 2

An experiment from May 22 to August 10 compared eight different lure and trap design combinations for capturing adults in the presence of mating disruption, and egg and bait traps for capturing adults and mated females, respectively. There were a total of 10 treatments, including the egg and bait traps. Some of the experimental trap designs were changed during this period, but treatments that were constant throughout this period included a stock delta trap containing a commercial pheromone lure and a commercial pheromone dispenser. This was functionally equivalent to the "delta PPO-phero" treatment in Experiment 1. Weekly data are presented to assess compare the timing between trap types, and assess the probability of detection of NOW.

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