

Objectives & Rationale

Deciduous fruit orchards found in landscapes with a high percentage of semi-natural areas may receive a pollination service from wild honey bees. If this contribution is significant it would have implications for industry recommended managed honey bee hive stocking rates. We aimed to develop a technique to determine the contribution of wild versus managed honey bees as pollinators in a deciduous fruit crop under different landscape contexts, in the Western Cape. Seeing as field observations alone cannot determine if observed honey bees are wild or managed, we propose to determine this ratio by manipulating introduced honey bee hives.

Methods

By using hive boxes that can regulate the foraging of the colony, counting foraging bees when the colonies are closed compared to when they are open, we would be able to determine the percentage of honey bees from introduced versus wild colonies. We wanted to use an early flowering plum cultivar as our study crop. This experimental approach is novel and no device has been developed to allow for the easy separation of returning honey bee foragers from outgoing foragers, without disruption.

A proof-of-concept trial using the new system was tested under field conditions at ARC-Nietvoorbij during October 2019. Four very strong honey bee colonies were used. There were no other known managed colonies within a 2km distance. All four colonies had a commercial hive-closure device that allowed the colonies to be quickly closed or opened. All colonies were fitted with extra ventilation to prevent them from over-heating, but not with recess chambers, so that an approximate count of the returning foragers could be made as they clustered on the hives; 2) Three feeding stations were set up approximately 500m from the colonies, using 30% honey water, starting on the 4th October. Each feeding station was replenished every day until the end of the experiment on the 17th October.

Key Results

The feeding stations were completely unsuccessful in attracting foraging honey bees throughout the experiment, and no counting of bees at these sites was possible. With regards to the counting of foraging honey bees at the close, intermediate and far Echimium sites, or in the Vicia field, there was no obvious decrease in foraging honey bees at any of the sites during the periods when the colonies were closed, notwithstanding that there were between 4 800 and 8 600 bees were clustered outside the 4 closed colonies by the time they were re-opened. The 'loss' of these foragers from the field, which are not replaced by other foragers as the colonies are closed, is not to be seen in the counts of foragers at the counting blocks. Honey bee counts were found to vary substantially with time of day, wind, temperature, and condition of the flowers, but did not correlate with the closure of the colonies, suggesting that a very large number of wild honey bee colonies were contributing the majority of the honey bee foragers at Nietvoorbij.

Conclusion and Discussion / Recommendation

In conclusion, the suggested methodology is unfortunately unlikely to be a viable method to determine the contribution of wild honey bees in pollination services, or to be an easy way to determine the recommended stocking rate for a landscape situation.