Longitudinal Evaluation of Honey Bee Colonies on Different Forage Regimes

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PROJECT SUMMARY

Objectives for current year:

- Determine the short-term and long-term effects of two different forage mixes on honey bee colony growth, health, and annual survival.
- Determine honey bee foraging preferences by collecting and identifying pollen brought to the colony.

Background and Discussion:

The national colony loss survey still reports average annual losses in the US close to 45%. Beekeepers are reporting an array of suspected causes including varroa mites, pathogens and exposure to pesticides. Research thus far demonstrates that honey bees benefit from having an access to plentiful and diverse pollen sources leading to improved immunity and pesticide detoxification ability (Alaux et al. 2010; Schmehl et al. 2014). Efforts to provide supplemental forage to colonies prior, during and after almond bloom are underway, however, there is a great need for recording how these efforts translate into both short-term and long-term colony health, productivity, and survival.

For the 2017 bloom, we plan to utilize forage plots already established in the northern growing regions (Arbuckle-Chico) by Williams lab and other sites established by growers in collaboration with Project Apis m. We project that the available sites will consist of 4-5 California native wildflower sites, 4-5 mustard mixes sites and 4-5 control sites (almond orchards with no supplemental forage). We will utilize minimum of 8 colonies per foraging treatment (2 colonies per site) to perform longitudinal monitoring. Prior to moving the colonies into experimental plots we will overwinter them in UC Davis apiaries and they will be managed as per standard management practices.

Prior to the experiment start colonies will be evaluated for weight, food stores, adult population, queen presence and brood production. If needed, colonies will be standardized by removing and/or combining frames. Samples of adult bees will also be collected at this time for future molecular (please see project 16-POLL14-McFrederick/Anderson) and physiological (measurement of hypopharyngeal gland size in nurse bees; Hatjina et al. 2013) analyses. Once placed at foraging sites, bees will be allowed to forage freely.

Colonies will be evaluated for the above measurements prior to almond bloom, once during almond bloom and once after almond bloom at the samples will be taken for molecular and physiological analyses. After the experiment is completed in the almond orchards, colonies will be stationed in UC Davis apiaries and monitored during 2017-2018. Colonies will be checked for queen presence and brood production every three weeks. Colony strength parameters (weight, food stores area, brood area, adult population size) and varroa mite infestation levels will also be measured and honey bee samples will be taken for molecular and physiological analyses.

We will also identify pollens collected by honey bees by placing pollen traps on focal colonies at each of the foraging sites to confirm target forage use by honey bees.

Our results will evaluate short- and long-term value of supplemental forage to honey bee colony health, productivity and survival in context of almond pollination.

Project Cooperators and Personnel: Neal Williams, University of California Davis; Quinn McFrederick, University of California Riverside; Kirk Anderson USDA/ARS Carl Hayden Bee Research Center; Billy Synk, Project Apis m

For More Details, Visit

- Poster location 114, Exhibit Hall A + B during the Almond Conference; or on the web (after January 2017) at Almonds.com/Research Database
- Related projects: 16-POLL13-Williams; 16-POLL14-McFrederick/Anderson;15-POLL15-Sagili; 13-POLL1-DeGrandi-Hoffman