

Lecture -6-

Honey Bee Enemies and Diseases:-

Honeybee colonies are affected by several enemies such as Parasitic Mites, Wax moths, Ants, Wasps, Birds and Mammals. The diseases such as Viral, Bacterial, Fungal and Protozoan.

1- Parasitic Mites.

Parasitic mites are economically important as they cause significant loss to honeybee colonies. These are categorized into endoparasitic and ectoparasitic mites. *Acarapis woodi*, *Varroa destructor*, *Varroa jacobsoni* and *Tropilaelaps clareae* are found to be destructive parasites on honeybee colonies.

a- *Acarapis woodi* (Tracheal mite)

Acarapis woodi is an endoparasite mite which inhabits the tracheae and air sacs of adult bees. It infests tracheae that would lead from the first pair of thoracic spiracles of adult bees. The damage caused by this mite is commonly called as Acarine.

b- *Varroa destructor* and *Varroa jacobsoni*

Varroa destructor is widely distributed on the colonies of *A.mellifera*

Symptoms:

- *Varroa* infested bee colonies become weak and show a spotty brood pattern with punctured capping.
- The mites pierce the soft intersegmental tissues of the abdomen and feed on the haemolymph.
- The bees become stunted with deformed legs and wings.
- The bees infested with many mites usually become crippled or die.
- Parasitized pupae would appear to have small pale or reddish brown spots on their normal white bodies.

Treatments:

- Hand removal of sealed drone brood from freshly infested colonies.
- Creating the colonies broodless by caging queen for three weeks.
- Dusting of wheat flour/sugar powder on bee combs at an interval of 10 days.
- Allowing of mites to move on the culture isolates of the entomopathogenic fungi such as *Hirsutella thompsonii* and *Metarhizium anisopliae* is found effective in control of population.
- Thymol based fumigants, Api life var® and apiguard® are also effective.

2- Insect Pests:

a- Greater Wax Moth.

b- Ants.

C- Wasps.

a- Greater Wax Moth: The greater wax moth, *Galleria mellonella* is a serious pest of honeybee colonies in world. Under such conditions, bee colonies become weak and are attacked by wax moth. It infests combs of all honeybee species throughout the world.

Damage:

- The wax moth larvae burrow into the comb by producing silken tunnels along with their excreta.
- They feed on the propolis, pollen and beeswax in the combs.
- During severe infestation, the combs are seen covered with silken web with numerous black faecal particles by destroying the combs.
- The grownup larva spins a dense silken cocoon, which are usually attached firmly to the hive parts.

Treatments:

- Keep bee colonies strong, hygiene and healthy with adequate food storage.
- Minimize cracks and crevices in the hive
- Keep the bottom board clean. Collect and burn the debris periodically.
- Control diseases and other pests that make the colony weak.
- Avoid pesticide poisoning which otherwise weaken the colonies.
- Remove extra combs from the hive, especially during dearth period.
- Destroy the silken tunnels to kill wax moth larvae in initial stages.
- The lethal concentrations of many commercial products of *B.thuringiensis* and *M. anisopliae* are found to be effective.

C- Wasps:

Wasps are widely distributed highly destructive predators of honeybees. They attack on bees at hive entrance and also on the flowers. The *Vespa orientalis*, the brown wasp, *Vespa velutina* are the major wasp predators of honeybee colonies.

3- VERTEBRATE PESTS:

a- Frogs and Lizards.

b- Birds.

c- Mammals (Mice and Bears).

Birds.

The green bee-eater, *Merops orientalis*, blue bearded bee-eater, *Nyctyornis athertoni* and the drongo, *Dicrurus leucophaeus* are the most common bird predators of bee colonies.

Honey Bee Diseases and their management:-

1- Viral Diseases

Viruses are causing diseases in honeybees. About 18 viruses have been identified in honeybees and most of them cause sub-lethal infections.

Major diseases of honeybees

Disease	Causal organism	Susceptible Honeybee Species
Thai sac brood	Thai sac brood virus	<i>Apis cerana indica</i>
Sac brood	Sac brood virus	<i>Apis mellifera</i>
Paralysis	Paralysis viruses	<i>Apis mellifera</i>
Kashmir bee virus	Kashmir bee virus	<i>Apis cerana indica</i> <i>Apis mellifera</i>
American Foul Brood	<i>Paenibacillus larvae larvae</i>	<i>Apis mellifera</i> <i>Apis cerana indica</i>
European Foul Brood	<i>Melissococcus plutonius</i>	<i>Apis mellifera</i> <i>Apis cerana indica</i> <i>Apis laboriosa</i>
Chalk brood	<i>Ascosphaera apis</i>	<i>Apis mellifera</i> <i>Apis cerana indica</i>
Stone brood	<i>Aspergillus flavus</i>	<i>Apis mellifera</i>
Nosemosis	<i>Nosema apis</i>	<i>Apis mellifera</i> <i>Apis cerana indica</i>
Amoeba disease	<i>Malpighamoeba mellifica</i>	<i>Apis mellifera</i>

a. Sac Brood:

Sac brood virus (SBV) is one of the foremost viruses reported from *A.mellifera* colonies. It infects and multiplies in the tissues of young larvae.

b. Kashmir Bee Virus:

c. Paralysis Viruses

d. *Apis* Iridescent Virus

2- Bacterial Diseases:

Bacteria cause many diseases in honeybee colonies. American foul brood and European foul brood are highly destructive and widely distributed bacterial diseases of honeybees.

A. American Foul Brood

American foul brood (AFB) is one of the most destructive infectious brood diseases killing millions of *A. mellifera* colonies throughout the world.

Symptoms:

- 1-The bees die in the larval or pupal stage (capped brood).
- 2-The cell capping of the affected larvae are indented.
- 3-The brood nest is irregular.
- 4-In the affected cells you will find a sticky mass, which forms threads when you remove it from the cell with a matchstick.
- 5-There is a smell of glue (glutton) in the hive.
- 6-Affected larvae are dark brown to black.

B. European Foul Brood

European foul brood is caused by *Melissococcus plutonius*, a non-spore forming bacterium. It is an infectious and contagious disease primarily infecting 2-3 days old young larvae. The virulence of the pathogen is common in high brood rearing season.

Symptoms:

- 1-The larvae die before the cells are capped (pupation).
- 2-The diseased larvae turn from white to a dirty yellow and then to brown.
- 3-There is a sour smell in the hive.
- 4-There are many open cells in the combs with capped brood.
- 5-The workers drag out the dead larvae.

3- Fungal Diseases

Fungi infect brood, adult bees and combs containing stored products in honeybee colonies. The most common fungal diseases of honeybees are chalk brood and stone brood.

A. Nosemosis: Nosema is a fungal infection that affects the bee's digestive system by the microsporidian and one of the most widespread adult honeybee diseases. It can cause dysentery, reduced longevity, and overall weakness in infected bees. It is caused by *Nosema apis*.

Symptoms:

- The bees of diseased colonies show restlessness and are unable to fly but drop loose excreta on the combs and hive parts.
- The hind wings of infected bees may get unlocked from the fore wings and held at unusual angles.

- The infected nurse bees do not produce sufficient royal jelly due to deterioration of food glands.
- The hypopharyngeal glands of the newly emerged adult bees with the pathogen fail to develop completely and eventually undergo atrophy.

B. Chalk Brood

The fungus, *Ascosphaera apis* causes chalk brood disease.

Symptoms:

- The fungus infects younger larvae and pre-pupae usually located in outer fringes.
- The infected larvae die after cell capping and turn white followed by grey and black colour on formation of fruiting bodies.
- Larva is over grown by fluffy like mycelia and swells.
- The infected larva dries into hard, shrunken white chalk mummies

C. Stone Brood

Stone brood disease is generally caused by the fungus, *Asperigillus flavus* and occasionally by *Asperigillus fumigatus*.

4- Protozoan Diseases:

A. Amoeba Disease