PESTS AND DISEASES OF HONEYBEES

The Indian bee is comparatively free from many infectious diseases except Thai Sac brood virus whereas the Italian bee in other countries is known to be susceptible to diseases like foul brood, sac brood, Acarine diseases etc. In our country bee enemies are more dangerous taking a heavy toll of life, as a result of which annually many colonies deserted by the bees.

Pests of honey bees

The greater wax moth, *Galleria mellonella L.* (Galleriidae) enjoys world wide distribution and its occurrences has been noted from the very early days of Aristotle (38322 B.C.). In South India it is seen causing severe damage in the plains and lower altitudes but it is rare in high altitudes. It is one of the most observed throughout the year but more common and severe during July to October and November to December. Combs of all the species of *Apis* are freely attacked. It is one of the most important enemies of the bee colony causing serious damage particularly to weak colonies where the number of bees are not sufficient enough to cover all the combs.

1. Wax moth

The caterpillars live in silken tunnels made by them and feed on the propolis, pollen and wax in the combs. As they penetrate the wax layers, particles of wax are dislodged and fall into the cells and in the hive. The presence of loose dislodged particles in the hive is the first symptom of attack. When the infestation is serious the comb is seen covered with silken webs with numerous black faecal particles of the caterpillars. Usually uncovered or partially covered combs and weaker colonies are damaged. In such cases bees abandon the colony.

The adult female moth enters the hive during night and in case of weak colonies even during day time and lays eggs in the cracks and crevices of the hive

and comb. About 200—800 eggs are laid in batches by a single female in course of a fortnight. The eggs are creamy white in colour and hatch in 8 to 10 days into tiny white caterpillars about 3 mm long. Full grown caterpillar is dirty grey in colour, cylindrical, smooth and about 2.5 cm long. Larval period extends over a month. Pupation takes place in a silken cocoon among the debris of the combs in the corners crevices of the hive. Pupal period is about 8 days. The adult is brownish grey in colour, 10 to I5 mm long and the outer *as* of the fore wings of the males have a semi circular notch they are smooth in females. Mating takes place soon after and eggs are laid in a day or two after mating.

The lesser wax moth, *Achroia grisella* F., is seen in comparatively higher altitudes. The caterpillars feed mainly on the debris of the combs. The larvae of another wax moth *Achroi innotatalankella* C. & T. occur both inside the combs and on the floor boards of working colonies.

These wax moths at times decap the sealed cells exposing the pupae inside and this diseased condition is referred to as bald brood.

The insect can be controlled by frequent examination all the crevices of the hive and removing all debris. The excess of the hive not covered by the bees are removed and stored after fumigation with ethylene bromide. In the store rooms the spare should be stored in tightly closed containers.

2. Ants

The black ant, *Camponotus compressus,* the-household red ant, *Dorylus labiams* and *Monomorium* spp. are dangerous enemies of the bee. They attack weak colonies and carry away the honey, pollen and the brood. Strong colonies are able to withstand the ants, but in weak colonies ant attack will result in destruction and end of the colony. By providing ant pans around the bases of the

stand or oil bands over the stands ants can be kept away. Underground ant nests are eliminated by dusting of Methyl parathion or carbaryl or pouring 0.1% chlorpyriphos solution.

3. Wasps

The yellow banded hornet, *Vespa cincta* F., is a large wasp with a broad transverse yield band on the abdomen. It is a social insect constructing papery nests in hollow spaces. It waits area the entrance of the hive, catches bees as they come out, macerates them for feeding the juice to its young. It captures bee in the field also. By reducing the width of the alighting board of the hive, the wasps can be prevented from sitting near the entrance Wasp nests should be destroyed by burning them. *V. tropica* vat, *haemotoides* B. is also known to attack bees in India.

The bee hunter wasp, *Palarus orientalis* Kohl., is black in colour with transverse yellow lines on the abdomen. It catches bees while they are on flight. A wasp can collect about 20 bees a day, stings and carries them to its underground nest and places one in each of the compartments of the nest before laying an egg on the back of each bee. The grub on hatching feeds on the bee.

In hilly regions another bee hunter wasp, *Phyllanthus ramakrishnae* T. attacks and carries away bees.

4. Waxbeetles

The tenebrionid beetle, *Platybolium alvearium* B., is found in the hives under unhygienic conditions feeding on the debris and on old combs in weak colonies. Periodical examination of empty combs and regular cleaning of the bottom boards will control the enemy.

5. Birds

King crow *Dicrucus* sp. and the bee cavers *Merops* spp. capture bees and devour them.

6. Tracheal Mites

The tracheal mite, *Acarapis woodi*, causes Acarine disease of adults. The adult mites infest the prothoracic tracheae i.e. the first pair found on the thorax, and complete their life cycle there. They feed on the blood (haemolymph) by piercing with their mouthparts through the tracheal walls. It causes 'K' winged condition in bees, where the wings are held at unusual angle and bees are unable to fly. Bees are seen crawling in front of the hive.

7. The parasitic mite Varroa destructor

These mites are ectoparasitic and attack both Indian and Italian bees. It feeds on early stage of lava and prepupa. The adult mites are broader than long. All the above mites can be managed by dusting micronized sulphur on the frames or by burning Folbex strips (Bromopropylate) as a fumigant inside the hive. The mites can also be controlled by keeping absorbent cotton soaked in 65 per cent formic acid.

8. Bee mites

Mites are microscopic and are ecto or endo parasites of honeybees.

9. Brood mite, *Tropilaelaps clareae*

These mites are serious ectoparasites on brood and adults of *Apis mellifera*. They attack the brood and cause larval death. Perforations are seen on the brood cells. The adult mites are longer than brood.

10. Other enemies

The 'death's head' moth, *Acherontia styx* enters hive and consumes honey. Occasionally cockroaches enter weak colonies and impart a foul smell to the hive. The Robber bee, the leaf cutter bee *Megachile disjuncta*, dragon flies and preying mantids capture bees and feed upon them. Lizards, frogs toads capture bees at hive entrances. Bears dismantle the hives and eat upon honey, pollen, brood and

the bees. Termites damagewooden parts of the hive; to check this the stands should be painted with coal tar. The termite mounds seen near the apiary-aid be destroyed by applying 0.1% Chlorpyriphos solution into the nests. The nymphs and adults of the Arachnid, *Ellingsenius indicus C.,* cling to adult workers in hilly regions

Diseases of Honey Bees

There are a number of diseases which affect the honeybee in India. Of the major diseases which affect honeybee are the Acarine and No*sema* diseases of the adult bees and the brood diseases of larval stages.

1. Nosema Disease

This disease is caused by a protozoan, *Nosema apis.* The *Nosema* infestation leads to dysentery. The flies are unable to fly and void loose excreta on the combs, frames and ground in front of the hive. It mainly affects the flight during cold weather. An antibiotic known as Fumagillin is useful in controlling the infection. The drug is administered by giving a feed of 100 mg fumagillin per colony in 250 ml of sugar syrup for 10 days continuously.

2. Broad Diseases

Honey bee broods suffer from variety of diseases. Loss of brood affects the colony strength. Adult bees are not affected by brood diseases but they can spread the casual organisms. Brood diseases are more serious than adult diseases. Brood diseases of bees are described below.

a. European foul-brood

b. American foul-brood

c. Sac foul-brood

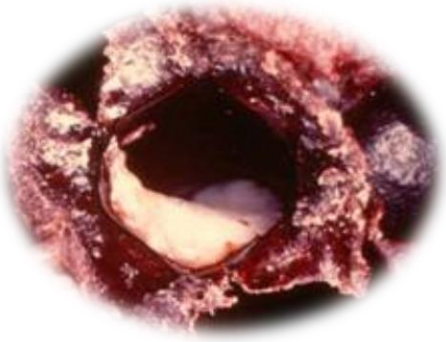
d. Thai Sac brood virus (TSBV)

e. Chalk foul-brood and stone brood disease

Out these brood diseases, the European foul-brood disease and the Thai Sac-brood disease are common in India.

a. European foul-brood disease, *Streptococcus pluton*

This disease was first noticed in Mahabaleshwar and is now widespread. The disease is believed to have been introduced along with *Apis mellifera* imported from exotic sources. The disease is caused by non-spore-forming bacterium, *Streptococcus pluton* along with *Bacillus alvei* as secondary invader. The disease affects larvae of all castes. The symptoms are: the larvae turn watery, yellow then brown and lastly dark coloured. The tracheal system becomes visible and larva dies in a coiled stage causing foul smell. In advanced stages, a hempy non-elastic thread is formed. Dead larvae are usually found in unkept cells with no predominant odour. Scales and larvae lie in any position. The disease occurs at a time when there is active brood rearing. Cells are poorly capped and mixed with normal cells. The use of antibiotic terramycin is most effective in treating the disease. Terramycin is given dissolved in sugar syrup @ 100 mg of active terramycin in a litre of syrup. The terramycin syrup (freshly prepared) is fed every seventh day. The disease can also be controlled by fumigation with ethylene oxide. Quarantine is a must to prevent entry of any of the bee diseases.



European foul brood disease

b. American Foul Brood, *Bacillus larvae*

American foulbrood is a disease affecting the bee larvae and is caused by *Bacillus larvae* White. The disease is prevalent in many tropical and sub-tropical countries. In U.S. it is the most destructive of all bee diseases causing annual losses of several hundreds of thousands of dollars.

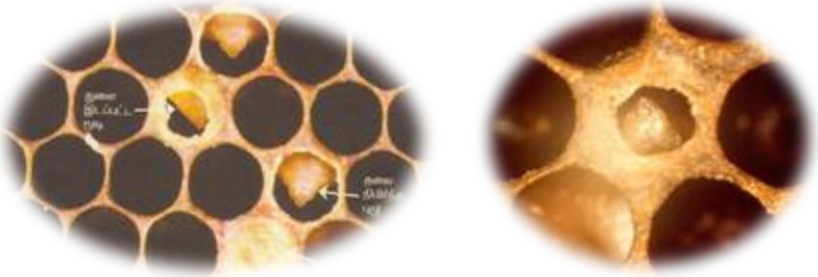
The pathogen is a rod-shaped, flagellate, motile bacillus highly resistant to heat, desiccation and disinfectants. Larvae of workers, drones and queens are all infected through ingestion of spores with their food. The spores germinate in the gut, penetrate the gut wall usually at about the time of pupation and reach the haemolymph there they multiply in large numbers. Youngest larvae are the most susceptible. The diseased larvae are removed and rejected by the nurse bees; those which are not thus removed die at the prepupal or pupal stage after they have spun their cocoons with their bodies stretched on their hack stand head inclined toward the cell cappings. They turn brown and putrefy emitting a disagreeable fishy odour. They dry and the cell cappings become dark coloured and sunk inwards. Now the adult bees repair the cells. The infection is spread by the nurse bees engaged in cleaning the cells. The larvae which are reared in cells previously occupied by diseased have also become infected. During good nectar-flow periods the diseased colonies may recover but during dearth periods the loss at be considerable.

The disease can be controlled by total destruction of the diseased colony including the hive, frames, bees and honey. In western countries some strains resistant to the have been evolved.

American foul brood disease

c. Sac-brood disease (SBV)

Sac brood is a virus disease attacking *Apis mellifera*. The diseased larvae appear sac like and hence the name. But so far this disease is not reported in India.



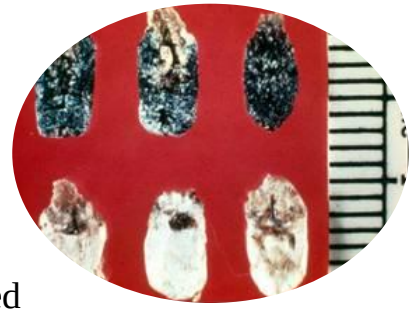
Sac brood disease

d. Thai sac brood virus (TSBV)

The causative agent is Thai Sac-brood virus. This virus attacks specifically *Apis cerena indica*. The dead brood is found in propupal but sealed stage. The pupae turn into sac-like structures filled with lemon-coloured liquid at the posterior end. In advanced stage, the larvae change their appearance from yellowish to brownish to black colour. No discernible foul odour is noticed. Many Indian bee colonies were destroyed by TSBV in South India during early 90s and caused severe loss to bee keeping industry. No effective method to control this disease is known as yet.

Prevention is better than cure. It is better to isolate the infected colonies. Combs from diseased colonies should not be used for any other purpose and dequeening the colony for a few days followed by requeening with a healthy queen from a strong colony is effective.

e. Chalk brood disease and stone brood disease



The fungus *Ascosphaera apis* that causes chalk brood only attacks larvae. When the spores are ingested, they germinate and mycelia grow through the body penetrating the epidermis and covering the pre-pupa in a short time-span. They cause mummification of the diseased larvae.