Sampling Methods and Development of Thresholds for Use Under Conventional and Mating Disruption-Based Management of Navel Orangeworm

Project Leader: Jay Rosenheim
Dept. of Entomology and Nematology; UC Davis; One Shields Ave.; Davis, CA 95616
(530) 752-4395; jarosenheim@ucdavis.edu

PROJECT SUMMARY

Objectives for current year:

- Prepare a series of datasets, all collected previously in commercial almond orchards using either conventional management or mating disruption methods between 2009-2014, that relate estimates of navel orangeworm population density made using different sampling methods to nut infestation and damage at harvest. Integrate the datasets and prepare them for analysis.
- Using a variety of statistical modeling techniques, determine which sampling method is the most accurate predictor of nut infestation and damage.
- Develop thresholds for applying insecticides to control navel orangeworm populations under conventional and mating disruption-based management programs.

Background and Discussion:

The navel orangeworm (NOW) is a major pest of almonds in California. A long-standing obstacle in developing improved management of navel orangeworm has been the difficulty of developing cost-efficient and accurate sampling methods. Sex pheromones, used successfully to monitor other moth pests, were long unavailable for navel orangeworm, because of its multi-component pheromone (Leal et al. 2005). In part because of the difficulty of estimating navel orangeworm densities, a data-driven density threshold that growers can use to make treatment decisions has never been established. A trusted threshold could, however, reduce the need for 'insurance' insecticide applications, thereby reducing the pressure for resistance evolution and lessening the risk of triggering outbreaks of spider mites (Hamby et al. 2013). Thus, a threshold could contribute to the sustainability of almond production.

Research breakthroughs in characterizing the navel orangeworm sex pheromone and in developing effective release methods for synthetic pheromone have now introduced two critical advances: (1) the availability of commercial pheromone lures (Suterra) as a monitoring tool; and (2) the ability to use season-long mating disruption methods on large spatial scales, using PuffersNOW, as a key means of suppressing navel orangeworm populations (Higbee et al. 2014). Pheromone traps may allow farmers managing navel orangeworm with conventional insecticide programs to establish density thresholds for optimized control decisions. However, in orchards using mating disruption, it is unclear if pheromone traps will still be viable as a sampling method, due to 'trap shut-down' (Higbee and Burks 2008). This is a major problem, as growers adopting mating disruption may still need to use supplementary insecticide applications, especially during the initial adoption process and in orchards adjacent to heavy sources of adult moths (e.g., pistachio orchards).

Almond production would be improved by establishing trusted thresholds for navel orangeworm control; both in orchards managed conventionally and in orchards that are transitioning to mating disruption based control. In both settings, a goal of this work is to establish the utility of synthetic lures for estimating densities of navel orangeworm. Another goal is to establish whether these lures can be used as a stand-alone sampling method, or should be used in combination with other sampling methods (in-season nut samples, catch of adult females in almond-meal baited traps, or egg traps).

Project Cooperators and Personnel: Bradley S. Higbee, Research Entomologist, Wonderful Orchards; Matthew Meisner, Farmer's Business Network

For More Details, Visit

- Poster location 21, Exhibit Hall A + B during the Almond Conference; or on the web (after January 2016) at Almonds.com/ResearchDatabase.