Honey Bee Management, Genetics and Breeding

Project No.: 01-RP-00

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Objectives

1. Develop management methods for the commercial beekeeping industry to maintain and produce commercial honey bees of good genetic stock that are resistant to diseases, free of objectionable Africanized honey bee genetic material, and are of high commercial value for pollination.

2. Selectively breed and maintain strains of bees that are more effective pollinating units.

3. Study the effects of the genome and the colony environment on the foraging behavior of honey bees in order to manipulate both and achieve greater pollination activity in colonies.

4. Conduct DNA surveys of feral honey bee populations to determine the extent of the spread of Africanized honey bees in California.

Summary

Honey bees collect pollen in response to the presence of chemicals produced by larvae. These chemicals (pheromones) have been determined and are available as a synthetic blend that can be applied to colonies. Over the past two years we have established the efficacy of the use of this synthetic "brood pheromone" to stimulate pollen foraging. The tests demonstrated effects when applied in small colonies maintained in almond orchards and within special flight cages.

Stored pollen inhibits the collection of pollen. As a colony sits in an orchard during the bloom, the amount of stored pollen increases, presumably resulting in a decrease in pollen foraging activity. Therefore, less pollinating activity is expected at the end of the bloom compared to the beginning when colonies are starved for pollen. This past season we tested the synthetic brood pheromone in commercial colonies of honey bees in orchards at the end of the almond bloom to see if we could re-stimulate them to collect pollen.

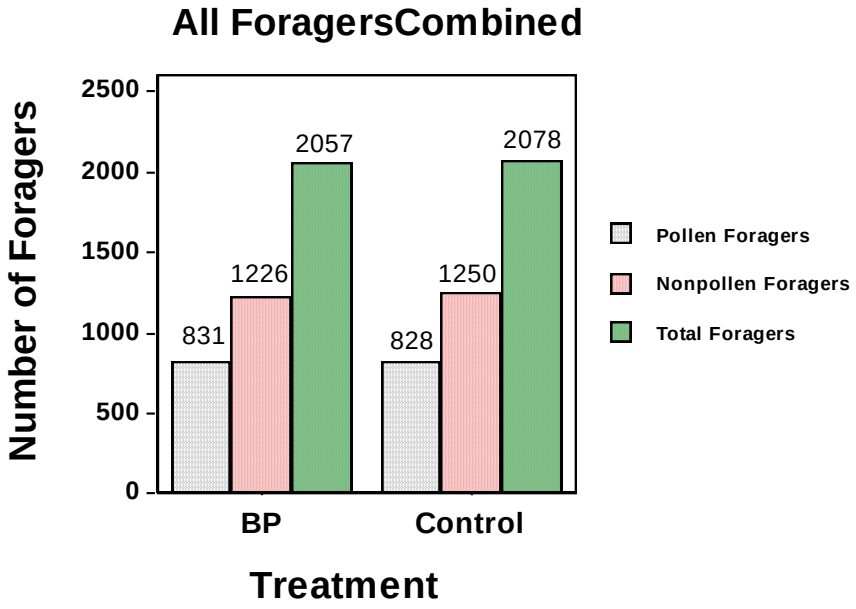

Figure 1. The numbers of pollen, nonpollen, and total foragers from colonies treated with synthetic brood pheromone and controls.

Thirteen colonies were used in repeated trials as controls and treatments. Treatment colonies had synthetic brood pheromone added as described in previously reports. Controls were sham treated as previously reported. Returning foragers were collected at the entrances of all colonies following the application of treatments and it was determined if they were pollen foragers, the weight of pollen they collected, and if they had collected almond pollen.

Our tests demonstrated that synthetic brood pheromone significantly increases the amount of almond pollen collected by commercial colonies at the end of the bloom. There were no detectable differences in the numbers of pollen and nonpollen (presumably nectar) foragers in the treatment and control trials (Fig. 1). However, colonies receiving the synthetic pheromone had significantly more pollen foragers returning with loads of almond pollen (Fig. 2). In addition, almond pollen foragers from treatment trials collected larger loads of pollen than almond pollen foragers from the control trials. The combined effect resulted in 46% more almond pollen being collected by the treatment colonies (Fig. 3).

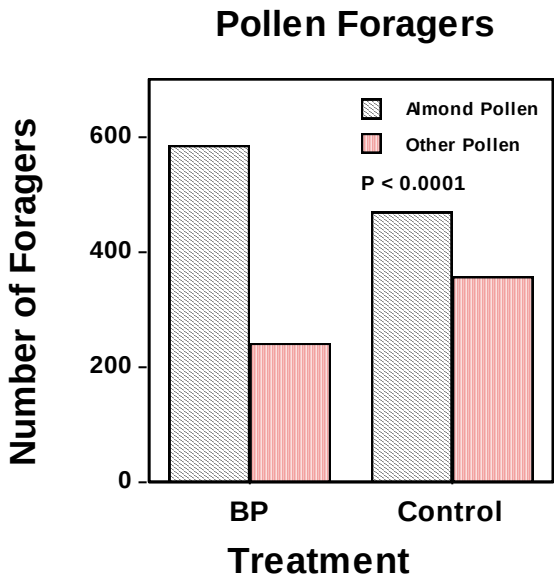

Figure 2. The number of pollen foragers sampled that were collecting almond pollen versus all other kinds of pollen.

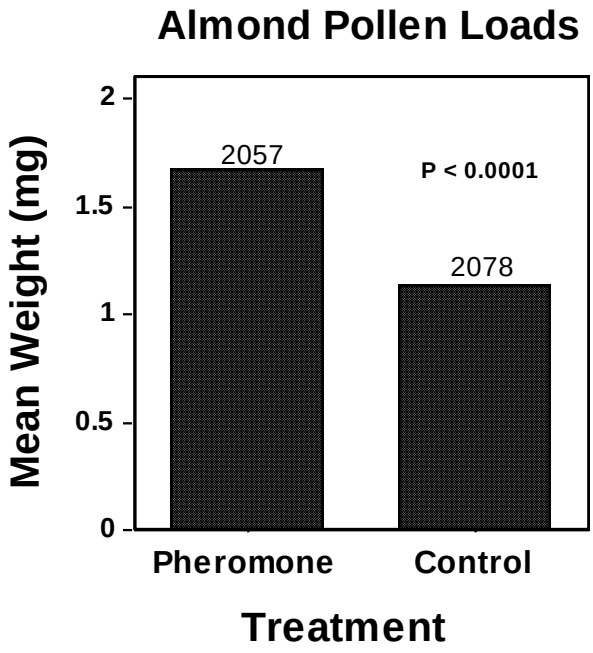

Figure 3. Mean weights of almond pollen collected by all foragers sampled.

We are currently working to develop better methods of application of synthetic brood pheromone to colonies. We also need to test this material during different stages of the bloom and under different weather conditions in order to determine its efficacy as a tool to enhance pollination.