

Honey Bee Colony Density and Almond Nut Set

Project Leader: Frank A. Eischen

USDA/ARS, Carl Hayden Bee Research Ctr. 2000 E. Allen Rd. Tucson, AZ 85719
(956) 373-5214, frank.eischen@ars.usda.gov

PROJECT SUMMARY

Objective:

- Evaluate the impact of differing colony densities on almond pollination during the 2012 season.

Background and Discussion:

A recent trend has been to reduce honey bee colony density during pollination down below the “standard” of 2 per acre. We examined the impact this has on nut set. This was carried out on four ranches near Bakersfield, CA. Blocks of almonds were paired for variety, age, tree density and management. One of the pair had a higher number of colonies per acre placed in or around it prior to bloom. Nominal colony density (i.e., the colonies rented per acre) differed between pairs by 0.5 - 1.0 colony per acre. In this test, the highest number of colonies rented per acre was 3 and the lowest was 1. Colonies in surrounding orchards out to 1.5 miles were counted and mapped. Their contributions of foragers to test orchards were predicted based on prior work.

The majority of orchards with higher colony densities had significantly higher pollination rates. Differences in pollination rate between low and high colony densities ranged from 1.2 to 20.2 percent for the early blooming varieties. However, when pollination rate differences between a pair of orchards were less than about

6%, we did not detect a statistically significant difference. Significant increases in pollination occurred in 60% of the paired early blooming variety blocks. In the later blooming hardshell blocks, 66.7% of high bee density orchards had significantly increased pollination rates. Differences in pollination rate between the low and high density late blooming blocks ranged from 1.7 – 17%. Again, when differences were less than about 6%, we did not detect significance.

Video recordings found that foragers in high bee density orchards remained on a flowering branch longer than foragers in low density blocks. They also visited significantly more flowers on a branch. This may be the result of lower rewards in blossoms causing foragers to spend more time collecting loads. Alternatively, foragers in high bee density blocks may have learned a certain expectation of reward. This increased time spent on a branch helps to explain why a doubling of colonies generally did not result in a doubling of the pollination rate for pairs of orchards.

Project Cooperators: Henry Graham, USDA-ARS, Tucson; Raul Rivera, USDA-ARS, Tucson; Joe Traynor, Scientific Ag; Lee Brown, South Valley Farms; Marty Hein & Carole Fornoff, Westchester Group, Inc; Greg Wegis, Wegis & Young; Geordy Wise, Gardiner-King Ranch, Gordon Wardell, Paramount Farming Co.

For More Details, Visit

- Poster location 31, Exhibit Hall A & B during conference; or on the web (after January 2013) at www.almondboard.com/researchreports
- 2011.2012 Annual Report CD (11.POLL11.Eischen); or on the web (after January 2013) at www.almondboard.com/researchreports