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INCREASING YIELD OF HASS AVOCADO BY ADDING BUMBLE BEE (*Bombus terrestris*) TO THE ORCHARDS

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ABSTRACT

Inadequate pollination is a limiting factor to improve avocado yield. We examined whether adding bumblebees (BBs; ca. 10 hives/ha) to conventional honeybees (HB; 5 hives/ha) would improve 'Hass' avocado pollination and yields. A preliminary trial (2017) in an avocado orchard with four consecutive rows of 'Hass' followed by one row of 'Ettinger' serving as a pollenizer (20% 'Ettinger') showed a considerable increase in 'Hass' yield in rows adjacent to (up to 80 m from) the BB hives vs. distant rows (=controls). In 2018, the trials were extended to three additional orchards. A significant yield increase was obtained in the BB hive-adjacent trees compared to BB hive-distant ones. Similar results were obtained in the years 2019-2022, in experiments conducted through-out the country. The SNP analysis, to determine the parents of 'Hass' fruit at varying distances from the BB hives, showed no differences in the cross-pollination rate ('Hass' × 'Ettinger'). However, pollination rates and the number of germinating pollen grains per stigma decreased with distance from the hives and correlated to the negative gradient in yield. Experiments conducted in the years 2020-2022 to examine the positioning of the hives in the orchards showed that the maximum radius of action of the BB ranges from 50 to 70 m from the hives, so it is better to place them along the rows and not at the edges and in rows 50-70 m apart. Taken together, our data suggest that adding BB hives to 'Hass' avocado orchards, at ca. 10 hives/ha resulting in 0.5–1.0 BB visits/tree per min, increases pollination and, accordingly, total yield.