Can Application Time Limit Fungicide Exposure to Honey Bees in Almonds?

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PROJECT SUMMARY

Objectives for the 2017 study:

- Determine if iprodione and propiconazole, two fungicides, when sprayed in AM or PM leads to differences in the level of contaminant in almond pollen sampled from anthers or collected at the hive.
- Assess fungicidal effects on honey bee foraging activity within the orchard and at hive entrances following AM and PM sprays.

Background and Discussion:

Although fungicides have not been traditionally viewed as a threat to honey bee health, recent work has revealed synergistic toxic effects of field relevant combinations of insecticides and fungicides (Johnson et al.) Furthermore, fungicide loads in bee-collected pollen have been correlated to the prevalence of the common honey bee parasite *Nosema* (Pettis et al. 2013). It is therefore important to reduce honey bee exposure to fungicides. Accordingly, the Almond Board in its "Honey Bee Best Management Practices for California Almonds" recommends: 1) Avoid tank-mixing insecticides during bloom; and 2) Any fungicide application deemed necessary during bloom should occur in the late afternoon or evening when bees and pollen are not present to avoid exposing pollen to spray materials.

The 2015 study was designed to document if spraying fungicide in the morning when pollen is exposed on anthers versus the afternoon-evening when there are no exposed pollen results in greater fungicide residues on pollen collected at the anthers and at the hive entrance.

In 2015, counts of bee presence among nearby blooms and of foraging traffic at the hive entrance were collected as a metric of honey bee health after spray events. Iprodione, as Rovral 4F, was sprayed according to label at a uniform rate using an air blast ground rig either at 6pm on Day 1 in Zone 1 (PM spray), or at 11am on Day 3 in Zone 2 (AM spray). The study took place at Wonderful Orchards in Kern County. Day 1 prior to spray yielded pre-treatment data. Foraging activity decreased from Day 1 to Day 3 as the almond bloom density declined, a factor that may have affected our results.

Pollen collected at the hive entrance and at the almond anthers were compared for iprodione contamination. As expected, anther pollen collected immediately after the AM spray had contaminant levels of iprodione significantly higher than levels in anther pollen collected the morning after the PM spray, despite detectable spray drift in the AM spray and no apparent spray drift in the PM spray. Counter to expectations, contaminant concentration in forager-collected pollen was significantly higher following PM spray than following AM spray. This observation may reflect declining forager activity as the bloom faded and not a difference in iprodione in available forage as intended. Fungicide residues were analyzed at the USDA-AMS laboratory, Gastonia, NC.

The 2017 study follows the same study design as the 2015 study with two exceptions. The effects of two fungicides will be assessed and the timing of the study will be targeted to peak bloom instead of late bloom in almonds.

Project Cooperators and Personnel: Gordon Wardell, Wonderful Orchards

For More Details, Visit

- Poster location 116, Exhibit A + B during the Almond Conference; or on the web (after January 2017) at Almonds.com/ResearchDatabase
- 14-POLL16-Pettis/Johnson on the web at Almonds.com/ResearchDatabase
- Related projects: 15-POLL3-Williams (2015 – 2016 Annual Reports CD); 16-POLL17-R. Johnson; 16-Poll18-Berenbaum; 16-POLL19-Cox-Foster