Fungicide Effects on Honey Bee Development

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PROJECT SUMMARY

Objectives:

- Evaluate iprodione (Rovral) effects on brood, queen, and overall colony health.
- Track egg and larval development for any effects of iprodione that could affect colony growth.
- Compare colony mortality in treated and untreated hives.

Background and Discussion:

Some beekeepers suspect that fungicides commonly used during almond pollination affect larval development. Although laboratory data also suggests that some fungicides are toxic to honey bee larvae, it is important to base conclusions on field-relevant fungicide concentrations and experimental design.

In 2012 we subjected colonies to pollen infused with iprodione (Rovral), chlorothalonil (Bravo, Echo), ziram, and boscalid/pyraclostrobin (Pristine). We tentatively observed less capped brood in colonies treated with iprodione and chlorothalonil compared to controls. We have repeated this experiment in 2013, focusing on iprodione in order to maximize statistical power.

We determined concentrations in almond pollen, compared these levels to those found by others and concentrations calculated for risk assessment purposes, in order to determine a field relevant concentration of iprodione. We fed bees pollen with 1X and 10X of this concentration of the active ingredient, and corresponding 10X concentration of formulated Rovral while they were confined in flight cages for one week.

Similar to 2012 results, in colonies treated with 1X and 10X iprodione we observed less development of capped brood than in controls beginning at 3 weeks from the initiation of treatment. We are continuing to compare the detailed observations we made of the fate of eggs and larvae in hopes of identifying the developmental stage affected by iprodione. We also observed increased Nosema levels in colonies treated with iprodione. Effects of the formulated product, Rovral, are less clear, possibly due to the difficulty of homogeneously incorporating this material into pollen which created uncertainty as to whether bees consumed it.

Our data may explain beekeeper reports of delayed toxicity to brood, although many other fungicides used during almond bloom should be explored for potential effects on honey bees. Additionally, bees are exposed to pests, pathogens, and variations in weather, nutrition, and beekeeper practices during almond pollination.

We hope that our results will inspire beekeepers and almond growers to consider practices that further decrease honey bee exposure to fungicides, including the timing and placement of hives, and the timing of sprays. Honey bee colonies are exposed to fungicides during pollination of many crops, and future research should consider the additive and synergistic effects of these exposures.

Project Cooperators and Personnel: Collaborator: Ramesh Sagili, Oregon State University; Undergraduate Students: Matt Stratton, Cole Ditzler, Sarah Montague, Josean Perez, OSU; Consultants: Eric Mussen, Dept. of Entomology, UC Davis, Jim Adaskaveg, Dept. of Plant Biology and Microbiology, UC Riverside

For More Details, Visit

- Poster location 2, Exhibit Hall A and B during conference; or on the web (after January 2014) at www.almondboard.com/researchreports
- 2012.2013 Annual Report CD (12-POLL12-Hooven); or on the web (after January 2014) at www.almondboard.com/researchreports
- Related Project: 12-POLL9-Frazier