

PRACTICAL 16

FAMILIARIZATION WITH ENEMIES OF HONEY BEES AND THEIR CONTROL

Aim: To become familiar with important bee enemies and their management.

Honey bee colonies are attacked by a large number of enemies. For efficient management, the colonies require appropriate protection from these enemies. It is important to understand nature and extent of damage caused by the bee enemies and how to prevent and control them? Some of the important enemies requiring regular attention of a beekeeper are described below.

1. Predatory wasps:

<i>Vespa velutina</i> (<i>V. auraria</i>)	Nests on tree tops/buildings
<i>Vespa magnifica</i>	Under-ground nest.
<i>Vespa tropica</i> (<i>V. cincta</i>)	Underground nest.
<i>Vespa basalis</i>	Nest on tree top/buildings.



Figure 16.1 *Vespa velutina* at hive entrance to attack bees. Note clustering of bees at entrance as a protective measure



Figure 16.2 *Vespa magnifica* Note large number of slaughtered bees at hive entrance



Figure 16.3 Severe attack of *Vespa basalis* at the hive entrance of *A. cerana*.

Nature of damage:

- The wasps catch the bees at hive entrance and kill them (Fig. 16.1)
- Most serious damage in hills is caused by *V. magnifica* which cuts down bees in large number while sitting or flying at/near hive entrance (Fig. 16.2)
- Sometimes even *V. basalis* has been found causing severe damage to the colonies (Fig. 16.3)
- The weak colonies may even perish due to its attack.

Prevention and control:

- Kill the fecunded females visiting the apiary during spring by flapping
- Burn the nests during night time
- In fire prone places destroy the nests by spraying them with strong insecticidal solution.
- Kill the wasps in the apiary by flapping.

2. Wax moth (*Galleria mellonella*)



Figure 16.4 Larvae of *Galleria mellonella* exposed from the galleries



Figure 16.5 Damage of comb by larvae of wax moth

Nature and extent of damage:

- The attack is more prevalent during monsoon
- The wax moth larvae (Fig. 16.4) tunnel through the mid ribs of the comb (Fig. 16.5) and there is presence of small mass of minute wax particles outside the tunnels
- In case of severe infestation, further brood rearing is stopped; bees stop field work and colony may abscond.

Prevention and control:

- Close cracks and crevices in the hive. Reduce hive entrance
- Remove combs not covered by bees. Keep the bottom board clean.

Control in storage: Keep spare combs in empty hive bodies in tiers and close both at bottom and top. Disinfect the stack by burning sulphur @ 180 g/ cubic metre (fumigation by sulphur fumes). After fumigation, put naphthalene flakes in moth proof stacks.

3. Ectoparasitic mites: In India, ectoparasitic mites *Varroa destructor* and *Tropilaelaps clareae* are causing severe damage to *A. mellifera* colonies. However, no damage in *A. cerana* colonies due to these mites has been reported.

Nature of damage:

i) *Tropilaelaps clareae*: This mite feeds only on bee brood. In case of severe infestation of this mite dead brood is thrown outside the hive by workers. The bee colonies may even abscond if control measures are not adopted. The diagnostic symptoms are:

- irregular brood pattern
- perforated brood capping
- dead or malformed wingless bees at the hive's entrance
- fast running small brownish mites can also be seen on the infected brood frame.

ii) *Varroa* mite:



Figure 16.6 Uncapped pupal brood due to attack of *Varroa destructor*
(Photograph by Dr B S Rana)



Figure 16.7 *Varroa destructor* on a adult bee (Photograph by Dr B S Rana)



Figure 16.8 *Varroa destructor* on a bee pupa (Photograph by Dr B S Rana)

- This mite develops and reproduces in the sealed brood cells of honey bees (Fig. 16.6) feeding on haemolymph of bee pupa (Fig. 16.8). Parasitized individual may die or develop into deformed, weak individual incapable of normal functioning
- This mite has caused heavy losses to *A. mellifera* colonies throughout the world as it reproduces both on drone and worker brood of this species. Although the native host of this mite is *A. cerana*, yet it is causing no serious damage to it. On *A. cerana* this mite reproduces only on drone brood and is unable to complete life cycle on worker brood due to slightly shorter developmental period
- In India, there was no serious damage in *A. mellifera* colonies till 2004 due to this mite though reported in 1988 on this species from Himachal. Serious infestation in *A. mellifera* was recorded in Gurdaspur, Amritsar and Hoshiarpur districts of Punjab in 2004 for the first time and now seriously affecting this bee all over India
- Now it is well known that the mite earlier referred to as *Varroa jacobsoni* is in fact a species complex consisting of two species *V. jacobsoni* and *V. destructor*, each having several strains. Only two strains of *V. destructor* have become pest of *A. mellifera*

The symptoms of colony infestation with *Varroa* are:

- Spotty brood pattern (Fig. 16.6)
- Mite can be seen on adult bee's body (16.7) as mature female mite attaches to young adult bee and also feed on haemolymph till further reproduction in the brood cell
- Dead brood and malformed adult bees are seen near/around hive entrance
- Colonies become weak and wounds inflicted by mites make the bees more susceptible to bacterial and viral diseases.

Methods of *Varroa* mite detection:

- Open about 50 sealed brood cells and remove pupae using forceps and count number of mites in each cell and pupa
- To examine mites on adult bees, take about 100 bees from a colony in a wide mouthed bottle and sprinkle about 15 gram of finely powdered sugar and shake the container after closing its mouth. Fine sugar particles will dislodge the mites as these stick to mite foot pads and disable them to grip the bee body surface. Take a white paper sheet and release the contents over it. The adult bees will fly away whereas mites can be seen in the collected sugar powder. Count the number of mites

- Natural mite drop in 24 hours is also taken as assessment tool for mite infestation but for this purpose screened bottom boards (with 8 mesh wire screen) with sticky paper need to be inserted in the bee hives. A drop of more than 30 mites in 24 hours is considered high infestation and requires treatment of bee colony.

Control:

- i. *Tropilaelaps clareae* : Sulphur dusting on top bars @ 200mg/frame
- ii. *Varroa destructor*: Formic acid fumigation @ 50ml/hive in sponge pads covered with perforated polythene bags. Level of mite infestation can be kept low by putting sugar (finely powdered sugar) @ 30g/frame and then sweeping sugar down between the frame spaces using a bee brush.

4. Bee louse, *Braula coeca*: Wingless fly found on thorax of bee and feeds by coming near mouth close to opening of salivary glands and take the available nourishment. It is not a serious pest.

5. Other enemies: Birds; bee eater, *Merops orientalis* and king crow, *Dicrurus* sp. eat bees while they are flying. To control the menace, scare them away. Attack of ants can be controlled by making the hive ant proof by putting the legs of hive stand in pots containing water. Bears and pine martines are the mammals which attack the bees for honey and bees.

Practical things to do:

Write down the steps after performing the following:

- i. Go to the apiary and note behaviour of predatory wasps attacking the bee colonies.
- ii. Observe nests of wasps on trees/buildings
- iii. Try flapping the wasps in the apiary
- iv. Place screened bottom board and by using sugar dusting record the number of fallen mites on the sticky paper in the screened bottom board after one hour of dusting
- v. Observe Varroa mites on adult worker bees. Draw a diagram showing position of mite on the bee
- vi. Open randomly 50 sealed brood cells and count the number of mites present
- vii. Check a comb damaged by wax moth. Note the larvae in the tunnels made by them. Draw a diagram of what you have observed.