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# Control of Navel Orangeworm (NOW) in Almonds Using Insecticides and Assessing Spray Coverage

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**Project No.:** 14-ENTO11-Siegel/Walse

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**Project Cooperators and Personnel:**

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**Objectives:**

1. Follow navel orangeworm (NOW) population dynamics and refine day-degree development models with a view towards improving spray timing and management decisions.
2. Assess and improve insecticide penetration and coverage, particularly in the upper canopy.
3. Assess the effectiveness, stability and longevity of insecticides commonly used in almonds against NOW.

**Interpretive Summary:**

Ongoing research is focusing on three aspects of navel orangeworm biology and control. First, navel orangeworm population dynamics have been followed for 11 years in almonds in Madera County using virgin female traps and the female sex pheromone when it became available. A degree-day based activity model was developed and validated for this insect. This model is unique in that it does not use biofix and instead tracks degree day accumulation from January 1. Peak activity is compared among years and between almond orchards and neighboring pistachios. The goal of these studies, coupled with numerous studies of insecticide application carried out in Madera and Fresno counties (Objective 2), is to optimize application. A second objective is to identify common pitfalls that decrease coverage to improve control. New nozzle configurations are currently being evaluated as well as the interplay between gallons per acre, operator speed and canopy height. A third objective is to assess the action of insecticides commonly used for control of navel orangeworm. Novel bioassays were developed so that spray card coverage could be linked to egg mortality and contact activity. Additional studies conducted by Spencer Walse determined the effective half life of three commonly

used insecticides on tree nuts. Finally, several classes of insecticides are under study and are currently being evaluated to quantify their adult activity, contact toxicity, and the role that different adjuvants play in determining their success. This research, using a spray tower, is conducted by Mark Demkovich. The ecological implications of our findings is being investigated by May Berenbaum and her students.