



Honeybee nutrition and effective crop pollination at an avocado orchard

Madlen Kratz

The University of Western Australia

Co-authors: Rob Manning, Lynne Milne, Kingsley Dixon, Boris Baer, Dominique Blache, Kenneth Dods

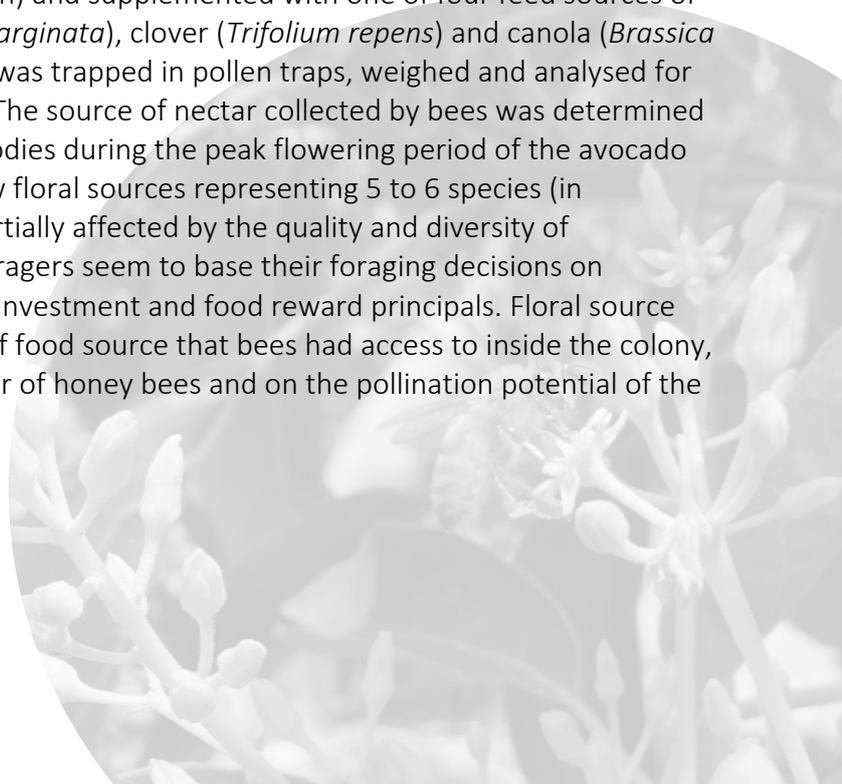
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Speaker Bio

My background is in research on honey bee nutrition, fertility, foraging behaviour and pollination. During my PhD I studied the effects of nutrition on colony health and crop pollination efficiency. The applied aspect of my research has led me to my recent appointment with the Department of Primary Industries in NSW, as the Honeybee Industry Development Officer where I focus on applied research to improve the productivity, profitability and sustainability of the beekeeping industry.

Presentation

In Western Australia (WA) commercial beekeepers commonly use coastal heathland (mix of native vegetation) and canola (*Brassica napus*) sites for the preparation of colonies for spring crop pollination. Avocado (*Persea americana*) is a crop that requires a large number of colonies for effective pollination from October to November in WA. Pollination of avocado flowers by honeybees might be limited because bees may prefer other nearby floral sources over avocado flowers, leading to inadequate cross-pollination. We conducted a field experiment at a local commercial avocado orchard to test 1) if the nutrition of stored food sources influences the foraging behaviour of honeybees and 2) if the foraging behaviour of honey bees affects the pollination of avocado flowers. Forty honeybee colonies were assigned to four feed treatments (10 colonies each) and supplemented with one of four feed sources of marri (*Corymbia calophylla*), jarrah (*Eucalyptus marginata*), clover (*Trifolium repens*) and canola (*Brassica napus*). Pollen that bees collected at the orchard was trapped in pollen traps, weighed and analysed for its floral diversity to indicate foraging behaviour. The source of nectar collected by bees was determined by identifying the type of pollen found on their bodies during the peak flowering period of the avocado crop. Both pollen and nectar collectors visited few floral sources representing 5 to 6 species (in abundance > 5%). The foraging behaviour was partially affected by the quality and diversity of supplemented food sources. Pollen and nectar foragers seem to base their foraging decisions on different environmental cues including energetic investment and food reward principals. Floral source abundance and attractiveness, besides the type of food source that bees had access to inside the colony, played an important role in the foraging behaviour of honey bees and on the pollination potential of the avocado crop.





Effects of nutrition on honeybee health and colony performance during crop pollination

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Nutritional deficiencies can exacerbate the prevalence of diseases, shorten honey bee lifespan and reduce colony performance. When honey bees are being used for commercial crop pollination, the major food source is often the crop itself and bees are limited in their selection of alternative food sources. This lack of diversity in food sources can lead to starvation or malnourishment, resulting in poor bee health and ultimately poor crop pollination. It was not known to what extent food sources collected from previous sites stored inside the hive can provide nutritional diversity during the pollination period and contribute to hive health. We conducted a field experiment at an agricultural setting to test the effect of four commercially important pollen and honey sources on the health and development of emerging bees. There was some variation in the nutritional composition between the supplemented feed sources. Regardless of the differences in nutritional values, nurse bees successfully raised young adult workers from the larval stage until emergence on all food sources. The results suggest that honey bees can process a variety of pollen sources and potentially adjust the composition of food fed to the larvae. Our results strongly suggest that beekeepers could use a variety of floral feed sources to manage honey bee colonies for crop pollination. Our study has wider implications for the management of pollen sources during pollen dearth or on low pollen producing honey flows.

