



## Stingless Bees Can Serve as Efficient Avocado Pollinators

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The honey bee serves now as the predominant avocado pollinator in almost all avocado-producing countries, including Mexico, California, and Israel [1]. Unfortunately, the avocado bloom is not very attractive to the honey bee, apparently because of the very high levels of potassium and phosphorous in its nectar [2]. As a result, honey bees from hives placed in avocado orchards would abandon the avocado bloom in favor of more attractive bloom within foraging distance. Indeed, an inadequate pollination rate often occurs in Israel and was found to be one of the main factors responsible for the poor and erratic avocado yields [1, 3].

The avocado originated and evolved in Central America in the absence of *Apis* honey bees. Thus, it is not surprising that the avocado does not have the traits to make it very attractive to the honey bee. Hence, a search for the native avocado pollinators at its region of origin was undertaken. In the late 1990s, a joint Israeli-Mexican research team conducted a large-scale survey for avocado pollinators in the main avocado-growing states of Mexico [3, 4]. Visiting insects were defined as efficient pollinators if they were observed visiting avocado flowers at both their female and male openings, making contact with the anthers and stigma by the same parts of the body, and carrying a significant amount of avocado pollen on these “pollinating zones.” Nine stingless bee species, one wasp species, and the honey bee were found by these criteria to serve as efficient avocado pollinators. Large numbers of stingless bees were sometimes observed on blooming avocado trees, mainly in locations that were not sprayed by potent insecticides. The following stingless bee species apparently are the major native avocado pollinators in Mexico: *Geotrigona acapulconis* Strand; *Nannotrigona perilampoides* Cresson; *Partamona bilineata* Say; *Plebeia frontalis* Friese; *Scaptotrigona mexicana* Schwarz; *S. pectoralis* Dalla Torre; *Trigona fulviventris* Guerin; *T. nigerrima* Cresson; *T. (Frieseomelitta) nigra* Provancher.

The honey bee (mostly “africanized bees”) usually was the major visitor of avocado blooms; however, in several places, we observed the honey bees leaving the avocado bloom for more attractive blooms, whereas the local stingless bees kept on working on the avocado flowers. It indicates that these stingless bee species are more faithful to the avocado bloom than the honey bee.

No endemic stingless bee species are present in Israel. At the conclusion of the research, we applied for permission to introduce one of the above stingless bee species into Israel in order to determine its effectiveness for avocado pollination. The Israeli proper authorities decided that there is no justification to take the risks involved. As a result, the research project was terminated. A year later, one of the largest apiaries in Israel, which has been heavily involved in renting hives for avocado pollination, decided to study the feasibility of using stingless bees instead of the honey bee for this purpose. Despite serious opposition, it got permission for a trial introduction of a domesticated stingless



bee species. *Scaptotrigona mexicana* was selected and introduced in Israel. The bees were kept in quarantine until found free of pests and diseases and then taken out into a screen house erected over flowering avocado trees. The released bees exhibited a strong activity on the avocado flowers. Unfortunately, a severe hot spell of 43 °C was fatal to the bees and the project was terminated.

Several stingless bee species have been found to be better adapted than the honey bee for avocado pollination and were not diverted away so readily to other blooms [3, 4]. We are convinced that avocado pollination, and consequently its yield, can greatly benefit by the use of proper stingless bee species as pollinators. We suggest that wherever stingless bees are present in regions of avocado cultivation, their efficiency for avocado pollination should be determined. If such a species would be found to be an efficient avocado pollinator, its use for that purpose should be developed. We even dare to suggest that in avocado-growing countries with no presence of endemic stingless bees and where avocado productivity could be significantly increased by improving pollination rates, the introduction of efficient stingless bee species is justified. Introduction of foreign crops is widespread all over the world and is of great economical importance. When needed, pollinators had been regularly introduced to provide for the efficient pollination of the introduced crops. Indeed, precaution should be taken, but there are no overwhelming reasons to completely prevent this beneficial practice.

## References

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