



FACULTY OF AGRICULTURAL SCIENCES & ALLIED INDUSTRIES

ENT -321 Management of Beneficial Insects 2 (1+1)

Lecture-4 Apiculture and Management of Apiary:

Beekeeping (or apiculture) is the maintenance of honey bee colonies, commonly in hives, by humans. A beekeeper (or apiarist) keeps bees in order to collect honey and beeswax, to pollinate crops, or to produce bees for sale to other beekeepers. A location where bees are kept is called an apiary. Three types of moveable frame hive are in common use: The Newton type, the Jeolikote Villager, and the Langstroth type. Apiary honey is produced in bee hives and is harvested by extraction in honey extractors. Other types of beekeeping equipment like queen excluder, smoker, hive tool, pollen trap etc. are also required for bee keeping. Production of honey is the major aim of bee keeping. Modern beekeeping also includes production of beeswax, bee collected pollen, bee venom, royal jelly, propolis, as also of package bees, queen bees and nucleus colonies. All these are possible only with a proper management of bees, utilizing the local plant resources and adapting to the local climatic conditions.

Seasonal management: It varies in different parts of the country although the basic management methods are the same. Flow management, dearth management, provision of feeding, and control and cure of bee disorders, bee diseases, pests and enemies, are some of the routine measures to keep bee colonies healthy and strong. Beekeeping activity depends for its success on the execution of a series of coordinated operations determined by the cycle of the seasons and successive flowering of plants. Combination of various operations – routine, seasonal and special is collectively referred to as “Bee colony Management”.

1. Spring season management: Key aspects to consider during this period are

- Cleaning
- Avoid starvation
- Disease inspection
- Brood manipulation
- Re – queening
- Creating space for expansion within the hive swarm control
- Removal of honey crop

2. Off season Management:

- Enough honey may be left in the hive to keep colony alive
- Protect from rain and wind
- Protect from enemies
- Take care of unhygienic conditions
- Regular inspection of colonies
- When the nectar is generally not available colonies should be given 300 to 500 ml warm sugar syrup in the evening

3. Summer season management:

- Provide shade to hives
- Provide clean water
- Provide sugar syrup to honey bees
- Management of pest and diseases
- Sprinkle cold water over hive
- Control robbing
- Keep colony strong
- Re – queening

4. Winter season management:

- Place colony under sun rays
- Plug all the openings
- Unite weaker colony with strong colony
- Keep colony strong
- Keep the entrance gate opposite to wind

Honey bees collect nectar and pollen from flowering plants. Nectar is a sweet secretion from the floral and extra-floral nectarines of flowering and is the raw material for honey. Pollen is protein-rich food for the bees.

Bee pasturage or bee forage:

The plants that yield nectar and pollen are collectively called bee flora, bee pasturage or bee forage. The period when a good number of plants providing nectar and pollen are available to bees is called honey flow period. If the nectar yield is copious from a good number of plants of a particular species, it is called major honey flow period. When the amount of nectar to be collected is small, it is called minor honey flow period. The day when there is no honey flow is called the dearth period. As nectar and pollen are basic raw material for beekeeping means managing honey bee colonies in such a way to obtain maximum colony population to coincide with the major honey flow in an area and to utilize the population for honey production and pollination. Plants which are good source of nectar are tamarind, moringa, neem, *Prosopis juliflora*, soapnut tree, *Glyricidia maculate*, eucalyptus, *Tribulus terrestris* and pungam. Plants which are good source of pollen are sorghum, sweet potato, maize, tobacco, millets, coconut, roses, castor, pomegranate and date palm. Plants which are good source of both pollen and nectar are banana, peach, citrus, guava, apple, sunflower, pear, mango and plum.

Foraging: Collection of nectar and pollen by bees is called foraging.

Nectar foragers: They collect nectar from flowers using lapping tongue and passes the nectar to hive bees. Hive bees repeatedly pass the nectar between pre oral cavity and tongue to ripen the honey later they drop the ripened honey into cells. **Pollen foragers:** They collect pollen by passing through different flowers pollen sticking to the body is removed by using pollen comb.

Then it is packet using pollen press into corbicula or pollen basket. Then the pollen is dislodged by middle leg into cells. Pollen is mixed with honey and stored.

Floral fidelity: A bee visits same species of plant for pollen and nectar collection until the source is exhausted. This is known as floral fidelity.

Qualities of honey bees which make them good pollinators:

- Body is covered with hairs and has structural adaptation for carrying nectar and pollen
- Bees do not cause injury to plants
- Adult and larvae fed on nectar and pollen which is available in plenty
- They are considered as super pollinators since they store pollen and nectar for future use
- No diapause is observed and needs pollen throughout the year
- Body size and proboscis length is very much suitable for many crops
- Pollinate wide variety of crops
- Forage in extreme weather conditions also

Effect of bee pollination on crops:

- It increases yield in terms of seed yield and fruit yield
- It improves quality of fruits and seeds
- Bee pollination increases oil content of seeds in sunflower
- Bee pollination is must in some incompatible crops for seed set
- Some plants such as figs, peas, seasonal flowers, chrysanthemum and many ornamental plants would produce no fruits unless pollinated by bees

Communication in Bees:

- Honey bees use chemical, mechanical and auditory signals for communication.
- Karl von Frisch discovered and interpreted the bee communication, in the year 1967.
- He was honored with Noble Price in 1973.
- Karl von Frisch published the 'Dance Language and Orientation of Bees' (1967) and Bees: their vision, Chemical sense and language (1971).
- All bees of a colony have specific odour and both chemical and stimuli are used to recognize them.
- Honey bees release alarm pheromone from the scent glands.
- The queen secretes 'Queen bee substances' (9- hydroxydecenoic acid) and the workers get it by licking the Queen's body. They distribute this substance among themselves and it checks the development of ovaries in worker bees.
- Honey bees perform basically two types of dance
- Round dance is performed by the honey bees when the food source is located at a distance of less than 80 metres from the hive. In this dance the bee circles in one direction, turns and then circles back in the direction from which she came.
- Tail-wagging dance or 8- fashion dance performed by honey bees when the food source is located at a distance of more than 80 metres from the hive.

- Bees use this dance for a few seconds to 3 minutes.
- The honey bees measure distance by the motion of the image received by their eyes as they fly. The compound eyes are very sensitive to 'flicker effect'.