



Ecology of Honey Bee in Floriculture Crops

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INTRODUCTION

Honey bees are the important components of Agro - ecosystem as they provide free ecosystem services in the form of pollination which not only enhance the productivity of agricultural crops but also help in conservation of biological diversity through propagation of wild flora besides, providing honey and other hive products. Some other types of related bees produce and store honey, but only members of the genus *Apis* are true honey bees. It is estimated that one third of the food that we consume each day relies on pollination mainly by bees.

Castes of honey bee:

The Queen: It is considerably larger than the members of other castes. The queen is the only individual which lay eggs in a colony and is the mother of all bees. It lays up to 2000 eggs per day in *Apis mellifera*, She lives for 3 years.

Drone: Male member of the colony and are generally produced during the breeding season for the purpose of mating with queen. Life span varies from 6-8 weeks. After mating, they are driven out of the colony and sometime forced them to die due to starvation.

Worker: Imperfectly developed female (sterile) and do all the works for the colony except egg laying. Bees wax, of which the comb is made, is a secretion of the wax glands located in the abdomen of the worker bees. For producing 1 kg of wax the bees consume 10 kg of honey.

FEATURE OF 4 DIFFERENT SPECIES OF HONEYBEE

Feature	LITTLE BEE (<i>Apis florea</i>)	ROCK BEE (<i>Apis dorsata</i>)	INDIAN HIVE BEE / ASIAN BEE (<i>Apis cerana indica</i>)	EUROPEAN BEE / ITALIAN BEE (<i>Apis mellifera</i>)
Size of bee	Smallest	Largest	Large	Medium
Comb type	Single vertical	Single, large one	Multiple, medium, parallel one	Multiple, large, parallel one
Nest location	Branches of bushes, hedges, buildings, caves, empty cases etc.	Branches of tall trees, steep rocks, rafters of tall buildings, water tanks and towers	In hollow cavities of trees, cracks in rocks and old walls, in termite mound	Hollow trees and caves
Distribution	Up to 450m above MSL.	up to a 2700 m above MSL	Up to 2500m above MSL	Variable
Domestication	No	No	Domesticated	Domesticated
Behaviour	Less ferocious and more swarming	High ferocious, Frequent swarming	Less ferocious, more swarming	Less ferocious and less swarming
Honey yield /colony/year	half a kilo	36 – 40 kg	6-8 kg	25-40 kg.

Honey bee species in India

Important behaviour of honey bee related to flower

1. Foraging behavior in honey bees:

Foraging activity is the final task performed by the workers before their death. They forage for Nectar, Pollen, Water and Propolis (resin).

2. Communication in honey bees:

Honey bees perform three major types dances either on comb surface or outside surface of the swarm.

Round dance: To say information of food source present

at less than 100m.

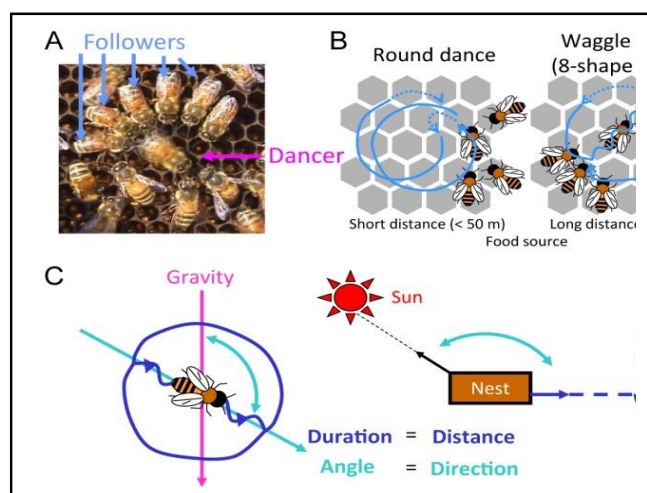
Wagtail (number 8 / Dumble) dance: To say information

of food source present at more than 100m.

Dorso-ventral abdominal vibrating dance:

For two

different activities of colony such as foraging and swarming.



Role of honey bee in flower crops:

Pollination eg. in rose to produce hips, Increase seed set percentage, eg. orchid seed set increase up to 10 to 15 %, Helps to conservation of germ plasm eg. in forest region, Hybrid seed production eg. in chrysanthemum , China aster. Creates

variation in germ plasm eg. in lillies , petal colour of dahlia.

Symbiotic relationship between a honey bee and a flower

The bees accumulate a positive charge, while the flowers have a negative charge. The interaction between the fields is detected by antennae or sensitive hairs on the

body. The electrical field helps bees to recognize pollen-rich blooms and perhaps even to transfer the pollen. The hairs all over the bees body attract pollen grains through electrostatic forces. Stiff hairs on their legs enable them to groom the pollen into specialized brushes or pockets on their legs or body, and then carry it back to their nest. When they land in a flower, the bees get some pollen on their hairy bodies, and when they land in the next flower, some of the pollen from the first one rubs off, pollinating the plant. This benefits the plants. In this mutualistic relationship, the bees get to eat, and the flowering plants get to reproduce. Insect-pollinated (Entomophilous) flowers. These typically have conspicuous colours and scents (which attract insects to them) and produce abundant nectar and pollen (which insects seek for food).

Major families of flowering plants dependence on bee pollination

Bee pollinated (many members feature zygomorphy, bright colors, abundant nectar): Boraginaceae, Malvaceae, Ericaceae, Orchidaceae, Iridaceae, Papilionaceae, Labiatae, Scrophulariaceae .

Insect pollinated, often visited by bees: Brassicaceae, Gentianaceae, Campanulaceae, Geraniaceae, Caryophyllaceae, Grossulariaceae, Cistaceae, Liliaceae, Compositae, Linaceae, Cucurbitaceae , Onagraceae.

Sometimes visited by bees: Aceraceae, Amaryllidaceae, Oleaceae, Rhamnaceae, Solanaceae, Violaceae, Papaveraceae, Primulaceae, Ranunculaceae, Rosaceae, Salicaceae, Tiliaceae, Umbelliferae.

Apiculture: Art and practicing of keeping honey bees for its products (honey, wax, royal jelly, venom, etc.) and for pollination service is called as Apiculture. Person involved is called as Bee keeper or Apiculturist.

Apiary: Place where honey bees are maintained.

Importance of Beekeeping:

1. It is a multiple source of income. We can earn money from the different products obtained namely honey, wax, royal jelly, venom, etc.
2. It has importance in pollination of crops to increase quantity and quality of the yield.
3. Provides nutrition to rural people.
4. Can be practiced as full time or part time job without heavy efforts.
5. It requires light physical work and all operations can be done by children, women and even aged persons.
6. Bee colonies do not requires constant care.
7. Requires very less financial investment.

The number of colonies of honeybees required per hectare very much depends on the strength of foraging bees in the colony, the crops and prevailing weather conditions. The optimum number of colonies of average strength may range from 3 to 9 colonies per hectare, since the bees usually forage within a radius of about 1 to 2 km to harvest their nectar and pollen loads, and then return to their own hive.

Products of honey bees:

Honey – a sweetener rich in bioactive substances, **pollen**– a good source of proteins and vitamins, **royal jelly**– an excellent dietary supplement for the elderly, **propolis**– natural antibiotic, **wax** – for softer and younger looking skin, **bee Venom**– an indispensable ingredient used to desensitise against bee stings

Diclining of honey bees population: The recent decades have seen an alarming decrease in insect pollinators, particularly honey bees; this could prove a considerable challenge to global food production shortly (Klein et al., 2006) .The decrease of honey bee population is due to Natural habitat loss, parasite and pesticide exposure, loss of floral richness, and low genetic variety owing to increasing land usage, longdistance transportation of colonies, exotic plants and bees, Misuse of crop protection products/Indiscriminate use of

synthetic agro-chemicals, and climate change might all be factors contributing to a significant reduction in the bee population.

Protective measures:

Save the bees: – Create pollinator gardens with wildflowers. Increase the number of nesting spots. Pesticides that have a less residual effect on honey bees should be selected and not be applied during the blooming period. The importance of crop pollination should be made known to the general public. The legal protection of honeybees and other insect pollinators, particularly the conservation of honeybees against chemical poisoning, should be emphasized. The central focus should be on developing conservation policies for pollinators.

CONCLUSION

Reduced pollination is a key cause of declining horticultural production, which can be attributed to several reasons. One can utilize better agricultural technology like high-quality seed, high-yielding varieties, and high-quality agronomic techniques like timely irrigation and fertilizers. Still, without pollination, no fruit or seed will be produced. Almost all the food that we consume results from the pollination activity done by insects, especially honeybees. To protect honeybees and other natural pollinators, increase their ability for agricultural pollination, and allow them to develop in a pollution-free habitat, research studies are necessary.