Impact of Sex, Age, and Mating Status on Flight Behavior of the Navel Orangeworm (NOW)

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PROJECT SUMMARY

Objectives:

- Compare the flight activity of unmated adults by sex and age
- Examine the impact of mating on sex- and age-specific flight activity
- Examine the association between laboratory flight and the number of eggs subsequently laid

Background and Discussion:

The navel orangeworm has a known capability for dispersal between orchards, and between tree nut crops. Knowledge of the details of this dispersal capability may be important to interpreting monitoring data obtained with the newly-available pheromone lures, and to efficacy of insecticide and mating disruption treatments for this key pest.

Flight mills provide information, under controlled circumstances, about the comparative flight ability of species and within-species differences due to sex, age, and mating status. The laboratory of Thomas Sappington, in Ames, Iowa, has used this technique to study various moth species over many years. In flight mill experiments, insects are attached with glue to a light metal arm balanced on a center pivot. An infrared detector along the center pivot detects each revolution of the arm, which represents a distance of one meter. Data from an array of 15 mills in a walk-in environmental chamber are sent to a computer and compiled by a custom program.

The first two objectives above have been addressed. Previous work under this project found that the navel orangeworm has greater flight capacity than other common orchard pests. The single-night median flight distance of mated navel orangeworm adults is 3-5 miles over the first five nights of adult life, and 1.5 miles for 7-day-old adults. Maximum single-night distances were 34-41 miles. Sex and mating status had a small but significant effect on the flight capacity of this pest. Females fly farther than males. Unmated moths fly farther than mated moths, particularly among males.

Damage in this species is entirely from larvae; therefore the importance of dispersal of mated females depends on the relationship between dispersal distance and the number of eggs deposited. Flight mill experiments are continuing to determine if there is a trade-off between the distance flown in laboratory flight mills and the number of eggs laid.

While flight mill studies offer comparisons under more tightly defined physiological conditions (e.g., age and mating status) than field studies, data from these two approaches (i.e., flight mill vs. field) must be compared for a more complete understanding. Flight mill data indicate minimum distances possible for navel orangeworm moths to travel, and are consistent with recent findings of higher damage in almonds located up to three miles from pistachio blocks, potential sources of higher navel orangeworm abundance.

Project Cooperators and Personnel: Thomas Sappington, Angela Rovnyak, and Mark Nehring, USDA/ARS, Ames, Iowa

For More Details, Visit

- Poster location 18, Exhibit Hall A + B during the Almond Conference; or on the web (after January 2015) at Almonds.com/ResearchDatabase
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