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How Apiculture Contributes Towards Sustainable Living

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Globally there are more honey bees than other types of bee and pollinating insects, so it is the world's most important pollinator of food crops. It is estimated that one third of the food that we consume each day relies on pollination mainly by bees. Honey bees are big money makers in developed nations like U.S. The social and hardworking insects produce a various hive product like honey, pollen, royal jelly, beeswax, propolis, and venom. All these collected products are used by people for various nutritional and medicinal purposes.

Beeswax is the second most important hive product from economic standpoint. The beeswax trade dates to ancient Greece and Rome, and in Medieval Europe. The substance was a unit of trade for taxes and other purposes. The market remains strong today. Beeswax is popular for making candles and as an ingredient in artists' materials and in leather and wood polishes. The pharmaceutical industry uses the substance as a binding agent, time-release mechanism, and drug carrier. Beeswax is a most commonly used waxes in cosmetics. The greatest importance of honey bees to agriculture is more important than the products as they work as crop pollinators. This agricultural benefit of honey bees is estimated to be between 10 and 20 times the total value of honey and beeswax.

- **Important species of honey bees:-**
  - The rock bee, *Apis dorsata* (Apidae).
  - The Indian hive bee, *Apis cerana indica* (Apidae).
  - The little bee, *Apis florea* (Apidae).
  - The European or Italian bee, *Apis mellifera* (Apidae).
  - Dammer bee or stingless bee, Melipona irridipennis (Meliporidae).
- **The Biology of Pollination**:-

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Upon entering a flower, an insect such as a honey bee, brushes against the pollen on the outside of the anther and carries it to the stigma. Sometimes, the pollen grains only need to reach the stigma of the same flower or another flower on the same plant. But often, the pollen must travel to the stigma of a flower on a different plant (but same plant species).

Many Workers, Several Drones, and One Queen Bee

A honey bee colony is a highly organized society made up of three kinds of adult bees like workers, drones, and a single queen each with specific roles. Worker bees are sexually undeveloped females and under normal hive conditions don't lay eggs. As suggested by their name, worker bees are the hive's labourers, performing all the tasks needed to maintain and protect the colony and rear the young bees. Despite being the smallest physically, they are by far the largest in number, making up nearly all the bees in a colony. A worker bee's life span ranges from six weeks in the busy summer to four to nine months during the winter.

Drones are male bees that are on standby for mating with a virgin queen, should the need arise. For the drones, death instantly follows mating. They number from a few to several thousand and are usually present only during late spring and summer.

As the lone sexually developed female in the colony, the queen's only function is to lay eggs. Queen mates only once with several drones and remains fertile for life time . The queen can live for several years, with an average productive life span of two to three years. When she dies or her productivity declines, worker bees raise a new queen.

Honey Bee Hives and Bee Brood

Derived from the Latin word *apis* meaning "bee," apiculture is the raising and caring of honey bee colonies by people. Beekeepers, or apiarists, house their domesticated honey bee colonies in man-made hives kept in an apiary, or "bee yard. The basic structural component of the hive is a wax comb suspended within a plastic or wooden frame. Worker bees construct the comb using beeswax, a substance produced by four pairs of glands located on the underside of their abdomens. These eight special glands convert sugar from honey into the waxy substance and secrete it as a liquid, which hardens into flat wax scales once exposed to air. Using spines located on their middle legs, the bees remove the wax scales from their

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abdomens. The bees transfer the scales to their mouthparts, and while chewing the wax, they add salivary secretions to soften it. The bees then use the now pliable wax to build the hexagon-shaped cells of the comb.

Within the six-sided cells of the wax comb, the bees store honey and pollen and rear the bee brood, a collective term encompassing the three developmental stages of bees egg, larval, and pupal. In the first stage, the queen deposits one egg in each cell. At peak production in spring and early summer, she may lay up to 1,500 eggs per day. Fertilized eggs develop into female worker bees. Unfertilized eggs become male drones. The egg hatches in three days to become a larva, a legless white grub. Sometimes called the feeding stage, the larval stage is one of rapid growth. While still inside its beeswax cell, the larva is fed by nurse worker bees. When the larva is a few days old, worker bees cap the cell with a beeswax cover. A healthy larva is plump and pearly white with a glistening appearance. During the pupal, or transformation, stage, the grub-like larva changes into an adult bee. This metamorphosis occurs within the capped cell. A healthy pupa remains white and glistening during the early period of development, even though it beginning to take on adult features. Depending on the kind of bee (worker, drone, or queen), it emerges from the cell 7½ to 14½ days after capping.

Why are bees disappearing?

Bees are in decline on a global scale as they face many threats, from habitat loss to the use of toxic pesticides. Many of the threats to bees share parallels with the threats to trees and woodland, so saving bees goes hand in hand with saving trees. If these threats aren't brought under control, we could be looking at a future without bees.

1. **Habitat loss**

An increase in urban development's and invasive farming methods has meant that many of the areas bees once called home no longer exist. These developments are as much a threat to bees as they are to trees and woodland. In the wild, several species of bee nest in hollow trees, so as more trees are destroyed so are the homes these bees live in. Wildflower meadows and other areas abundant in flowering plants are also in serious decline, meaning that bees lose an important food resource.

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2. Use of pesticides

One of the main threats to our beloved bees is the use of toxic pesticides. Whilst pesticides are designed to kill pests, due to their intense toxicity they are having an adverse effect on other insects too, including bees. Neonicotinoids in particular cause bees a great deal of harm, as when they are sprayed onto plants they are absorbed. So, when a bee comes to pollinate said plant, it will ingest this pesticide. This can seriously damage the bee's central nervous system.

3. Climate change

Climate change and the extreme weather it often causes is another contributing factor in the decline of bees. It disrupts bee nesting behaviour and alters the normal seasonal timings, meaning flowers may bloom earlier or later than expected. Whilst the planting of more trees is helping to mitigate some of the effects of climate change, it is still a serious issue that could prove deadly for many of our bees.

4. Parasites and diseases

Parasites and diseases are another big threat to bees. The varroa mite, *Varroa destructor*, is a parasitic mite which clings to the back of the honey bee, passing diseases and viruses to it and gradually draining its strength.

How To Extend Our Hands To Wards Bees

- **Provide shelter for bees:** Like most invertebrates, bees need shelter to nest and hibernate in. You can create your own shelter or buy a ready-made bee hotel – just hang it up in a sunny sheltered spot in your garden and watch bees filling the tubes during the spring and summer months.
- **Stop using pesticides:** Pesticides are one of the key disadvantage to bees, and so one way to help bees is to stop using them in our farm and garden. Some pests provide food for crucial pollinators, so leaving them to be controlled naturally is the best option if you want to help save bees.
- **Grow flowers the easy way with seed balls:** Simply scatter the seedballs in a location of your choice and watch them sprout.

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- **Fill your garden with bee-friendly flowers:** One of the easiest ways to help out bees is by planting lots of bee-friendly flowers in your garden. Bees favour a wide range of flowering plants