Assessing the value of supplemental forage during almond pollination

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Introduction

Our current agricultural production involves extensive monocultures, and many of these production systems are without the presence of cover crops, which had once provided supplemental pollen sources for honey bees (Dimitri, 2005). Within this current system, honey bees are left with few pollen species in their diet for a significant amount of time as they are transported from bloom to bloom. When monoculture crops are not in bloom, these areas provide no forage for bees, turning already diminished open land into resource deserts (Kremen et al. 2002). The resulting scarcity of pollen and nectar sources could significantly impact both adult bee survival and brood development (Naug 2009).

Almond orchard with no vegetative understory
Photo: OSU Honey Bee Lab

Honey bee colonies employed for almond pollination face two different challenges with respect to nutrition:

a) lack of adequate foraging resources before and after almond bloom

b) lack of floral diversity during almond bloom

Various measures have been proposed to enhance pollen diversity such as planting hedge rows near the fields and cultivation of few acres of different crops in proximity of monocultures (Schmidt et al 1995).

Organizations such as Project Apis m. are working with other cooperators to develop appropriate seed mixes and planting regimes to provide alternate forage for bees before and after almond bloom in California. To successfully implement and promote this strategy we need to understand the potential of these supplemental bee forages in promoting honey bee colony health.

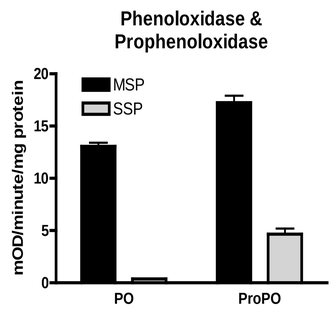
Objective

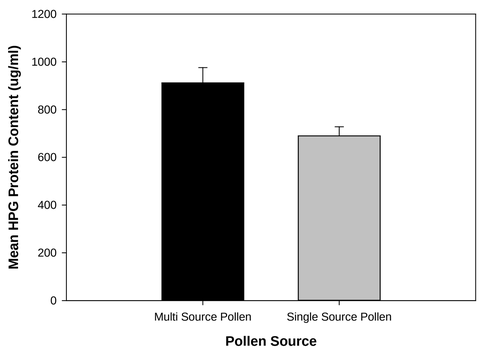
We will evaluate and document nutritional value of supplemental forage prior to and after almond bloom on honey bee nutrition, colony growth, immune system and survival.

Almond orchard with alyssum cover crop
Photo: Priscilla Baker, NRCS

Preliminary Data

In a recently concluded study we evaluated effects of pollen diversity on honey bee physiology and immunocompetence. Results from this study indicate that phenoloxidase and prophenoloxidase enzyme activities (indicators of immunocompetence) and nurse bee hypopharyngeal gland protein content in single-source pollen treatments were significantly low compared to multi-source pollen treatments ($P < 0.01$ and $P < 0.05$ respectively).

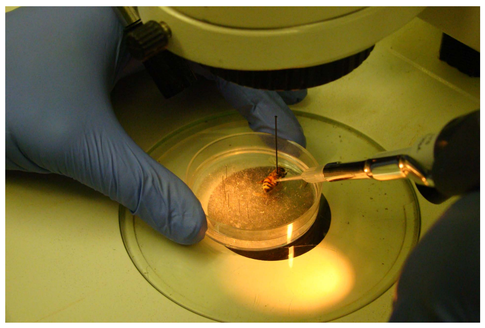




Methods

Six almond orchards, three with supplemental bee forage and three orchards without supplemental bee forge will be selected for this study. Orchards without supplemental forage will serve as controls. Honey bee colonies from cooperating beekeepers will be placed near these selected almond orchards.

Fifteen colonies will be number tagged and monitored in each of the six experimental orchards. Bee samples will be obtained from all the experimental hives at regular intervals for hypopharyngeal gland protein analysis, lipid analysis, midgut proteolytic enzyme activity, immunocompetence analysis, and pest and pathogen analysis.



Each week, pollen collected by foragers will be trapped using pollen traps to analyze pollen composition.

Co-operators/collaborators: Dr. Neal Williams, U.C. Davis; Project Apis m and beekeepers from California and Oregon

Acknowledgements

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