Supporting Integrated Honey Bee Pollination in Orchards through Increased Forage

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PROJECT SUMMARY

Objectives for current year:

This study has four primary research objectives related to supporting bee forage to achieve high quality pollination of almond.

- Assess the performance of flowering plant mixes including their establishment, multi-season persistence and bloom timing.
- Quantify *honey bee* use of the flower plantings through visitation and pollen use.
- Quantify potential competition between forage plantings and almond orchards for pollinator visits through monitoring visitation rates of *honey bees* and *wild bees* to blooming almond orchards with and without plantings.
- Assess preliminary nut set (pre June-drop) in relation to forage plantings

Throughout we will coordinate with other research teams collecting hive health data, to integrate results from multiple projects.

Background and Discussion:

Almond pollination relies on healthy honeybees. Wild bees also may increase the pollination effectiveness of honey bees through synergistic interactions that cause honey bees to move more frequently between varieties (Brittain et al. 2013). Lack of diverse nutrient sources remains a primary threat to honey bees and wild bees alike. Although almond pollen and nectar are important resources, alternative pollen and nectar sources immediately preceding and following the bloom of almond will likely benefit honey bee health through increased nutritional diversity. Wildflower habitat plantings are increasingly used to boost forage for honey bees and with informed selection of plant species, the same flower mixtures designed to support honey bee nutrition can also extend forage resources for wild bee populations within the landscapes.

Our past project, with industry collaboration, completed two years of wildflower assessment in southern (Lost Hills) and central regions (Modesto), and began preliminary work in the northern region (Arbuckle-Chico). It also initiated collaborative work comparing bee use of flowering mustard mixes (Project Apis m).

In the current project we will collect data from five wildflower sites, paired mustard sites, and unplanted control sites before, during and after almond. To assess honey bee use we will monitor visitation to flowers at each site. At a subset of sites, we also will quantify bee use by sampling bee-collected pollen at the hives placed near to the forage plantings or control margins. To independently assess potential competitive impacts between orchards and different types of flower plantings, we will compare wildflower sites with separate ongoing Project Apis m. mustard sites. At all of these sites we will simultaneously monitor honey bee and wild bee visitation to almond orchards and flower plantings throughout the orchard bloom period. In March we will count numbers of post-anthesis flower along a standard branch length. Different distances into the orchard. We will return in late May to assess the conversion of flowers to nuts. This metric serves as a proxy for how proximity to forage plantings can benefit nut set.

This research will be coordinated with other research teams assessing pollen use and colony health of managed honey bee hives in each location.

Project Cooperators and Personnel: Kimiora Ward, Elina Niño, UC Davis; Quinn McFredrick, UC Riverside; Kirk Anderson, USDA/ARS Carl Hayden Bee Research Center; Billy Synk, Project Apis m.

For More Details, Visit

- Poster location 113. Exhibit Hall A + B during the Almond Conference; or on the web (after January 2017) at Almonds.com/ResearchDatabase
- 2015 - 2016 Annual Reports CD (15-POLL13-Williams); or on the web (after January 2017) at Almonds.com/ResearchDatabase
- Related projects: 16-POLL14-McFrederick/Anderson; 16-POLL20-Niño;15-POLL15-Sagili; 13-POLL1-DeGrandi-Hoffman