

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 and 2013 seasons.

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 five 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 1.5 to 18.4 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 92% of the paired early blooming variety blocks. Differences in pollination rate between the low and high density late blooming blocks ranged from 5.7 – 18.4%. Again, when differences between pairs of orchards were less than about 6%, we did not detect significance. 2013 harvest data have yet to be obtained and analyzed.

2013 results for pollination rates fall in line with the 2012 data. For 2012 bloom studies, set was significantly higher with higher hive density in about 70% of the variety pairings analyzed; however, harvest yield differences were equivocal: yields were higher with higher hive density in about 50% of the variety pairings analyzed and were actually less in 40% of these pairings.

Petal fall was monitored daily to get an estimate of flower density in both early and late varieties. We found that the average number of flowers (total bloom) for Nonpareil, Monterey, Fritz trees was 33,400, 53,431, and 37,093 flowers/tree, respectively. Butte and Padre had, on average, 62,163 and 70,211 flowers/tree, respectively. These are considerably higher estimates than those previously reported. Daily petal fall provides an estimate of new flower openings and a projection of the bee-to-flower ratio.

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

- 2012.2013 Annual Report CD (12-POLL11-Eischen); or on the web (after January 2014) at www.almondboard.com/researchreports