

## Harmonized Good Beekeeping Practices

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### Introduction:

Honeybees are an important part of the natural environment and impact the forest as well as the agricultural environment. Almost one-third of the human diet comes from insect pollinating plants and 80% of pollinated honeybees (Anonymous, 2019). The decline in the honeybee population in the world has been ascribed to many factors associating with each other (Omkar, 2017). Five honey bee species are found all over India, namely *Apis florea*, *Apis cerana*, *Apis dorsata*, *Apis mellifera*, and *Trigona iridipennis*. However, only *A. cerana* and *A. Mellifera* are usually reared in hives (Swamy, 2008). One of the biggest challenges to beekeeping industries involves identifying and offering ways to reduce the adverse effects of honeybee pests and diseases. Honeybee's colonies are infested by different insect and non-insect enemies like hive beetle, wasps, ants, termites, mites, birds, mammals, and waxmoth, which cause significant losses (Pirk *et al.*, 2015). The environmental factors like extreme temperature, relative humidity, lack of water, deforestation, human factors like poor apicultural practices, use of synthetic pesticides, diseases, and insect pests led to the decline of honeybee colonies and their products (Mulatu and Gebissa, 2021). Hence, the following points are aimed to provide comprehensive management information on the occurrence of various biotic and abiotic factors for beekeeping.

**Keywords:** *Apis mellifera*, Beekeeping, Honeybee, Insect pests, Management, Natural enemies.

### 1. General apiary management

#### (A) Selection of good apiary site:

- The apiary site should be rich in bee flora which may provide forage for most parts of the year and in addition there should be good density of honey flow sources near the apiary site. For collecting 20 kg of honey, one colony needs 100 blooming trees or 2-4 acres of blooming crop.

- The apiary site should be easily accessible by road.
- There should be availability of fresh running water near the apiary.
- The apiary site should have natural or artificial wind breaks to protect the bees from strong/chilly winds.
- The site should receive morning and afternoon sunshine. During summer provision of shade (either using artificial structures or using shade of the trees) should be made.
- Apiary Site should be free and away from predator's nest (ants and wasps), garbage, drainage, marshes, stagnant water and grazing animals.
- Avoid apiary sites from footpaths, roads and other busy places, power station, highway, train tracks etc. or anything disturbing bees by vibrations and sound pollution.

**(B) Transportation**

- Comply with legal obligations concerning restrictions on animal movement in cases of noticeable diseases.
- Transport/move only healthy colonies.
- Transport hives avoiding the warmer hours of the day, providing adequate openings for air ventilation in the hives.

**(C) Hygiene**

- Observe general hygiene rules, such as the periodic cleaning of suits, gloves and other beekeeping equipment.
- Observe hygiene rules when dealing with dead colonies (combs, food stores, boxes, etc.).
- Use disposable gloves when handling diseased hives.
- Disinfect levers and other potentially contaminated equipment (e.g. gloves) after inspection of hives affected by transmittable diseases.
- Do not place honey supers directly on the ground – to avoid honey contamination with *Clostridium botulinum*.
- Avoid contact with dust during transport of the supers from the apiary to the honey house.
- Do not place beehives directly on the ground.

**(D) Bee health**

- For nuclei, use only bees and brood combs from healthy colonies.
- Balance colony strength among colonies by transferring frames only in the case of healthy hives.
- Buy new bee colonies only after thorough inspection for honeybee diseases, preferably with a health certificate from a expert.
- Keep only healthy and strong colonies in the apiary.
- Place apiaries in areas free from environmental pollutants (pesticides, heavy metals, etc.).
- Do not imbalance the proportion between nurse bees and brood while equalizing the hives; use preferably combs with hatching bees to fortify weak colonies.
- Perform genetic selection in order to have queens that are more resistant to disease and adapted to local climatic conditions.
- Keep newly introduced colonies in a quarantine apiary, separate from the existing stock, for at least 1 month, in order to monitor them against diseases and prevent transmission of diseases.
- Keep purchased or weak colonies/swarms in a quarantine apiary before introducing them into the final destination apiary.
- Reduce bee stress (e.g. avoiding unnecessary winter inspections of the hives; limiting the use of the smoker; properly feeding the bees).

#### **(E) Apiary management**

- Evaluate the melliferous and pollen capacity of the area and the availability of water resources.
- Do not leave beekeeping material abandoned in the apiary.
- Adjust the number of hives in a specific area to the amount of melliferous plants/pollen sources in the area.
- Avoid placing apiaries in windy areas.
- Place apiary in an area that is easy to access with a vehicle.
- Adjust the number of hives in the apiary according to season, pollen, nectar, honeydew resources.
- Place apiary in a dry area.

- Prevent drifting: avoid keeping too many colonies in a single row.
- Avoid having broken or not well-maintained hives with openings to prevent robbing.

**(F) Wintering**

- Before winter, reduce the empty space in the hive.
- Reduce the size of the hive entrance.
- Perform beehive box maintenance: verify the integrity of hive boxes, replace damaged or broken parts or paint.
- Verify there is enough food storage in the external frames.
- Remove the unpopulated frames and adjust the hive volume to the size of the colony.
- Insert a follower board frame to reduce the volume for the hive nest.
- Wrap the hive in black tar paper, if needed.

**(G) Human health**

- When required, ask the assistance of an expert.
- use protective clothing and beekeeping tools when visiting honeybee colonies.
- Avoid placing hives in areas of high presence of toxic plants.
- During apiary inspections, always keep corticosteroids or other medicines within easy reach to guarantee health of operators (e.g. in case of anaphylaxis).
- Limit the lifting of heavy weights (e.g. when harvesting supers or when moving hives) and, if needed, use back-protector devices.
- Avoid areas where allergenic plants (e.g. *Ambrosia trifida* and *Artemisia vulgaris*) can be found in significant numbers.

**(H) Colony management**

- Adopt hive management practices according to region, season, and strength of colony.
- Replace the queens at least every 2–3 years, except those of high genetic value.
- Comply with the planned schedule for beehive inspection.
- Prevent swarming by splitting strong colonies in the spring.
- Prevent swarming by insertion of new wax foundations.
- Prevent swarming by placing of supers.
- Prevent swarming by removing the entrance reducer.
- Prevent swarming by adopting genetic selection of the queens.

- Prevent swarming by insertion of drawn combs.
- Use a queen excluder.
- Reduce the opening of the hive entrance during robbing and cold periods, and increase the opening of the hive entrance during the hot season.
- Mark the queen bee according to its year of birth.
- Orient hive entrance in a way that the sun can reach it from the early morning hours.
- Prevent drifting by painting numbers or different geometrical signs in different colours on the front and entrance of the hive.
- Indicate the age of the combs on the top bar of the frame (e.g. the year of placing of the frame with foundation).
- Prevent swarming by removing the beehive's bottom board.
- Ensure adequate air circulation in the hive, if needed.

## 2. Use of Medicines for Honeybee

### Appropriate measures:

- Use only medicines for honeybees registered in the country or medicines legally imported.
- Ensure that all treatments are carried out correctly as described in the instructions (respecting dosage and method of application).
- Do not apply illegal treatments.
- Use only pharmacological products registered for beekeeping use, following the instructions of use, and record the treatments.
- Observe the withdrawal time of Medicinal products, and ensure that products from treated hives are not used for human consumption until the withdrawal period has elapsed.
- When using instruments for the application of a treatment (formic acid dispenser, sublimators for oxalic acid treatment) ensure that they are appropriate and correctly calibrated for the administration.
- Respect the required storage conditions for medicines and feeds.
- Dispose of used instruments and devices in a biosecure manner.

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