

Fungicide Effects on Honey Bee Development

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PROJECT SUMMARY

Objectives:

- Measure levels of fungicides in almond pollen
- Observe whether development of bees is affected in colonies fed pollen containing fungicides
- Determine whether fungicides are degraded by microbial activity within the hive.

Background and Discussion:

Some beekeepers report problems with bee development during almond pollination and suspect fungicides. Not all beekeepers report such losses, and there may be a specific set of conditions which cause this loss, which could include a specific fungicide or other variable experienced by only certain beekeepers.

Although some fungicides have been shown to be toxic to honey bee larvae in laboratory tests, it is unclear how closely those experiments resemble field exposures. Our overall goal is to determine whether fungicides applied while bees are potentially present affect honey bee development in a semi-field setting.

Iprodione (Rovral), Ziram, chlorothalonil (Bravo, Echo), and boscalid/pyraclostrobin (Pristine) were used in this study based on previous reports. We determined concentrations of these pesticides in pollen collected during almond bloom, and fed bees pollen with 10 times the highest concentrations found while they were confined in

flight cages. In colonies treated with ziram, we observed increased mortality of queens. In the colonies treated with chlorothalonil and iprodione, we observed less development of capped brood than in controls. In agreement with other studies examining effects of Pristine on bees, we observed no difference between controls and colonies treated with boscalid/ pyraclostrobin.

While fungicides are generally of low toxicity to adult bees, fungicides potentially interfere with bee nutrition. This could explain beekeeper reports of delayed toxicity and our results. Conversely, bacteria and fungi that ferment pollen could degrade pesticides before they are consumed by bees. We are currently analyzing pollen from our experiments for pesticide levels.

We intend to validate our results in future trials. To further verify that bees are exposed to these fungicides, some of which are used post-bloom, we will collect additional pollen during almond pollination for analysis. Additionally, we are mapping California pesticide use statistics with bloom time to gauge how bees are exposed to specific fungicides during almond bloom.

Project Cooperators: Collaborator: Ramesh Sagili, Kim Anderson, Oregon State University; Undergraduate Students: Melissa Andreas, Russell Jernstrom, Craig Bohan, Stevan Jeknic, Elizabeth Records, OSU. Consultants: USDA Specialty Crop Research Initiative Proposal Team, including Eric Mussen, Dept. of Entomology, UC Davis, Jim Adaskaveg, Dept. of Plant Biology and Microbiology, UC Riverside

For More Details, Visit

- Poster location 37, Exhibit Hall A & B during conference; or on the web (after January 2013) at www.almondboard.com/researchreports
- 2011.2012 Annual Report CD (11.POLL12.Hooven); or on the web (after January 2013) at www.almondboard.com/researchreports
- Related Projects: 12.POLL9.Frazier