Management of Beneficial Insects

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- **Bee species**
- There are five important species of honey bees as follows.
- *Apis dorsata:The rock bee Apidae.*
- *Apis cerana indica:The Indian hive bee Apidae.*
- *Apis florea :The little bee Apidae.*
- *Apis mellifera:The European or Italian bee Apidae.*
- *Melipona irridipennis: Dammer bee, Meliporidae stingless bee.*

Honey bee castes

Every honey bee colony comprises of a single queen, a few hundred drones and several thousand worker castes of honey bees. Queen is a fertile, functional female, worker is a sterile female and the drone is a male insect.

Duties of a queen

1. The only individual which lays eggs in a colony .(Mother of all bees).
2. Lays upto 2000/day in Apis mellifera.
3. Five to Ten days after emergence, she mates with drones in one or more nuptial flights.
4. When her spermatheea is filled with sperms, she will start laying eggs and will not mate any more.
5. She lives for 3 years.
6. The secretion from mandibular gland of the queen is called queen's substance.
7. The queen substance if present in sufficient quantity performs following functions.

a) Prevent swarming and absconding of colonies.
b) Prevent development of ovary in workers.
c) Colony cohesion is maintained.

8. The queen can lay either fertilized or sterile eggs depending on the requirement.

Duties of a drone

1. Their important duty is to fertilize the queen.
2. They also help in maintenance of hive temperature.
3. They cannot collect nectar / pollen and they do not possess a sting.

Duties of a worker

1. Their adult life span of around 6 weeks can be divided into

a) First three weeks- house hold duty.

b) Rest of the life- out door duty.

House hold duty includes

a. Build comb with wax secretion from wax glands.

b. Feed the young larvae with royal jelly secreted from hypopharyngeal gland.

c. Feed older larvae with bee-bread (pollen+ honey)

d. Feeding and attending queen.

e. Feeding drones.

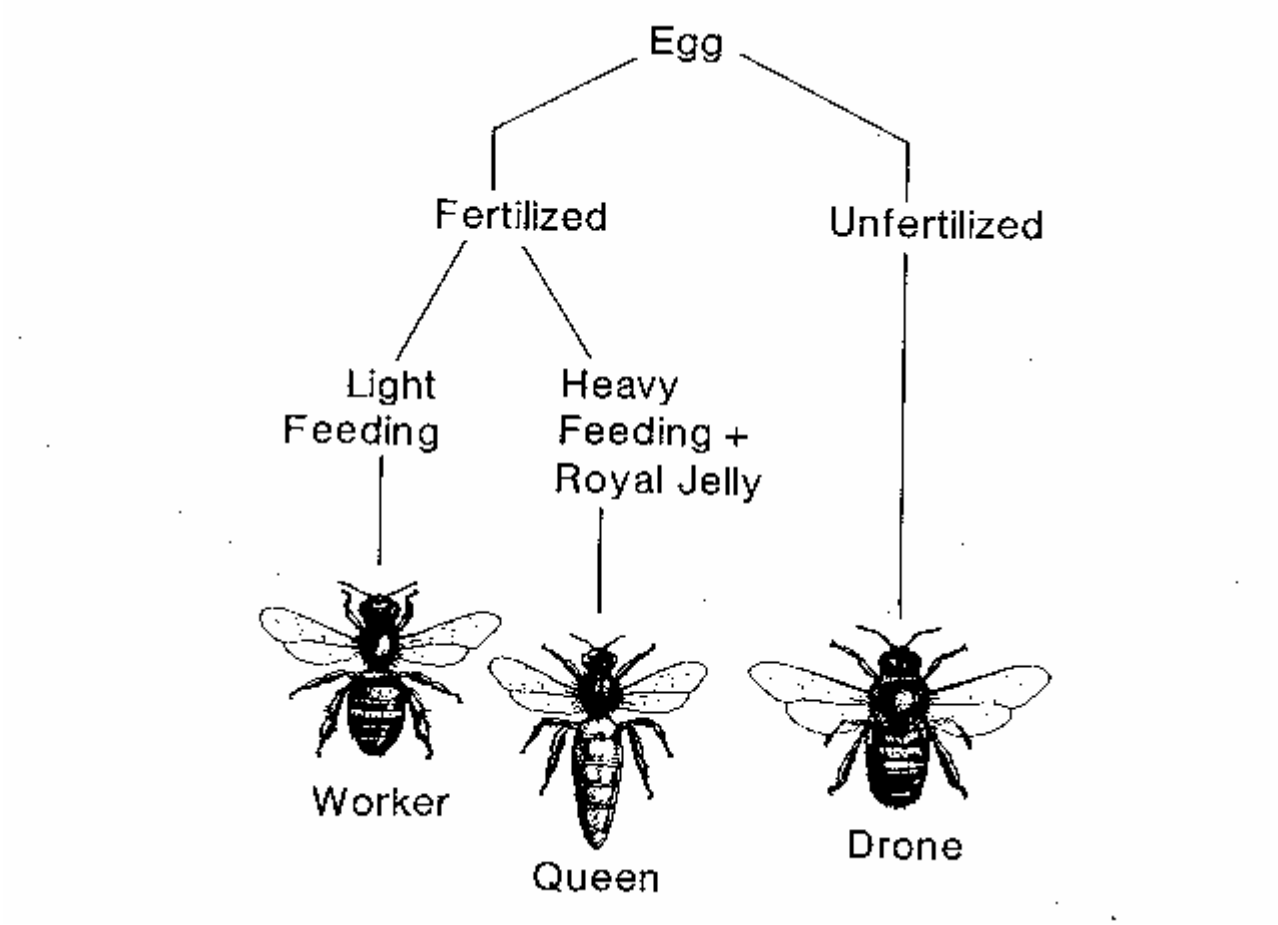
f. Cleaning, ventilating and cooling the hive.

g. Guarding the hive.

h. Evaporating nectar and storing honey.

Outdoor duties

1. Collecting nectar, pollen, propolis and water.
2. Ripening honey in honey stomach.


Egg
Fertilized
Unfertilized
Light Feeding
Heavy Feeding + Royal Jelly
Worker
Queen
Drone

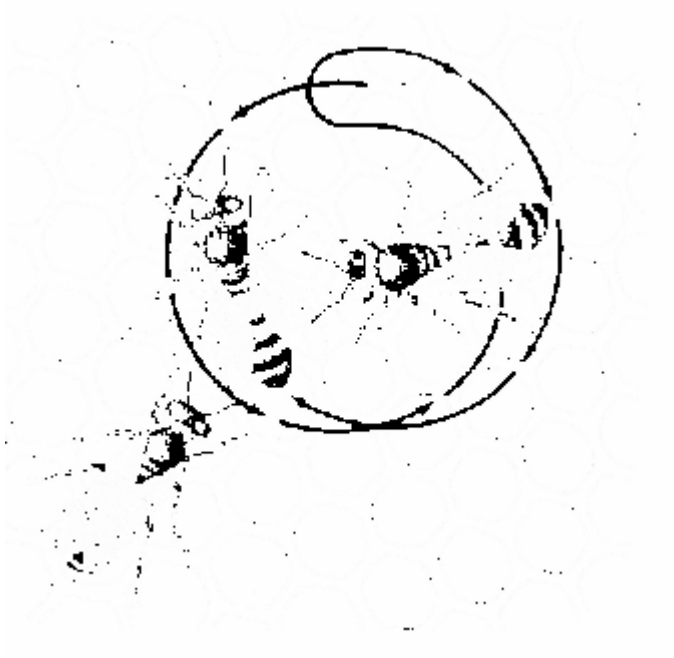
Communication in bees

- Bees communicate using various phenomones, including the queen's substance,
- vasanov gland secretion, alarm pheromone emitted from sting and secretion of
- tarsal gland. In addition the bees also communicate by performing certain dances.
- When scout bees return to the box after foraging they communicate to the
- other forages present in the box about the direction and distance of the food source
- from the hive by performing dances. The important types of dances are noticed.

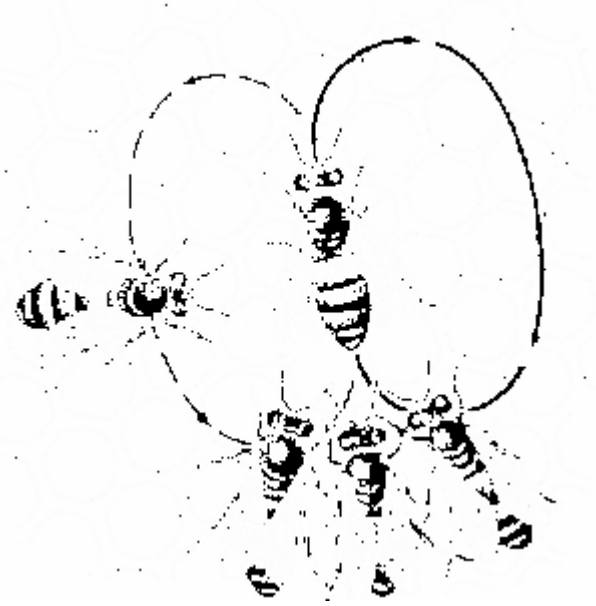
Round dance is used to indicate a short distance (Less than 50m in case of

- A.mellifera). The bee runs in circles, first in one direction and then in opposite direction, (clockwise and anticlockwise).

Round dance



Wag tail dance



Tail wagging dance or Wag-tail dance.

- This is used to indicate long distance.(more than 50m in case of A.mellifera). Herethe bee makes two half circles in opposite directions with a straight run in between.
- During the straight run, the bee shakes (wags) its abdomen from side to side, thenumber of wags per unit time inversely proportional to the distance of the food (more the wags, less the distance.). The direction of food source is conveyed by the angle that the dancing bee makes between its straight run and top of the hive which is the same as between the direction of the food and direction of the sun. The bees, can know the position of the sun even if it is cloudy.

APIARY MANAGEMENT

Pre-requisites to start beekeeping

a. Knowledge / Training on beekeeping

b. Knowledge on local bee flora

c. Sufficient on local bee flora

d. If necessary practice migratory beekeeping

Apiary site requirements

a. The site should be dry without dampness. High RH will affect bee flight and ripening of nectar.

b. **Water - Natural source / Artificial provision**

c. **Wind breaks - Trees serve as wind belts in cool areas**

d. **Shade - Hives can be kept under shade of trees. Artificial structures can also be** constructed

e. **Bee pasturage / Florage - Plants that yield pollen / nectar to bees are called bee** pasturage / florage

General apiary management practices

Hive inspection - Opening the hive at least twice a week and inspecting for following details.

- Presence of queen
- Presence of eggs and brood
- Honey and pollen storage
- Hive record to be maintained for each hive
- Presence of bee enemies like wax moth, mite, disease

Expanding brood net

- Done by providing comb foundation sheet in empty frame during honey flow period.

Sugar syrup feeding

- Sugar dissolved in water at 1:1 dilution
- Used to feed bees during dearth period

Supering (Addition of frames in super chamber)

- This is done when brood chamber is filled with bees on all frames are covered
- Comb foundation sheet or constructed comb provided in super chamber

Honey extraction

- **Bee escape board - Kept between brood and super chamber**
- Bees bushed away using **brush**
- Cells uncapped using uncapping knife
- Honey extracted using honey extractor
- Combs replaced in hive for reuse

Swarm management

- Remove brood frames from strong colony and provide to weak
- Pinch off the queen cells during inspection
- Divide strong colonies into 2 or 3
- Trap and hive primary swarm

Uniting bee colonies - Done by Newspaper method

- Bring colonies side by side by moving 30 cm / day
- Remove queen from week colony
- Keep a newspaper on top of brood chamber of queen - Right colony
- Make holes on the paper
- Keep queenless colony on top
- Close hive entrance (the smell of bees will mix)
- Unite bees to the brood chamber and make it one colony

SEASONAL MANAGEMENT

- - Pollen and nectar available only during certain period
- Honey flow season (surplus food source) x Dearth period (Scarcity of food)
- - Extremes in climate like summer, winter and monsoon - Need specific
- management tactics

Honey flow season management (Coincides with spring)

- - Provide more space for honey storage by giving CFS or built combs
- - Confine queen to brood chamber using queen excluder
- - Prevent swarming - As explained
- - Prior to honey flow - Provide sugar syrup and build sufficient population
- - Divide strong colonies into 2-3 new colonies - if colony multiplication need
- - Queen rearing technique may be followed to produce new queens for new
- colonies

Summer management

- Bees have to survive intense heat and dearth period
- Provide sufficient shade (under trees or artificial structure)
- To increase RH and reduce heat - Sprinkle water twice a day on gunny bag or rice straw put on hive
- Increase ventilation by introducing a splinter between brood and super chamber
- Provide sugar syrup, pollen supplement/substitute and water

Winter management

- Maintain strong and disease free colonies
- Provide new queen to the hives
- Winter packing in cooler areas (Hilly areas)

Management during dearth period

- Remove empty combs (and store in air tight container)
- Use dummy division board to confine bees to small area
- Unite weak colonies
- Provide sugar syrup, pollen supplement/substitute

Rainy season / monsoon management

- Avoid dampness in apiary site. Provide proper drainage
- In rain when bees are confined to the hive, provide sugar syrup feeding

BEE PASTURAGE / BEE FORAGE

Plants that yield pollen and nectar are collectively called bee pasturage or bee forage.

Plants which are **good source of nectar**

1. Tamarind
2. Neem
3. Soapnut tree
4. Eucalyptus
5. Pungam
6. Moringa
7. *Prosopis juliflora*
8. *Glyricidia maculata*
9. *Tribulus terrestris*

Plants which are **good source of pollen**

1. Sorghum
2. Maize
3. Millets like Cumbu, Tenai,
4. Varagu, Ragi Roses
5. Pome granate
6. Sweet potato
7. Tobacco
8. Coconut
9. Castor
10. Date palm

Plants which are good source of Pollen and Nectar

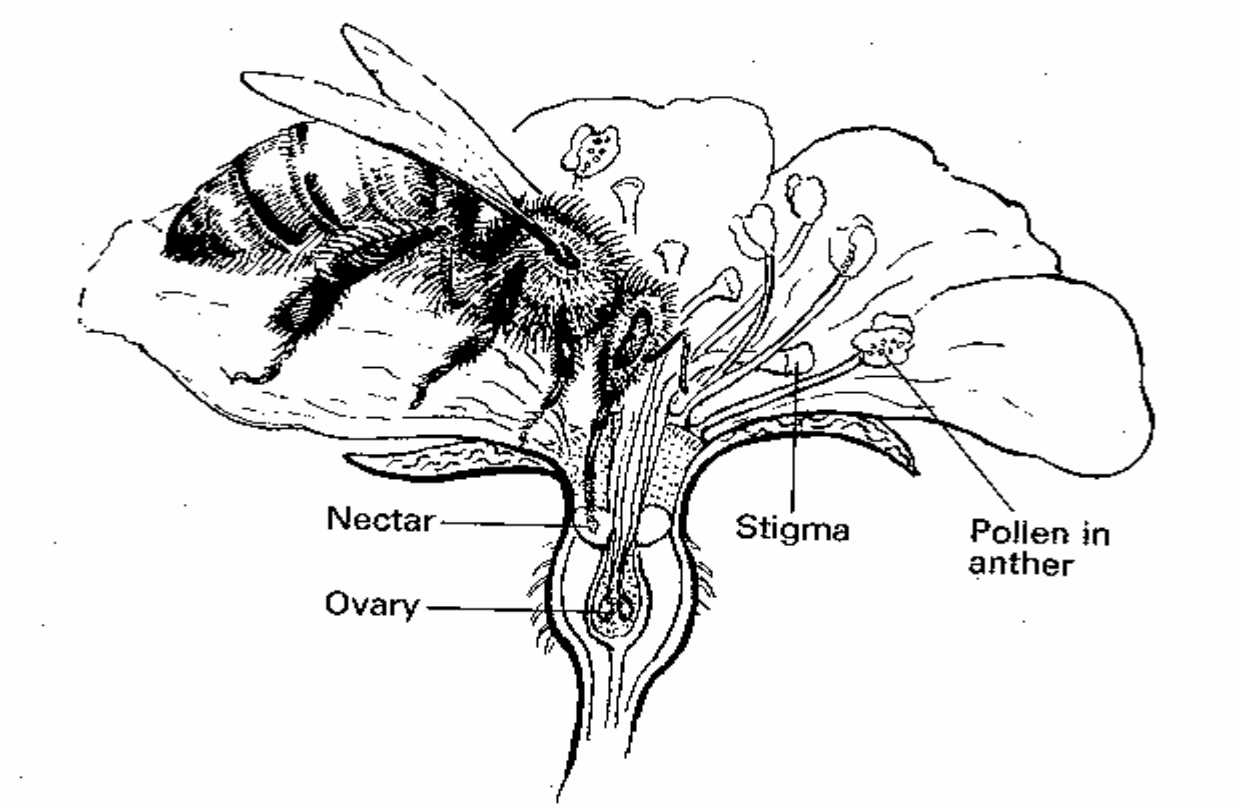
1. Banana
2. Citrus
3. Apple
4. Berries
5. Pear
6. Plum
7. Peach
8. Guava
9. Sunflower
10. Safflower
11. Mango

FORAGING

Refers to collection of nectar and pollen by bees.

Nectar foragers

- Collect nectar from flowers using lapping torigue
- Passes the nectar to hive bees
- Hive bees repeatedly pass the nectar between preoral cavity and tongue – to ripen honey
- Later drops into cell



Pollen foragers

- Collects pollen by passing flower to flower. Pollen sticking to body removed - Using pollen comb
- Packed using pollen press into corbicula
- A single bee carries 10-30 mg pollen (25% of bee's wt)
- Dislodge by middle log into cell
- Mix with honey and store