

# Effect of Application Time on Honey Bee Exposure to Fungicide

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**PROJECT SUMMARY**

**Objectives:**

- Determine if iprodione, a fungicide, 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 iprodione 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. 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.

Our study was designed to document if spraying fungicide in the morning when pollen is exposed on anthers versus the afternoon-evening when there is no exposed pollen results in greater fungicide residues on pollen; furthermore, to determine if the fungicidal residue is quantifiable in anther pollen versus pollen trapped at the hive entrance.

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, or at 11am on Day 3 in Zone 2. Day 1 prior to spray yielded pre-treatment data, The study took place at Wonderful Orchards in Kern County. Fungicide residues were analyzed at the USDA-AMS laboratory, Gastonia, NC.

Anther pollen sampled after the AM spray had the highest overall concentrations of iprodione in this study despite detectable spray drift. As expected, anther pollen collected immediately after the AM spray had contaminant levels significantly higher than anther pollen collected the morning after the PM spray, which had no detectable spray drift. Counter to expectations, contaminant concentration in forager-collected pollen was significantly higher following PM spray than following AM spray. The simultaneously high loads of iprodione in anther pollen and the low loads in bee-collected pollen following AM spray may be a reflection of declining forager activity within the treated sites rather than a difference in iprodione in available forage. Foraging activity decreased from Day 1 to Day 3 as the almond bloom density declined. In future studies, this question should be addressed during a period of more consistent bloom. We have interest to repeat the study earlier (e.g., during mid-bloom) as we feel that the diminishing late bloom in this study may have affected our results.

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**Project Cooperators and Personnel:** Sarah Bluher, USDA-ARS Bee Research Laboratory, Jody Johnson, Cullaborate, LLC, Gordon Wardell, Wonderful Orchards.

**For More Details, Visit**

- Poster location 7, Dec 9, 2015, Exhibit Hall A + B, during the Almond Conference; or on the web (after January 2016) at [Almonds.com/ResearchDatabase](http://Almonds.com/ResearchDatabase)
- Related project: 15-POLL3-Williams