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

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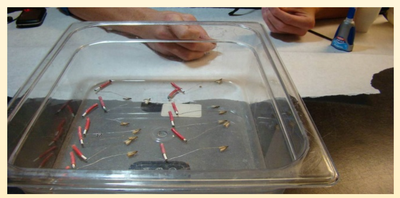
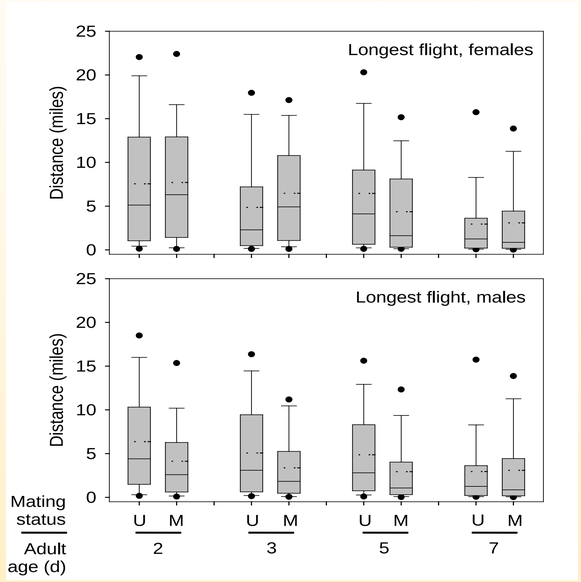
## Approach

Flight mills are used to study the flight capacity of an insect under controlled conditions. In these 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.



## Effect of mating status on flight capacity (longest single flight)

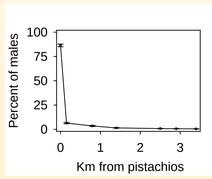
Box plots are used to present results from 36-77 moths flown for mated and unmated males and females of each age tested (total 855). The solid and dashed center lines respectively represent the median and the mean; the ends of the boxes represent the 25th and 75th percentile, the whisker represent the 10th and 90th percentile, and the individual points represent 5th and 95th percentile.

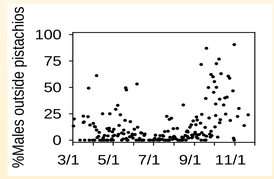



## Findings

- All adults up to 5 days old have substantial dispersal capacity
- Slightly decreased dispersal capacity evident on day 7
- Trade-off for males: 2- and 3-day females flight performance is slightly better after mating, whereas for same-age males it is slightly worse. This suggests transfer of energetic resources during mating.

Caveat: a distinction must be made between physiological capacity and field behavior, as illustrated below.




Counts of NOW males in pheromone traps on the edge of a large pistachio block and at distances up to 3.4 km across open range were examined weekly for 8 years. On average, 86% of males were captured in the traps on the edge of the pistachios, and only 14% went as far as 150 meters out of the pistachios (**upper left**). However, this proportion varied greatly (**upper right**), and was more strongly associated with season than with abundance. These observations suggest that environmental factors (e.g., temperature and/or day length) influence the probability of NOW males leaving an orchard and venturing over open landscape.

# Optimization and Use of NOW Biolure for Monitoring NOW in Almonds

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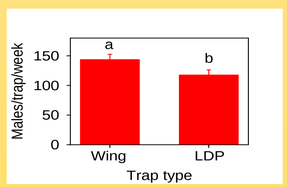
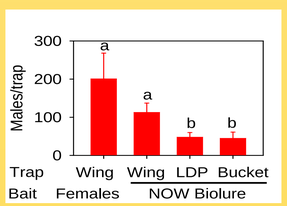
## Trap type and effectiveness of NOW Biolure: Wing better then LDP


**When both baited with females, wing and LDP traps capture proportionally to glue area**

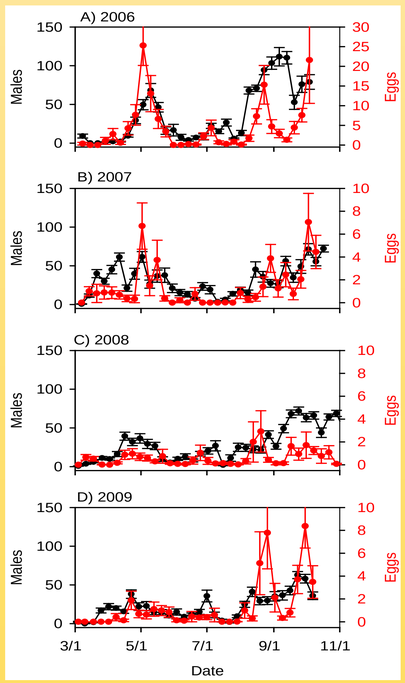
This experiment was conducted from 27 August to 24 September, 2012 in 8 replicate blocks in various almond orchards in Kern County, CA. Data was collected and females exchanged every 3-4 days for a total of eight sampling intervals.




**When both baited with Biolure, wing traps capture significantly more males than LDP traps**

Results shown are from a randomized complete block design in walnuts in 2013 with 6 replicate blocks and 6 replicates in time. Data was collected and females replaced on a daily basis, this NOW Biolure was compared to females at peak effectiveness. Very similar results were obtained in 2012 from 2 replicate 4 × 4 Latin square blocks in almonds.

## Pheromone and egg traps more synchronized in mid-summer than earlier or later




Data shown (**plots to left and right**) are from 31 3-acre plots located on Paramount farming properties in spread across Kern County. The plots consisted of five-row plot in blocks containing ‘Nonpareil’ and ‘Monterey’. Insecticide treatments was withheld from these 3 acre plots. Other such plots were plots 440 yards to 25 miles away. In each plot, a single female-baited wing trap and two egg traps monitored weekly through the growing season. In each plot, six 300-nut subsamples of each variety were taken at harvest. Harvest damage (to right) was for ‘Nonpareil’; ‘Monterey’ damage was similar.

## On a regional and year-to-year basis, egg traps were more associated with damage than were pheromone traps