

## Apiculture: A Way towards Sustainable Agriculture

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### SUMMARY

Honey bees are considered the finest pollinators among all that contribute to pollination and generate honey and other hive products that add to farm income. It plays vital role in sustaining plants bio-diversity resulting in environmental stability.

### INTRODUCTION

Albert Einstein once said that "If the bee disappears from the surface of the earth, man would have no more than four years to live. No more bees, no more pollination no more men!" Apiculture - Latin name *Apis mellifera*, meaning 'honey gatherer'. The vital role all bees play in the pollination of crops and flowering plants has caused apiculture to also include the management and study of non-*Apis* bees such as bumblebees and leafcutter bees. The wasp-like ancestors of bees took advantage of the food made available by flowers and began to modify their diet and physical characteristics. Since then, flowering plants and bees co-evolved. This eventually led to a complete interdependence, meaning that flowering plants and bees cannot live and reproduce without each other. Honey bees are considered the finest pollinators among all that contribute to pollination and generate honey and other hive products that add to farm income. It plays vital role in sustaining plants bio-diversity resulting in environmental stability.

### Important honey bee species and their significance

#### Rock bee (*Apis dorsata*)

These bees are the largest among the bees about 20 mm, called as giant honey bee. They are found all over India in sub-mountainous regions up to an altitude of 2700 m. They construct single comb in open about 6 feet long and 3 feet deep. They shift the place of the colony often. Rock bees are ferocious and difficult to rear. A single comb makes 60 pounds of honey, which is maximum amount of a comb. Workers pollinate 12,000 flowers daily. Workers are very small and active, and due to their ferocious nature, they are non-domesticable. They are efficient pollinator of agricultural and horticulture crops and produce 35-40kg of honey per comb.



Rock bee and its hives

#### Indian hive bee/Asian bee (*Apis cerana indica*)

It commonly called as Indian bee or Asian bee. They are native of India/Asia. These are the domesticated species, which construct multiple parallel combs with produces about 8-10 kg of honey per hive per year. These bees are larger than *Apis florea* but smaller than *Apis mellifera* and slightly smaller than *Apis dorsata*. They have very high swarming tendency. It prefers to live in dark places by making parallel combs of one foot in protected areas.



Indian bee and its hive

#### Little bee (*Apis florea*)

It commonly called as little bee. They build vertical comb. They also construct comb in open of the size of palm in branches of bushes, hedges, buildings, caves, empty cases etc. They produce 0.5 kg to 1kg honey per comb per year. They are not rearable as they frequently change their place. The size of the bees is smallest among



Little bee and its hives

four *Apis* species. They are very less harmful to humans so the hives can be handled with minimum protection. Due to high absconding tendency, they cannot be kept in artificial hives. They distribute only in plains and not in hills above 450 MSL.

### European bee/Italian bee (*Apis mellifera*)

It is called as European bee. They are originated from Italy. Although bee produces less honey but it is the best species for commercial point of view. It has very less swarming tendency and gentle temperament with good honey gathering capabilities. They are also similar in habits to Indian bees, which build parallel combs. They are bigger than all other honeybees except *Apis dorsata*. They have been imported from Italy. The average production of honey 50-60 kg per hive.



European bee

### Dammer bee

Besides true honey bees, two species of stingless or dammer bees, viz. *Melipona* and *Trigona* occur in our country in abundance. These bees are much smaller than the true honey bees and build irregular combs of wax and resinous substances in crevices and hollow tree trunks. The stingless bees have the importance in the pollination of various food crops. They bite their enemies or intruders. It can be domesticated. But the honey yield per hive per year is only 100 gms.



Dammer bee hives

### Traditional Beekeeping

A fixed comb hive is a hive in which the combs cannot be removed or manipulated for management or harvesting without permanently damaging the comb. Almost any hollow structure can be used for this purpose, such as a log gum, skep or a clay pot. Beekeeping using fixed comb hives is an essential part of the livelihoods many communities in poor countries.

### Modern Beekeeping

The Langstroth was the first successful top-opened hive with movable frames, and other designs of hive have been based on it. While knowledge of the bees is the first line of defence, most beekeepers also wear some protective clothing, Novice beekeepers usually wear gloves and a hooded suit or hat and veil. Experienced beekeepers sometimes elect not to use gloves because they inhibit delicate manipulations.

### Enemies of bees

They have numerous enemies-bears, monkeys, skunks, bee martins, man many other animals. Their combs are destroyed by termites, ants and wax-moth caterpillars. Bees are parasitized by many insects and are subject to epidemic diseases such as "foul brood".

### Maintenance of Bee keeping

#### Stock improvement

As the productivity of the commercial bee species is low, attempts for the improvement of the bee stock through breeding programmes are essential. Promotion of migratory bee keeping. The marginal beekeepers generally have tough time during dearth periods. If co-operative migration is undertaken, the bee colonies can be pooled together and migrated to areas, where abundant bee forage is available.

### Promotion of mass planting of bee flora

The problem of depleting floral resources has reduced the bee keeping potential. But social forestry programme, which advocates growing of good bee forage trees, such bee plants should be identified and their plantation be undertaken in wastelands of low agricultural value.

### Contents of honey

Sugars like fructose, glucose, sucrose, maltose, lactose and other disaccharides and trisaccharide's. Proteins, fats, vitamins, minerals, enzymes and amino acids. Volatile aromatic substances. Ashes and water etc. Various

ingredients of honey have helped it to become not only a sweet liquid but also a natural product with high nutritional and medicinal value. The medicinal quality, taste, texture, colour, aroma of honey differs according to the geographical area and the species of plants from which it has been collected.

### **Economic importance of Honey**

#### **Medicinal value:**

- It is laxative, antiseptic and sedative and used in Ayurvedic and Unani medicinal systems.
- Act as a curative of ulcers on tongue and alimentary canal.
- Typhoid germs are killed by it.
- In nature, the bees are able to make honey, but man could not.
- The salivary enzyme converts the complex sugar of nectar into the simple sugar of honey.
- Honey makes an important food for man and other animals.
- It is a natural antiseptic due to the presence of an anti-bacterial agent, which also prevents honey from spoiling.
- It prevents infection if placed on a wound.
- It is used as preservative, in brewing industry, in poultry and fishing Industries.
- It is used to stimulate the growth of plants, the bacterial culture, in insect diet.

#### **Pollination:**

- The honeybees are probably of greatest importance of agriculture in the pollination of plants.

#### **Beeswax**

- It is secreted in the form of small flakes by five pairs of ventral abdominal glands.
- Bees consume 10kg of honey to produce one kg of wax.
- It is used extensively in the manufacture of soaps, varnishes, polishes and various waxes. It is also used for medical purposes.

### **CONCLUSION**

Beekeeping is an important in relation to agriculture, food, nutrition, industrial products and environment. The declining productivity can be attributed to a number of factors, but pollination plays a crucial role. One can go for use of improved agricultural technologies, such as the use of quality seed, high yielding varieties, good agronomic practices like timely irrigation and fertilizers, but without pollination, neither fruit nor seed will be formed. Pollinator scarcity is the main factor responsible for inadequate pollination; this can be overcome by conserving manageable species of honey bees' populations. Promoting use of beekeeping for pollination of crops will be of benefit to both the beekeeper and to the farmer. Widespread adoption of these practices is will increase the sustainability in agriculture production.

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