The Influence of Cover Crop Forage on Honey Bee Nutrition and Gut Microbes and on Colony Growth and Activity

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PROJECT SUMMARY

Objectives for current year:

- Develop methods to exploit data from continuous monitoring of bee colonies in the field.
- Determine the effect of strategically planted oilseed cover crops that bloom prior to, and shortly after the almond pollination, on honey-bee nutrition, health, and queen quality.
- Determine if cover crops affect the honey-bee gut microbiota when compared to bees fed high fructose corn syrup.
- Understand the interplay between cover crops, honey-bee nutrition, health, queen quality, and microbes by synthesizing the results from objectives 1-3.

Background and Discussion:

The almond pollination is the largest commercial pollination event in the world, yet occurs at a time of the year when floral resources are typically unavailable. Bee keepers therefore often feed sugar syrup or high fructose corn syrup (HFCS) and pollen substitutes to their colonies to boost colony size for almond pollination. Other research has shown that artificial food such as HFCS affects bee nutrition and immunity, but whether providing flowers before the almond pollination can affect colony size, queen quality, and honey bee nutrition remains unknown. In winter of 2014, we evaluated and equalized 40 colonies that we then placed at four sites in Arizona: two sites with little to no forage available and two that were planted with two acres of rapini forage each. After this we then moved the hives to almonds. Hive weight, queen quality, worker nutrition, and the worker gut microbiome in each colony were monitored.

We are in the middle of analyzing the data we collected during the 2015 almond pollination. We predict that colonies fed artificial diets only prior to almond bloom will exhibit poorer nutrition, colony productivity, and an unhealthy gut bacterial community when compared to colonies allowed to forage on rapini in January and February prior to almond bloom. If so, we will be able to recommend providing rapini forage before the almond pollination occurs. The benefit to the bees is expected to amount in healthier and more reliable honey bee colonies for almond production.

One limitation to the work we did in 2015 was that we were unable to locate forage sites in California suitable for our experimental design and we had to apply the forage treatment in Arizona, and move the colonies into almonds once the bloom began. We were therefore unable to assess how rapini planted near almond orchards affected honey bee colonies. We have already begun to plan for the 2016 pollination, in hopes that we can set up the experiment in California almond orchards as originally planned.

Project Cooperators and Personnel: Kirk Anderson, USDA; Gordon Wardell, Wonderful Farms; Jason Rothman & Hoang Vuong, UCR; Milagra Weiss, USDA.

For More Details, Visit

- Poster location 2, Exhibit Hall A + B during the Almond Conference; or on the web (after January 2016) at Almonds.com/ResearchDatabase
- 2014 - 2015 Annual Reports CD (14-POLL14-McFrederick/Meikle/Carroll); or on the web (after January 2016) at Almonds.com/ResearchDatabase
- Related projects: 15-POLL13-Wiliams; 15-POLL15-Sagili; 13-POLL1-DeGrandi-Hoffman