

Ambient Orchard Volatiles as Attractants for Navel Orangeworm (NOW)

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PROJECT SUMMARY

Objectives:

- Collect and identify ambient volatile emissions (odors) of almond orchards over the course of a growing season
- Develop a synthetic blend that mimics the primary orchard odor components for laboratory-based bioassays
- Develop an agricultural adjuvant, or additive, that could be used to enhance existing NOW trapping and mating disruption

Background and Discussion:

This work is an extension of the final year of a four-year study investigating the use of natural attractant odors from almond orchards for their ability to act as chemical cues (semiochemicals) toward the insect pest navel orangeworm (NOW). These almond orchard odors can help the insect locate its host plant, and may have several potential applications as noted below.

To accomplish the work, the researchers utilized an optimized large-scale ambient volatile collection system to obtain ambient orchard volatiles over the course of the growing season, as well as to collect damaged and hull-split almond volatiles *in situ*. Odor components were identified by gas chromatography-mass spectroscopy. Electrophysiological laboratory bioassays of these odor components were conducted using male and female NOW antennae and a blend was developed for use in attracting NOW moths in behavioral studies. 2011-2013 field trapping studies conducted in Kern County measured the responses of both male and female NOW adult moths using the

captured number of moths as the metric.

Results from the 2011 study (see also, Beck et al., *J. Agric. Food Chem.* **2012**, *60*, 8090-8096) indicated an overall efficacy of the formulated blend to be greater than that of the current standard, almond meal.

Recent work has continued the investigation of varying almond matrices (e.g., fungal-contaminated hulls) for other candidate semiochemicals. A key attractant, conophthorin in the current blend was found to originate from almond hulls. Other volatiles emitted from this matrix are being investigated for their ability to attract navel orangeworm moths (see also Mahoney et al., *Phytochem. Lett.* DOI:10.1016/j.phytol.2013.03.004)

This work on attractants / semiochemicals has a number of potential applications and benefits, including:

- Development of a trap that catches females, rather than monitoring egg laying only
- Development of a trapping system that is attractive to female moths after hullsplit
- Potential for significantly improved female oviposition disruption
- Combining attractants with insecticides for targeted "attract and kill" with minimal impact on beneficial insects and the environment
- Formulating the attractants with female NOW sex pheromone components for increased attractiveness of male NOW

Project Cooperators and Personnel: Bradley S. Higbee, Paramount Farming Co.; Noreen E. Mahoney, Douglas M. Light, Wai S. Gee, USDA/ARS, Albany, CA; Ring Cardé, UC Riverside

For More Details, Visit

- 2012.2013 Annual Report CD (11-ENTO4-Beck); or on the web (after January 2014) at www.almondboard.com/researchreports
- Related Projects: 11-ENTO12-Kuenen/Walse; 13-ENTO9-Cardé