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Indigenous technology in beekeeping of stingless bees (*Trigona* SPS.) by locals of south Goa, India

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Abstract

In India Honeybees viz., *Apis cerana indica* (Indian bee), *Apis mellifera* (Italian bee), *Apis dorsata* (Rock bee), *Apis florea* (Little bee) and *Trigona* spp. (Stingless bee) are observed pollinating different crops. *Apis cerana indica* (Indian bee or Satode muha mus) is scientifically domesticated by Goan locals considering its role in pollination as well as honey production. However, *Trigona* spp. (konyatale muha mus) is domesticated by few local Goans in south Goa with indigenous technology which is inherited from their ancestors. This study was done to understand indigenous technology to rear (*Trigona* spp.) stingless bee which is unique and not used in other honeybee species. The present findings also give importance to evolve commercial strategies to extract pure natural honey from *Trigona* spp. and conservation of stingless bee. Locals of South Goa have developed technology to rear stingless bees in earthen pots, bamboo poles, areca nut poles and wooden logs. Stingless bees build a comb made up of propolis, mud and about 300-400 g pure honey per colony per year. Due to medicinal value the honey produced by *Trigona* spp., fetches good price in the range of Rs.2000 to 3000 per kg of honey.

Keywords: *Trigona* spp, stingless bee, beekeeping, bamboo poles, earthen pots

Introduction

India has been bestowed with the riches of few species of honeybees. These bees have been of great importance for the ecological health of environment. There are two kinds of bees, which are categorized as stinging and stingless. The stinging bees which are reared mainly include *Apis cerana indica* and *Apis mellifera* while stingless one are *Trigona* spp. *Trigona* spp. Have subspecies which are locally known as redpoi, sonpoi etc. This species is very small as compared to the other stinging species. Naturally this species nest among boulders, old walls, dead trees and tree cavities. The honey produced by them has a higher demand due to its high medicinal value and people emphasize on feeding it to young ones in the locality. This study has been made to study indigenous technology in rearing of stingless bees by locals of south goa.

Material and methodology

The methodology used by locals from south Goa area was studied by interviewing the locals who have been practicing *Trigona* spp. Beekeeping through periodical visits (M suresh kumar *et al.*, 2012) [1]. Material used by locals for rearing stingless bee is earthen pots, bamboo poles, arecanut poles and wooden logs etc. Sites of beekeeping were observed to note salient features of their technology. Total ten farmer families of south Goa which resides in different villages viz., Netravali, Vaddem, Kajur, Sulcorna, Malcornem, Pirla, Keri- rivona were interviewed. Local people are maintaining *Trigona* colonies in their home as well as in farmhouses. One of the local farmers is having more than fifty hives at his residence.

Trigona spp. Is native to Goa and neighboring states which fall under Western Ghats. *Trigona* spp. Has been commonly reared in the interior parts of the state. Since, these bees provide high grade medicinal produce in addition to pollinating services, the study of their maintenance and conservation is of great significance. Local people have been practicing it for ages since this method was passed down from generations. With changing times, people may lose this priceless ancestral information of rearing stingless bees as there is no proper scientific documentation. Therefore, we need to preserve this technology for the benefit of the future farming community.

Results and discussion

Natural beehive of stingless bee

Stingless bees are inhabited by making hives in cracks and crevices of wall, tree trunks or other undisturbed dark places. They make hives by collecting resin from desired trees and mixing it with wax. Majority of these bees prefer Bamboo, Acacia, Cashew, Mango, Jackfruit and Teak trees. The colony is comprised of a queen, drones and workers. The colony arrangement of these bees is very peculiar. The hive has single entry and exit hole. The unique nature of these bees is its multilayer arrangement. Hive having different chambers and are arranged in the following order, viz., pollen storage chamber, honey storage chamber, and brood rearing chamber. *Trigona sps.* Have tendency to expand their hive horizontally or vertically in tree trunks. These stingless bees generally swarm once in a year (June-July) and during this period their hive disappears in the trees.

They use variety of resinous substance (propolis) for building hives. Propolis was collected from Jackfruit, Mango, Arjun, Teak, Jamun etc. Stingless bee foraging includes: White amaranthus, *Mimosa pudica* (lajalu), Cuphea, *Tridax procumbens* (Ekdandi), *Ocimum sanctum* (Tulsi), *Coccus nucifera* (Coconut) etc. Honey extraction without bee disturbance from natural beehive is difficult. Problem in transferring stingless bees from natural beehive to modern hive is they abscond. There are three different materials are used for rearing stingless bees by locals of south goa

Rearing of stingless bees by using bamboo poles

Bamboo tree is easily available in Western Ghats of Goa. Some farmers are also growing bamboos on commercial scale. A hollow Bamboo of approximately 15 cm diameter or more is chosen and split into two halves. The length of bamboo hive generally 2-3 ft and was decided by farmer's choice. The two halves are joined with the help of ropes. Both ends of poles are sealed. A small hole is made at the middle of pole or at the one end of pole as entry and exit path for bees. The tied pole is opened into two halves to transfer brood chamber of natural hive into bamboo pole. After two hours, the colony settle completely inside bamboo poles. The bamboo halves are closed. The bamboo pole hive is taken to the home or farm house and tied below the roof of it. The movement of bees can be seen through the hole left at the middle or at one end of pole. After few days the bees make the entrance smooth by depositing resins collected from trees and their wax. A colony generally consists of a queen, drones and workers. In the month of May - June, bees store maximum honey. One colony produces 300-400 gm per year. When the bamboo hive is loaded with honey, the bamboo poles are opened. The time of harvest is decided by observing the color change of wax or propolis. Black color propolis indicates the honey is ready for harvesting. Yellow color wax indicates sufficient honey is not produced.

Rearing of stingless bees by using earthen pots

Earthen pot of five-liter capacity is used for rearing stingless bees by locals of South Goa. In this method, the stingless bees from the natural site are transferred to the pot. The mouth of the pot is covered with coconut shell or any other metallic lid. A hole is made on the pot as an entry as well as exit point approximately at the bottom on the pot. Stingless bees seal the mouth of the hole with propolis to make smooth path way. If artificial hole is not provided, bees somehow create a hole from the gap between the surface of the lid and pot. Pots are installed below the roof of farm house or any corner of house.

In the month of May -June, honey is harvested from honey chamber.

Rearing of stingless bees by using areca nut poles and wooden logs

Some locals of South Goa rear stingless bees in Areca nut poles and wooden logs. The areca nut poles are easily available in Goa. Areca nut pole of 15-20 cm diameter is chosen and split into two halves. Pole length is taken approximately 2-3 feet. Remaining procedure is followed similar to rearing of stingless bees by using Bamboo poles. Wooden logs of trees like teak, jackfruit etc., are also used for rearing *Trigona sps.*

Division of colony

Colony is multiplied in the month of October-November. The virgin queen is selected and transferred into another artificial hive with worker colony.

These methods can be elucidated to farmers and other institutions concern, So as to preserve rear and obtain the highly nutritious produce from *Trigona sps.* It serves as great benefit to the local environment due to pollination activity of bees. This will also help the farmers to increase their economy from honey.



Fig 1: Earthen Pot Beehive



Fig 2: Arecanut Pole Beehive



Fig 3: Bamboo Pole Beehive



Fig 4: Entrance Hole



Fig 5: Wooden Log Beehive



Fig 6: Arrangement of Beehive

Conclusions

Locals of South Goa rear the stingless bees by using artificial hives *viz.*, Bamboo poles, Earthen pot, Areca nut poles and wooden blocks. In this artificial hives, bees are allowed to build their colony. A colony generally consists of a queen, drones and workers. Hive has different chambers are arranged in following order, *viz.*, pollen storage chamber, honey storage chamber, and brood rearing chamber. In the month of May-June, bees store maximum honey. One colony produces 300-400 gm per year. The significance of the present investigation is to highlight the art of rearing stingless bees by locals of south Goa and to evolve the modern method of beekeeping by modifying indigenous technology. Proper scientific technology in this traditional method will help to produce a high amount honey with medicinal value and local farmers can augment their income. Further study to develop technology on artificial multiplication of colonies will help to increase pollination activities.

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