

An Introduction of Honey Bee and Beekeeping

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SUMMARY

Honey Bees are social insect. It is comes under Genus *Apis*, order Hymenoptera and phylum Arthropoda. It is beneficial insect. Beekeeping or apiculture is the maintenance of bee colonies by humans. India is diverse country, in climatic conditions of India inhabit five species of honeybee out of which *Apis cerana*, *A. florea*, *A. dorsata*, *A. laboriosa* are native whereas *Apis mellifera* was introduced and is being reared commercially. Three sub-species of *A. cerana*, viz. *A. cerana indica*, *A. cerana cerana*, *A. cerana Himalaya* are colonized in different regions of india. *A. cerana* is cultivated on local as well as in modern bee hive. Hive productivity is very low due to problems associated with apiculture. Honey Bee health may be affected by a number of different factors, for example the spread of parasites and pathogens reduces in available in forage, beekeeping management practices and weather. It is play role in pollination of cross pollinated crops.

INTRODUCTION

Honey bees are social insects, which means that they live together in large, well-organized family groups. Social insects are highly evolved insects that engage in a variety of complex tasks not practiced by the multitude of solitary insects. Communication, complex nest construction, environmental control, defense, and division of the labor are just some of the behaviors that honey bees have developed to exist successfully in social colonies. These fascinating behaviors make social insects in general, and honey bees in particular, among the most fascinating creatures on earth. A honey bee colony typically consists of three kinds of adult bees: workers, drones, and a queen. Several thousand worker bees cooperate in nest building, food collection, and brood rearing. Each worker has a definite task to perform, related to its adult age. But surviving and reproducing take the combined efforts of the entire colony. Individual bees (workers, drones, and queens) cannot survive without the support of the colony. In addition to thousands of worker adults, a colony normally has a single queen and several hundred drones during late spring and summer. The social structure of the colony is maintained by the presence of the queen and workers and depends on an effective system of communication. The distribution of chemical

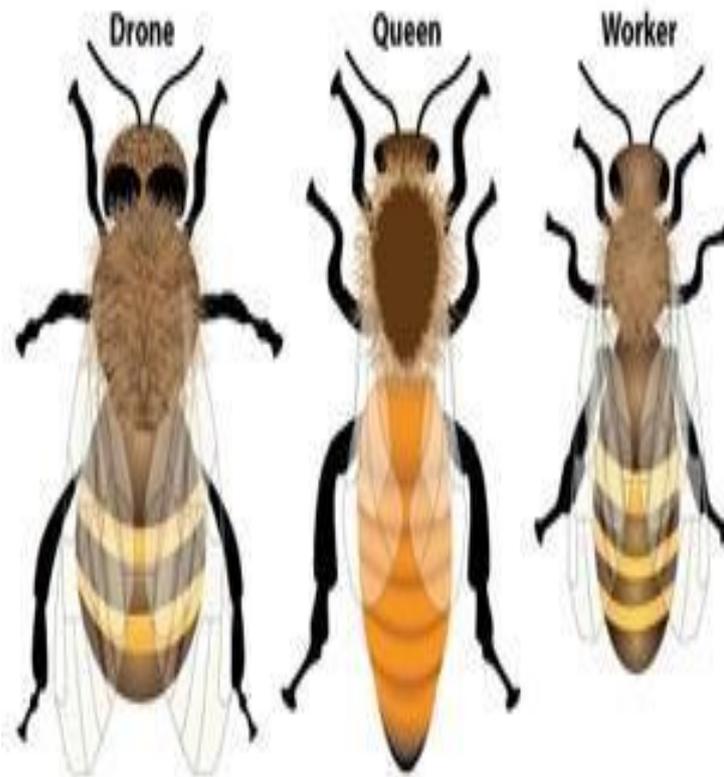


pheromones among members and communicative “dances” are responsible for controlling the activities necessary for colony survival. Labor activities among worker bees depend primarily on the age of the bee but vary with the needs of the colony. Reproduction and colony strength depend on the queen, the quantity of food stores, and the size of the worker force. As the size of the colony increases up to a maximum of about 60,000 workers, so does the efficiency of the colony. Beekeeping (or apiculture) is the maintenance of bee colonies, commonly in man made hives, by humans. A beekeeper (or apiarist) keeps bees in order to collect their honey and other products that the hive produce (including beeswax, propolis, flower pollen and royal jelly), to pollinate crops or to produce bees for sale to other beekeepers. A location where bees are kept is called apiary or “bee yard”.

Members of the Hive

A beehive is made up of three distinct types of bees:

- Workers
- Drones
- The queen



(Source: NJDEP New Jersey Department of Environmental Protection)

Worker bees are female bees that typically do not lay eggs. They do, however, tend to the queen, tend to the nursery of young bees, build comb, store food, and fly miles and miles and miles from flower to flower collecting pollen and nectar. Worker bees also have glands in their abdomens that produce wax, as well as glands in their heads that are capable of producing royal jelly, which is a nutrient-rich substance used to feed larvae. The queen is usually the only egg-laying female in the hive. For this reason, the queen is given special treatment from the rest of the workers. She is fed, tended, and protected by the workers. In exchange for their care, the queen supplies the hive with the eggs needed to sustain a healthy, working colony. The queen is the largest bee in the hive, with a slender, elegant body—considerably larger than that of a worker bee. There are only two times when there might be more than one egg-laying female. One is when the main queen is aging and the hive is considering producing a replacement (known as supersedure). The other time is when the queen has died, and confused worker bees begin laying eggs. Drones are male bees. They have a slightly different build than the workers, with a generally larger body and significantly larger eyes to aid in the location of a flying queen. The drones fly with

new queen bees and mate with her, but do not contribute to the hive otherwise. You won't see drones out collecting pollen, since their legs have no pollen baskets, and you won't see them defending the hive—drones don't have a stinger! They cannot produce wax for building, either. Still, they are essential to the lives of bees, and a healthy colony in mid-summer might be home to 1,000 drones.

Honeybee Management Practices throughout the Year

January

- Begin emergency feeding with frames of honey, sugar candy, or dry sugar, if necessary.
- Clean, paint, and repair equipment.
- Check apiary for vandalism, hive covers blown off, and so forth.
- Order packages, nucs, queens, if not done in December.
- Consider your mite and disease management program and order/construct the necessary materials (monitoring boards, screen bottom boards, drone foundation, chemicals, and so on).

February

- Check colonies for honey stores.
- Continue emergency feeding with frames of honey, sugar candy, or dry sugar, if necessary. Continue to prepare equipment for coming season.
- Clean up dead colonies.

March

- Continue emergency feeding, if necessary.
- Feed pollen supplements or substitutes, if needed.
- First quick inspection of brood nest, if weather permits.
- Check for and clean up dead colonies.
- Clean out entrances and bottom boards.
- Assemble section honey supers.

July

- Remove comb honey supers when properly sealed.
- Check for queen cells, especially in colonies used for queen rearing.
- Add sufficient super space (undersuper).
- Remove and extract early season honey crop.
- Freeze comb honey to prevent wax moth damage.

August

- Check colonies for disease and monitor/treat for mites.
- Remove and extract summer honey crop.
- Remove section supers.
- Do not work bees unless necessary to avoid robbing.
- Add more supers if needed. January
- Begin emergency feeding with frames of honey, sugar candy, or dry sugar, if necessary.
- Clean, paint, and repair equipment.
- Check apiary for vandalism, hive covers blown off, and so forth.
- Order packages, nucs, queens, if not done in December.
- Consider your mite and disease management program and order/construct the necessary materials (monitoring boards, screen bottom boards, drone foundation, chemicals, and so on).

September

- Check colonies for disease and monitor/treat for mites.
- Provide supers for fall goldenrod and aster flows.
- Requeen colonies.
- Unite weak colonies.

April

- Monitor colony stores, especially if weather is cold and wet.
- Inspect brood nest for laying queen, disease, and so forth.
- Introduce package bees on drawn combs.
- Requeen colonies with failing queens.
- Reverse brood chambers when weather moderates.
- Add supers to strong colonies at the time of maple or dandelion bloom.
- Unite weak colonies.
- Equalize strength of all colonies.

May

- Monitor colonies for queen cells.
- Control swarming.
- Add more supers as necessary (oversuper).
- Place queen excluder below shallow super on colonies for comb honey.
- Install packages on foundation.
- Split strong colonies.
- Capture swarms.
- Cull and replace defective combs with full sheets of foundation.
- Begin implementing an IPM program for the control of mites.

June

- Continue to check for queen cells.
- Rear queens if you prefer your own stock.
- Check colonies for disease and monitor for mites.
- Remove comb honey supers when properly sealed.
- Provide plenty of super space.
- Control swarming.
- Capture swarms.

October

- Prepare colonies for winter.
- Begin fall feeding with heavy syrup if needed.
- Unite weak colonies with stronger colonies.
- Put on entrance reducers to keep out mice.
- Extract fall honey crop.

November

- Finish handling honey crop.
- Order new equipment for coming season.
- Develop and implement your honey (and other hive products) marketing program, especially for the holiday season.
- Begin late-fall feeding.

December

- Repair and assemble hive equipment.
- Order packages, queen, nucs, if you know your needs.

Role of Honey bees in Pollination

Honey bees are useful in Cross pollination. In cross pollination the pollen is transferred one plant to stigma of another plant where external agent honey bee are involved.

Effect of bee pollination on crop

- It increase yield in terms of seed yield and fruit yield in many crop.
- It improves quality of fruits and seeds.
- Bee pollination increases oil content of seeds in sunflower.
- Bee pollination is must in some self incompatible crops for seed set.

Qualities of honeybees which make them good pollinators

- Body covered with hairs and have structural adaptation for carrying nectar and pollen.
- Bees do not injure the plants.
- Adult and larva feed on nectar and pollen which is available in plenty.
- Considered as superior pollinators, since store pollen and nectar for future use.
- No diapuse is observed and needs pollen throughout the year.
- Body size and proboscjs length is very much suitable for many crops.
- Pollinate wide variety of crops.
- Forage in extreme weather conditions also.



Crops benefited by bee pollination

- Fruits and nuts: Almond, Peach, Strawberry, Apple, Apricot
- Vegetable crops: Cabbage, Cauliflower, Turnip, Radish, Melons, Cucumber, Carrot, Coriander, Pumpkin.
- Oil seed crops: Sunflower, Niger, Mustard, Gingelly (Till), Safflower, Rapeseed.
- Forage crops: Lucerne, Clover.

Yield increase due to bee pollination

Table: Percentage yield increase in crops

Name of Crop	Percent yield increase
• Mustard	40-43%
• Sunflower	32-48%
• Cotton	17-19%
• Lucern	100-112%
• Onion	93%
• Gingelly(till)	25%
• Apple	44%
• Coriander	187%
• Cardamom	21-37%

Management of bees for pollination:

- Place hives very near the field (source) to save bee’s energy.
- Migrate colonies near field at 10% flowering.
- Place colonies at 3/ha - Italian bee; 5/ha - Indian honey bee.
- The colonies should have 5-6 frame strength of bees, possess sealed brood, have young mated queen.
- Allow sufficient space for pollen and honey storage.

Pesticide Poisoning in Honeybees

The use of pesticide has become inevitable in modern agriculture. During last four decades, the consumption of pesticides in india has increased several folds. Pesticides used on field crops for the control of pests have their side effect, one of which is toxicity to honey bees. Honeybees are susceptible to many pesticides. Three types of harmful effects evident in agriculture are

- Loss in production of honey.
- Contamination of bee products.
- Reduction in the yield of cross pollinated crops.

Symptoms of bee poisoning

- Dead bees near the entrance of hive or colonies.
- Lack of recognition of guard bees.
- Aggressiveness, fighting among bees.
- Dead bees on the top of frames or bottom board.
- Paralysed bees crawling on near by objects.
- Sudden decline in food storage and brood rearing.
- Finally results in contamination of bee products and depleted population of the colony.

Management of bee poisoning

The basic principle in the management of bee poisoning is to avoid the exposure of honey bees to toxic effects. This could be achieved with the help of both bee keepers and the farmers. The practices to be followed by bee keepers includes the following;

- Bee colonies should be maintained where use and drift of pesticide is minimum.
- Feeding of colonies with sugar syrup at the time of pesticide application to rreduce bee foraging.
- Close co-operation with farmers to avoid irrational use of pesticides.

Pests and Diseases of Honeybees	
Insects-Pests	Diseases
Greater Wax Moth, <i>Galleria mellonella</i>	American Foul Brood, Bacillus larvae
Lesser Wax Moth, <i>Achroia grisella</i> , A. <i>innotatalankella</i>	European Foul Brood Disease, Streptococcus apis, Bacillus pluton
Ant, <i>Camponotus commpressus</i> , <i>Dorylus labiatus</i> , <i>Monomorium spp.</i>	Sac brood Virus disease (SBV)
Yellow banded Hornet (wasp), <i>Vespa cincta</i>	Thai Sac Brood (TSBV)
Bee hunter wasp, <i>Pararus orientalis</i>	Chalk brood disease, Stone brood disease
Bee hunter wasp, <i>Philanthus ramakrishnae</i>	
Wax beetles, <i>Platybolium alvearium</i>	
Brood mite, <i>Tropilaelaps clareae</i>	
Tracheal mite, <i>Acarapis woodi</i>	
<i>Varrona jacobsoni</i>	
King crow, <i>Dicrurus sp.</i>	
Bee eater, <i>Mderops orientalis</i>	

Integrated Pest Management in Beekeeping

IPM of Insect Pest of Bees		
Contol Mesures	In General	Specific to Beekeeping
Cultural Methods	Good Sanitization, Habit Modification	Comb Culling, Requeen with resistant rootstock, Small sized comb

Phsical- Mechanical Methods	Flea/lice cob,screens, proper clothing	Dronr comb removal, Screen bottom boards, Heat
Biological Methods	Predators, Parasitiiodes	Fungal Pathogen
Chemical Methods	Parasiticides,Antibiotics, Insecticides	Flualinate, Coumaphos, Tettamycin,Tylosin

Application of Pesticides at evening or night

Avoid pesticide application directly to blooming flowers as much as possible can help limit the exposure of honey bees are attracted to all types of blooming flowers must be sprayed in the field at that time. Usual foraging hours of honeybees are when the temperature is above 55-60⁰F during the day time, and by the evening, the bees return to the hives.

Bee products

- Bee wax
- Propolis
- Honey
- Royal jelly
- Pollen



CONCLUSION

Bees are sign of well- functional ecosystem. Bess are play role in pollination (Cross pollination) of crops like as coriander, apple, sunflower, etc. increase both production and productivity (improve socioeconomic status of farmers). Pesticides are linked to colony collapse disorder and now considered a main cause and toxic effect of Neonicotinoides on bees are confirmed.

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