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Stingless Bee: An Alternative of Honeybee in Crop Pollination

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SUMMARY

In the tropics, stingless bees are frequent visitors to flowering plants, although there is little proof of their significance or efficiency as crop pollinators for the majority of plant species. There is insufficient data to evaluate their overall effectiveness or significance; however, they might help pollinate more than 60 species of crop plants. Stingless bees are particularly significant because they produce therapeutic hive products, including honey, propolis, and beebread, used in basic health care. The capacity to pollinate small-sized flowers is a specialty of stingless bees. They can forage successfully in glasshouses and contribute to biodiversity preservation by preserving populations of species that might otherwise decline due to human disruption of ecosystems. Despite of all these qualities, poor domestication technology and lack of large-scale hives are some drawbacks when it comes to agricultural pollination.

INTRODUCTION

To date, the honeybee, *Apis melifera*, has provided the majority of managed pollination services, but the colony populations have been rapidly dropping in recent years, leading to low agricultural yields. Man's misapplication of pesticides, which kill colonies and pollute their hives, illnesses, pests such as trachea mites (varroa), logging, bush fires, and habitat damage are some of the leading causes of this decline. These issues also affect bee pollinators in natural environments like forests, resulting in the extinction of plant and animal species that rely on fruit and seeds for existence. As a result, an appropriate alternative that can be employed for regulated pollination in both agricultural and natural environments has become necessary. This search appears to have led to Stingless bees, which have existed in tropical and subtropical habitats since the beginning. Stingless bees are particularly significant because they produce therapeutic hive products, including honey, propolis, and beebread, used in primary health care.

Role of stingless bee in crop pollination:

The stingless bee genus has roughly 500 species, most of which are found in Latin America, Australia's continent, Africa, and Eastern and Southern Asia (Rasmussen and Cameron, 2010). Melipona and Trigona are two genera of stingless bees found in most countries. The Melipona genus has a vast number of members, even more than the common honeybee (*Apis mellifera* Linnaeus). Stingless bees have a significant impact on the environment, economy, and culture. Many wild and domesticated tropical plants rely on them for pollination (Aguilar *et al.*, 2013). Honey, pollen, and cerumen, among other things, have been used as a source of income for millennia. The capacity to pollinate small-sized flowers is a specialty of stingless bees, according to a research officer at the Malaysian Agricultural Research and Development Institute (MARDI), which cannot be achieved by the honeybees, which are relatively large.

Furthermore, stingless bees do not discriminate when it comes to establishing a colony hive. As a result, creating an artificial hive to manipulate the colony and maximize honey output is much easier. Stingless bees, as their name implies, do not sting, making it easier to extract honey, pollen, and propolis on a regular basis. Furthermore, stingless bees are easier to manage than honeybees, which are frequently lost, depart their colony, and are disease-prone (Khairunnisa, 2011).Similarly, stingless bee honey is distinct because it comes from lush vegetation seen in natural settings. It has a particular sweetness that is balanced by a sour, acidic flavour. The distribution of the honey is less than that of the typical honeybee population, in contrast to the stingless bee population. This is owing to a lack of awareness about this honey, which has made it less popular in terms of industrial production, shelf life, and quality standard (Guerrini *et al.*, 2006).

Strengths and limitations of stingless bees for crop pollination:

Stingless bee traits have many similarities with those of honeybees. Their ability to pollinate several plant species and adapt to new ones is influenced by a variety of attributes, including

(a) domestication: Colonies can be placed in hives, inspected, propagated, fed, requeened, and controlled for enemies, transported, and otherwise managed; this has the apparent advantage of enabling colonies to endure extended times of scarce food supply;

Tetragonulasp.

Lepidotrigona sp.

Melipona sp.

Few important genera of Stingless bees

(b) forager recruitment: Workers recruit nest mates to reward floral resources and provide information on the location of those floral resources, allowing the rapid deployment of large numbers of foragers (Nieh and Roubik, 1995);

c) polylecty and adaptability: Perennial colonies, which enable workers to forage continuously within climatic constraints and eliminate the need to develop colonies each year; large food reserves are stored in nests; (d) the potential for in-hive pollen transfer, which reduces the need for bee movement between plants of self-incompatible species;

(e) floral constancy: A worker on a trip typically visits only one plant species.Stingless bees differ from honeybees in that they are typically less dangerous to people and domesticated animals (Ramalho *et al.*, 1994).

They can forage successfully in glasshouses and contribute to biodiversity preservation by preserving populations of species that might otherwise decline due to human disruption of ecosystems.They are less likely to abscond because the old queen is flightless and resistant to diseases and pests. The stingless bees in such a system would not be affected by a honeybee epidemic that disrupted pollination (Delfinado-Baker, 1989).Stingless bees have the following drawbacks when it comes to agricultural pollination: Most species have poor domestication technology, few large-scale hives are available, colony growth rates are lower than for honeybees, some species cannot be domesticated due to particular nesting requirements, some species damage leaves in search of resin, and some species are territorial and fight when placed together.

CONCLUSION

Numerous attributes of stingless bees increase their value as agricultural pollinators, both in managed and wild populations. The absence of readily available large numbers of hives and the lack of information regarding the pollination requirements and essential pollinators of tropical crops are obstacles to their widespread usage.The foraging flying range typically ranges from 100 to 400 meters. Therefore, remaining forests located at this separation from orchards can support sufficient bee populations. Better domestication techniques would make more hives available and lessen dependency on native populations. Based on frequently limited information, many crops in many families seem to benefit from pollination by these insects. The pollination of coconut, mango, *Bixa orellana*, *Sechium edule*, *Myrciaria dubia*, carambola, and *Macadamia spp*.are known to be significantly aided by stingless bees. Though they haven't been mentioned in the literature, stingless bees most likely pollinate a large number of different tropical crops. It is obvious that these bees produce significant, though not yet quantified, economic benefits through agricultural pollination services.

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