

Quantifying the effect of deploying honey and stingless bee hives on macadamia pollination

L. Evans, S. Read, D. Pattemore and B. Howlett

Plant and Food Research NZ

lisa.evans@plantandfood.co.nz

In most cases, cross-pollination between macadamia varieties increases nut set. Honey bees (*Apis mellifera*) and stingless bees (*Tetragonula carbonaria*) are considered effective pollinators of macadamia, moving pollen directly between flowers as they forage. The introduction of honey bees or stingless bee hives into orchards is likely to significantly boost the number of these insects visiting flowers. For both insects, there is a lack of published information on how many hives are needed for optimal pollination to be achieved. To better understand the number of honey and stingless bee colonies required for macadamia pollination and how distance to hives affects pollination, we carried out a single block trial, consisting of cultivars '842' and '814' grown in alternating rows in an orchard located in Bundaberg, Australia. The aim was to assess the relationship between hive placement, bee abundance and pollination. Fifty-two honey bee and 20 stingless bee hives were placed at opposite ends of the block and bee abundance and nut set was recorded on marked racemes across 120 trees (12 trees over 10 rows) located between 0 and 325 metres away from the hives. Bee abundance was affected by both distance from the hive and flower availability on trees. Higher numbers of honey and stingless bees were observed on trees in close proximity (i.e. 0 to 75 m away) to the hives. Bee numbers were also higher on trees with more open flowers, which decreased over time as flowering progressed, and also with distance from the hives because exposed trees on the edge (where colonies were positioned) had a greater number of flowers than trees in the middle of the block. The average nut set per raceme did not appear to be affected by number of bees observed or distance from hives, but rather the date racemes opened, with earlier flowering racemes producing more nuts. We showed that bees were not distributed evenly over the study block, which is likely to affect nut set. However, we were not able to directly link hive position and nut set, due to the confounding effect of flower density on bee visits. Our data suggest that honey and stingless bee hives should be deployed throughout each block to increase the probability of even visitation. Alternatively, management of flower number through pruning could be effective at increasing tree attractiveness to pollinators across the block and thus promoting cross-pollination.