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# Contribution of Honeybees in Pollination of Crops

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**SUMMARY**

Pollination is an important factor for improving the productivity and yield quality of the crops. Pollination by honeybees and wild bees significantly increased yield quantity and quality on average by up to 62 per cent. Pollination is the transfer of pollen grains from anther to the stigma of the same flower or a different flower. One of the most recognisable insects, honeybees are the most widely domesticated bee species in the world. Honeybees belong to family Apidae of the order Hymenoptera. Major four species of honey bees have been found foraging under natural conditions . Two of them are wild and make nest in the open . They are Apis dorsata and Apis florea, and domesticated bees are Apis mellifera and Apis cerana. The management of honeybees for commercial production of honey and other bee product is termed as Apiculture.

## INTRODUCTION

The transport of pollen grains from anthers to stigma is referred to as pollination. As pollen comes into touch with the stigma, pollen tube germination occurs, which precedes ovule fertilisation. Pollination is a key precursor to sexual reproduction in plants. Many blooming plants cannot produce seeds or fruits unless they are fertilised. Consequently, fertilisation cannot occur before pollen contacts the stigma. Pollination is a complicated for the completion of the procedure. Several variables impact pollination success, including flower physiology and shape, pollinator traits, and weather influences.The biggest group of insects for pollination are solitary bees, bumblebees and honeybees because of their rich body hair and their behaviour patterns of collecting forage [1]. Among all other pollinating insects, the honeybee plays a very important role in pollinating the crops. Insects are considered to be responsible for 80-85% of all pollination, and of this 75-80% are attributable to honeybees [2]. Many flower and fruit crops depend on insect pollinators to increase seed set, improve the quality of the seeds and fruits, and promote early flowering. Insufficient pollination caused the difficulties in hybrid seed production and getting high quality seed in cross-pollinated crops. When we comparing the other pollinators such as bumblebees, dipterans and butterflies, the visiting frequency is very less as compare to honey bee. The honeybees are more ferocious as compare to other pollinators. When compared to other pollinators, honeybees visit more flowers each minute in open pollination.

### Different flowering structure and their maturity time

Pollination is critical for the roughly 250,000 flowering plant species that rely on pollen passage from flower anther to stigma to reproduce. The anther is the topmost component of the stamen, which is the male reproductive section of the flower [3]. Plants that are dioecious (male and female organs occur in separate plants), monoecious (male and female organs occur on the same plant but on different flowers), dichogamous (male and female organs mature at different times), or heterostylous (stamen and style have different lengths and require pollen transfer) require insects to pollinate effectively. Moreover, certain hermaphrodite blooms (with male and female parts growing at the same time) are self-infertile, necessitating insect pollination [4].

### Honey bees an ideal pollinator

Bees have various characteristics that make them ideal pollinators, such as their many body hairs, foraging habit, and ability to collect food for themselves and their offspring. This final characteristic is critical since other insects eat on nectar and pollen but do not gather it. Because of their foraging habit and floral constancy, bees are the most significant pollinators for animal-pollinated agricultural crops globally (ability to visit flowers of only one plant species on every foraging bout). Nevertheless, only around 15 per cent of the world's crops are pollinated by managed bee species, such as *A. mellifera* and *Bombus spp*., with the remainder pollinated by unmanaged solitary bees and other animals [5]. In developed countries bee species are used on rent for pollination purposes, e.g. *Bombus spp*. for greenhouse tomato. Entomophily is a type of plant pollination in which pollen is dispersed by insects, most notably bees. It should be noted that honeybees will pollinate many plant

species that are not native to the locations where honeybees live, and that they are frequently ineffective pollinators of such plants. As a bee arrives on a flower, the hairs on its body use electrostatic forces to capture pollen grains. Their stiff leg hairs allow them to groom pollen into specialised brushes or pockets on their legs or bodies, which they subsequently bring back to their nest [6]. Individual bees prefer to concentrate on one type of bloom at a time, which implies that pollen from one flower is more likely to be carried to another flower of the same species by the same bee. In order to generate viable seeds, many plants require this type of pollen dispersal, known as cross-pollination.

**Qualities of honeybees, which make them good pollinators**

- Body covered with hairs and have structural adaptation for carrying nectar and pollen.
- Bees - Not injurious to plants
- Adult and larva feed on nectar and pollen - Available in plenty
- Superior pollinators - Since store pollen and nectar for future use
- No diapause - Need pollen throughout year
- Body size and probascis length - Suitable for many crops
- Pollinate wide variety of crops
- Forage in extreme conditions also

**Some of crop varities and their pollination agents**

| Common Name | Scientific Name | Pollinators | Pollinator Impact |
|---|---|---|---|
| Sunflower | *Helianthus annus* | Honeybee, solitary bee, Bumblebee | 10-40% |
| Strawberry | *Fragaria spp* | Honeybee, solitary bee, Bumblebee | 10-40% |
| Sesame | *Sesamum indicum* | Honeybee, solitary bee, Bumblebee, Wasp | 40-90% |
| Safflower | *Carthamuss tinctorium* | Honeybee, solitary bee, | <10% |
| Papaya | *Carica papaya* | Honeybee, solitary bee, butterflies | <10% |
| Mango | *Manfifera indica* | Honeybee, solitary bee, houseflies, wasp | 40-90% |
| Cotton | *Gossypium spp* | Honeybee, solitary bee, Bumblebee | <10% |

Source, ( Kewanit Alemberhe Kidu Gebremeskel, 2006 ) [7].

Pollinators play an important role in increasing biodiversity by ensuring the survival of many plant species. Several cross pollinated crops require insect pollination.

**Per cent increase in yield due to honey bees pollination**

| Crops | Botanical Name | Per cent Yield Increase |
|---|---|---|
| Mustard | *Brassica sp* | 43% |
| Sunflower | *Helianthus annus* | 32 – 48% |
| Cotton | *Gossypium sp* | 17-19% |
| Onion | *Allium cepa* | 93% |
| Apple | *Purus malus* | 44% |

Source , http://www.eagri.org/eagri50/ENTO232/lec04.pdf [8].

**CONCLUSION**

For enhancing crop production, quality and quantity of pollination become important aspects. Honeybees directly or indirectly provide up to 30% of the human food supply. For a range of advantages, such as food and fibre, plant-derived medications, ornamentals and other aesthetics, genetic diversity, and overall ecosystem resilience, pollination is an essential input in crop production.

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