Disease of Honeybees

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Introduction

Honeybees are attacked both at brood and adult stages by microorganisms.

The disease of honeybees are divided into brood disease and adult disease.

TYPES OF DISEASES :

Protozoan -Nosema, Amoebic

Bacterial- American and Europian Foul brood

Fungal -Chalk brood, Stone brood

Viral -Thai sac brood, Acute and Chronic bee paralysis

Diseases caused by Mites viz. Acarosis (Tracheal mite) and Varroasis (Varroa mite)

Disorder- Colony Collapse

Brood diseases

American foul brood

European foul brood

Fungal brood diseases

Chalk brood

Stone brood

Viral diseases

Thai sac brood

Nosema disease

American foul disease

The most destructive microbial disease in temperate and sub-tropical region all over the world.

Cause:

spore forming bacterium, ***Bacillus Larvae***

Only affect brood

Symptoms:

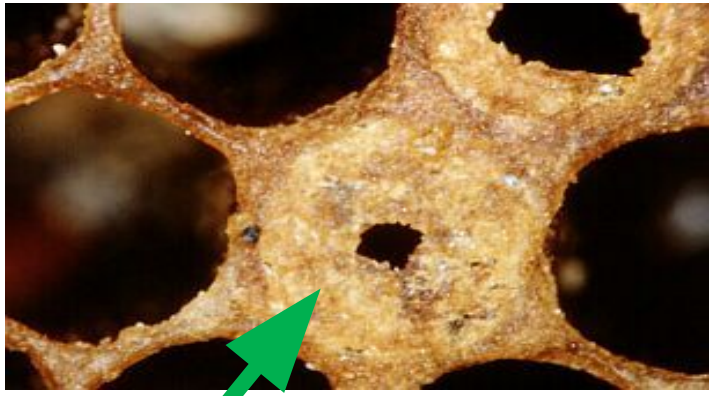
Initial stage, isolated capped cells from which brood has not emerged can be seen on the comb.

Caps of these brood cells are darker than the caps of healthy cells..

The infected brood die at prepupal or late larval stage.

The dead brood is dull white in color, but gradually changes to light brown, coffee brown and finally dark brown or almost black.

Dead Pupae



Irregular and sunken brood

Diagnostic procedure:

The simple test for AFD is the “Stretch test”

A match stick or tooth stick is inserted into the body of the decayed larva and then, gently and slowly, withdrawn.

If the disease is present, the dead larval content adhere to the tip of the stick, stretching up to 2.5 cm before breaking and snapping back in somewhat elastic way.

Treatment:

Feeding of **sodium sulphathiazole** @ 0.1g/litre in sugar surup

Feeding **oxytetracycline(Terramycin)** 0.25 to 0.4g in 5 litre sugar syrup.

Feeding **streptomycine** in sugar syrup @ 0.05-0.15g/litre.

Dust **Terramycin(TM50)** in powdered sugar (1.20) @ 4 tea spoon full on top bars of the brood frames

Chemotherapy has no effect on spores that contaminate the equipment.

Chemotherapy is not advisable for low disease

European foul Brood

In India, except Maharastra, EFB has not been recorded so for in Apis Mellifera colonies.

Cause:

Pathogenic gram negative bacterium Melissococcus pluton

Symptoms:

Honeybee larvae killed by EFB are in younger stages than those killed by AFB.

The diseased larvae die when they are 4 to 5 days old, or in the coiled stage.

The color of the larvae changes from shiny white to pale yellow and then brown, as it decays.

Another symptom of EFB is that most of the affected larvae die before their cells are capped.

Treatment:

Not required if the infection is low.

Sterilization of combs and honey could be done with **formaldehyde and acetic acid.**

0.5 or 1 g **oxytetracycline (tetramycin)** dissolved in 500 ml

Fungal Brood Diseases

Chalk brood

Cause: causative agent is ***Ascophaer apis***

It is a heterothallic fungus

Colonies rarely die from disease, but in some cause honey yielda may be reduced.

Symptoms:

It affects honeybee larvae or brood.

Chalk brood is usually more common on the edges of the brood chamber

It is most common in drone brood.

Initially, the dead larvae are swollen to the size of the cell and covered with the whitish mycelia of the fungus.

Subsequently, the dead larvae become mummified, hard, shrunken and chalk like in appearance

Treatment:

Equipment's should be sterilized using **formalin or carbolic acid.**

0. 7% of thymol has been reported to prevent the growth of fungus.

Amphotericin B, sorbic acid and sodium propionate fed to bees in pollen-sugar patties controlled infection within 7 days without affecting bees.

NistapiR controlled more than 98% of the infection in affected colonies.

Increasing ventilation

Removing “mummies” from bottom board and around the entrance.

Destroying combs containing large numbers of mummies.

Stone Brood

Cause: it is caused by ***Aspergillus niger, Aspergillus fumigates, Aspergillus flavus.***

Symptoms:

Mummification of brood

Larvae and pupae that are infected with A.flavus turn green in contrast to white or black in chalk brood.

The green growth is powdery and be readily ssen with unaided eye.

Fungus spores are found most abundantly near the head of the affected larvae and pupae.

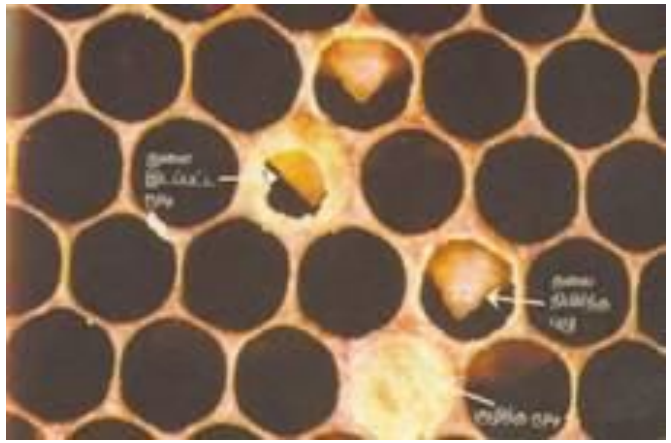
Viral Diseases

So far, the world over, 18 viruses have been found to infect honeybees.

Thai sac brood virus and ***Apis iridescent*** virus have been found to cause heavy losses to bee industry in India.

Thai sac brood

Cause : it is caused by a virus (TSBV) which primarily infects the larvae of ***Apis cerana*** and is closely related to sac brood virus(SBV) which infects the ***Apis mellifera L.,*** but the two are not identical.



Symptoms:

This results in the death of the larva in the uncapped cells.

Diseased colonies show irregularly capped brood with sunken and faded caps.

The head of the dead larva is turned up partly across the cell opening.

Infected larva turn pale yellow and finally brownish when dead.

Kashmir bee virus

Kashmir bee virus is related to the preceding viruses. Recently discovered, it is currently only positively identifiable by a laboratory test. Little is known about it yet.

Black queen cell virus

Black queen cell virus causes the queen larva to turn black and die. It is thought to be associated with *Nosema*.

Cloudy wing virus

Cloudy wing virus is a little-studied, small, icosahedral virus commonly found in honey bees, especially in collapsing colonies infested by *Varroa destructor*, providing circumstantial evidence that the mite may act as a vector.

Control measurements:

use antibiotics such as **Rifampin, Leavamisol, Amentidine** along with vitamin B complex fed to honeybee colonies @ 250mg/4 lit of sugay syrup at weekly intervals.

Avoiding overcrowding.

Adult Bee Diseases:

The diseases of adult bees are caused by protozoa which are single celled animals and form spores or cysts.

They multiply by sexual or asexual methods.

Their infection reduces vitality of bees, and shortens their life and fecundity.

Protozoan is perfect parasites as they do not kill the host immediately.

These diseases are difficult to diagnose, though inability to fly, unhooked wings and dysentery can be treated as general symptoms of an unhealthy bee.

Microscopic examination is often necessary for a definite diagnosis.

Disease of Adult Bees

Apis Iridescent Virus

Symptoms:

Reduced egg laying / brood rearing.

Bees become sluggish and make cluster.

The infected bees crawl on the ground.

The affected bees cease foraging, reduce honey collection, and the colony face starvation and starts dwindling.

Illuminated body tissue can be seen under microscope look bluish / greenish.

Spread: Disease is caused by iridovirus. Its infection is serious during hot / dearth seasons. It is transmitted by nurse bees through glandular secretion (food).

Management of Viral Diseases:

For viral pathogens, there is no chemical control.

Affected colonies should be isolated beyond their flight range.

Provide proper ventilation to reduce humidity.

Cage the queen for a week and then requeen.

Use sterilized equipments / combs.

Check robbing, drifting and swarming.

Provide supplement feeding.

Undertake selective breeding for natural resistance.

Nosema Disease:

This disease is caused by ***Nosema apis Zander***.

It is disease of adult bees.

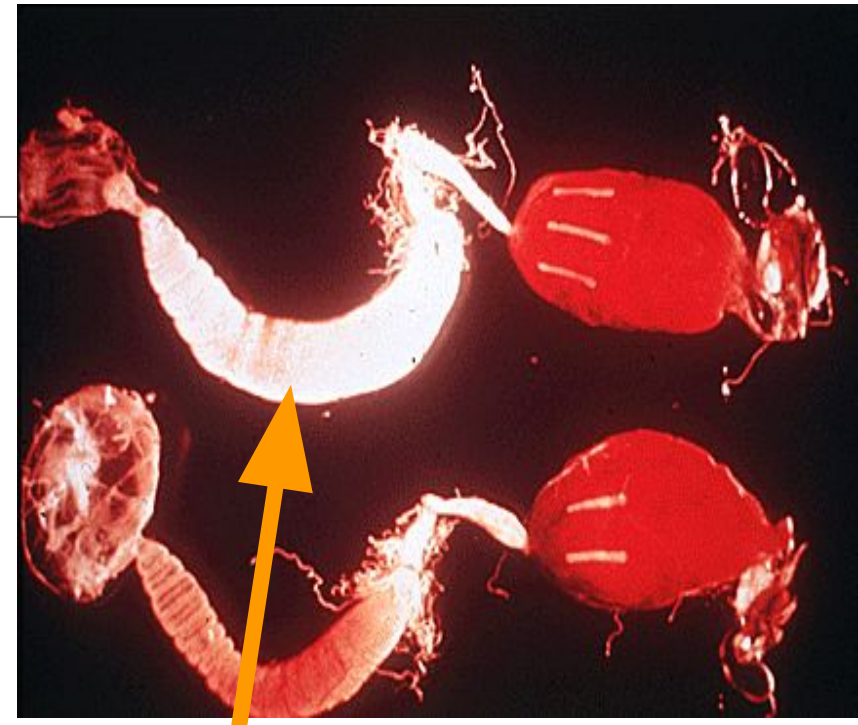
It parasitizes all the castes.

Their spores germinate in the ventriculus of the host.

Pathogen multiplies in epithilial cells

One affected bee may contain 180 million spores.

Infection spreads through ingestion of fecal matter with contaminated food.



Hind gut is inflamed by protozoa

Symptoms

Bees start foraging at younger age.

Bees feel fatigued, are less able to fly and fall down during their return journey.

Abdomen is distended with fecal matter.

Body hairs are lost and bees become shiny.

Mid intestine is swollen and if dissected, shows dull greyish white contents.

Bees soil the hive entrance.

Management:

Provide fresh running water. Drain off stagnant water from the apiary.

Provide upward ventilation to reduce humidity.

Feed **fumagillin** in concentrated syrup. It inhibits DNA replication of the pathogen.

Disinfect the empty hives with **ethylene oxide or acetic acid fumigation** @ 120 ml / hive.

ACAROSIS (The Honey Bee Tracheal Mite)

CAUSAL AGENT- honey bee tracheal mite, *Acarapis woodi*, a small parasitic mite. It affects mostly the trachea and body fluid.

Nature of damage:-

It infects worker, drone and queen honey bees. mites live and reproduce in trachea.

They pierce the tracheal tube walls & feed on the hemolymph of the bees.

feeding on blood & depositing their faeces in the passage.

STAGE OF INFECTION:- adult

PLACE OF INFECTION: Trachea and body fluid

MANAGEMENT:-

Use of grease patties (typically made from 1 part vegetable shortenings mixed with 3-4 parts powdered sugar) placed on top bars of the hive. Menthol allowed to vaporize from crystal form or mixed into the grease patties.

Use of resistant hybrid bees known as Buckfast bee, developed by Brother Adam at the Buckfast Abbey.

Cotton soaked in Methyl salcilate and placed under the hive in flat perforated lid.

Destruction of affected colony.

Smoke fumigation with Chlorobenzilate

Time of Treatment: Spring and early summer

VARROASIS (The Varroa Mite)

CAUSAL AGENT: Asiatic varroa mite, *Varroa destructor.*

Symptoms:

Varroa reproduce on honey bee pupae and feed on bee hemolymph.

Varroa are also known to carry and vector bee viruses that are particularly damaging to the bees.

Varroa infestations can cause irreversible damage to honey bees that can lead to honey bee colony losses.

STAGE OF INFECTION: Larval

PLACE OF INFECTION: Body and body fluid i.e. haemolymph

MANAGEMENT:

Apivar: Apivar is effective against varroa mites, Apistan-resistant varroa mites, and Checkmite+ resistant varroa mites.

Using 65% formic acid

Mite Away Quick Strip (MAQS): MAQS is a 7-day, single application mite control product registered for use against varroa and tracheal mites.

Time of control: Spring and early summer

Amoeba Disease

cause

It is caused by ***Malpighamoeba mellifecae.***

This infection is caused by ingesting the cysts along with contaminated food.

Cysts germinate, amoeba migrate to malpighian tubes and feed on cell contents.

Cysts accumulate in the mid-gut / rectum.

Cysts are shed in the intestine and are excreted out with the fecal matter.

Peak infestation occurs during April-May.

Management:

Ensure proper hygienic conditions.

Scarp off the bottom board and disinfect it with 2% carbolic acid.

Disinfection of hives and equipments with acetic acid is also helpful.