Longitudinal Evaluation of Honey Bee Colonies on Different Forage Regimes

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PROJECT SUMMARY

Objectives for current year:

- Evaluate short- and long-term impacts of supplemental forage on honey bee colonies within the context of almond pollination (year 2).

Background and Discussion:

Here we evaluated two different forage mixes planted in almond orchards on colony growth, health and survival, as well as bee foraging preferences. In 2017, we utilized forage plots in the northern growing regions (Arbuckle-Chico) consisting of four California native wildflower sites, four mustard sites and eight matching control sits (2 colonies per site, 32 colonies total). Prior to moving the colonies into experimental orchards, they were overwintered at UC Davis apiaries and were managed as per standard management practices.

At start of the experiment, colonies were evaluated for weight, food stores, adult population, queen presence and brood production. Samples of adult bees were also collected at this time for future molecular (with collaborator McFrederick) and physiological analyses (hypopharyngeal). Bees were allowed to forage freely at the experimental sites and data were collected pre- and post-bloom as well as twice during bloom. Once the almond bloom ended, colonies were moved back to UC Davis apiaries and are being monitored continuously every four weeks and until spring 2018.

Colony strength parameters are evaluated as per Kanga et al. (2013), as well as alcohol washes for varroa mite infestation. We have also collected pollen from all colonies by placing pollen traps at the front entrance in order to determine target forage (with Williams lab). We will use results of pollen identification to conduct fine-scale analysis and more directly correlate nutritional availability with colony growth, health and survival.

Thus far, comparison of all four groups revealed no significant differences for the colony parameters measured for any of the evaluation time points (ANOVA on transformed data, $p<0.05$). However, due to unpredictably wet season, wildflower plantings did not bloom at the expected time, effectively making this group more similar to the controls. When we analyzed the data comparing only the mustard group with the matching control, we identified significantly higher amount of adult bees and brood for two time points in mustard colonies. These findings suggest that mustard supplement may positively affect bee population growth leading to increased forager numbers and potentially improved pollination effectiveness.

We did not find any significant differences in varroa mite infestation between groups. This is not surprising since thus far there has not been recorded interaction between varroa mite infestation levels and honey bee nutrition. The analysis of pathogen loads, hypopharyngeal glands, and immunity are currently underway. Lastly, the true value for beekeepers would be reduced colony losses. While we did not see significant differences in colony mortality between the groups, four out of four (100%) dead colonies were in one of the control no forage groups.

Our preliminary data analysis highlights the potential immediate value of mustard forage to honey bee colony growth within the almond pollination context. Future work will focus on exploring additional forage options such as wildflower plantings with the ultimate goal of providing planting recommendations to interested stakeholders.

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
- 2016 - 2017 Annual Reports (16-POLL20-Nino) on the web at Almonds.com/ResearchDatabase
- Related projects: 17-POLL13-Williams; 17-POLL14-McFrederick/K. Anderson