Silkworm Diseases and Pests

SEC PAPER

SERICULTURE

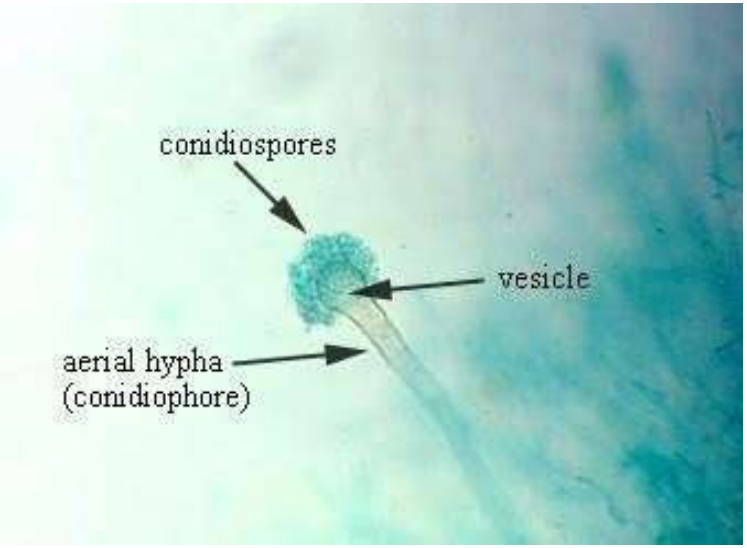
Protozoan disease- Pebrine

- In Hindi this disease isknown as 'kata'.
- **Causative agent and infection**:
- *Nosema bombycis nageli*
- Infection- Transovarion(through ovary) or orally(consumption of infected leaves)
- Also from diseased and dead larva.
- Microspores are oval and refractile.
- Spores hatch in digestive tract, reaches blood and affects all organs.

- **Symptoms**:
- Eggs loose adherence capacity, poor hatching , laid in clumps.
- Infected larva shows black spots like pepper.
- They show Sluggish, retarded growth and development.
- Pupa heavier and flimsy
- Moths with deformed body.
- **Control**:
- Use of disease free eggs and moths
- Sterilization of rearing house and equipments with 2% formalin.

Fungal disease - Muscardine

- **A) White Muscardine**
- **Causative agent and infection**
- *Beauveria bassiana*
- Highly contagious disease. Main source of infection is dead larva.
- Fungi shows 3 stages: conidium, vegetative mycelium & aerial mycelium
- Conidium - oval , germinate in 6-8 hrs, spread throughout body.



- **Symptoms:**
- In early infection larva looses appetite, becomes inactive.
- Moist specks appear on body.
- Body becomes limp loosing elasticity, they cannot move and die.
- After death body becomes hard and stiff.

- **B) Green muscardine**
- **Causative agent and infection**
- *Spicaria prasina*
- Infection occurs through skin by conidia.
- Conidia germinate in 15-20 hrs after infection.
- Conidia- oval/round , light green in colour.
- Germ tube penetrates the body.

- **Symptoms:**
- larva looses appetite, becomes inactive.
- specks appear on body, becomes large specks and appear dry & concave.
- After death worms start becoming stiff and hard.
- Within 2-3 days body covered with mycelia.
- After 10-15 days body bears fresh green conidia.

- **C)Yellow muscardine-**
- **Causative agent and infection**
- *Paecilomyces farinosa*
- Conidia are oval/ spherical shaped & appear yellow.
- **Symptoms**:
- Similar to other muscardine disease.
- Body covered with yellow mycelia

- **D) Aspergillosis/ Brown muscardine**
- Caused by genus *Aspergillus*
- Process of infection similar to other muscardine, but infection is localized.
- **Symptoms**:
- Serious disease of chawki worms
- Infected worms become lustrous and die.
- In late age worms body area not covered with mycelia rots easily .

- **Control**:
- Disinfection of rearing house and equipments with 2% formalin
- Rearing bed should be kept dry
- Destruction of infected worms.

Bacterial disease- A) Flacherie

- The term flacherie refers to flaccid condition(Body becomes soft & loose) of larva.
- it is syndrome associated with bacterial disease.
- The infection is mainly due to consumption of contaminated leaves.
- **Symptoms**:
- Larva becomes motionless and lethargic.
- Body becomes soft, they stop feeding.
- Larva fails to moult.

Fig. 3.37(a). Flacherie attacked larvae showing soft and loose skin

Fig. 3.37(b). Dead larva with black carcass after flacherie

B) Sotto disease

- **Causative agent and infection**
- *Bacillus thuringenesis*
- The bacteria produces toxin which kills the worms.
- Infection occurs orally or through wounds.
- Bacteria affects nervous system.
- **Symptoms**:
- Silkworms looses appetite, becomes sluggish.
- Body shrinks, shows paralysis and dies.

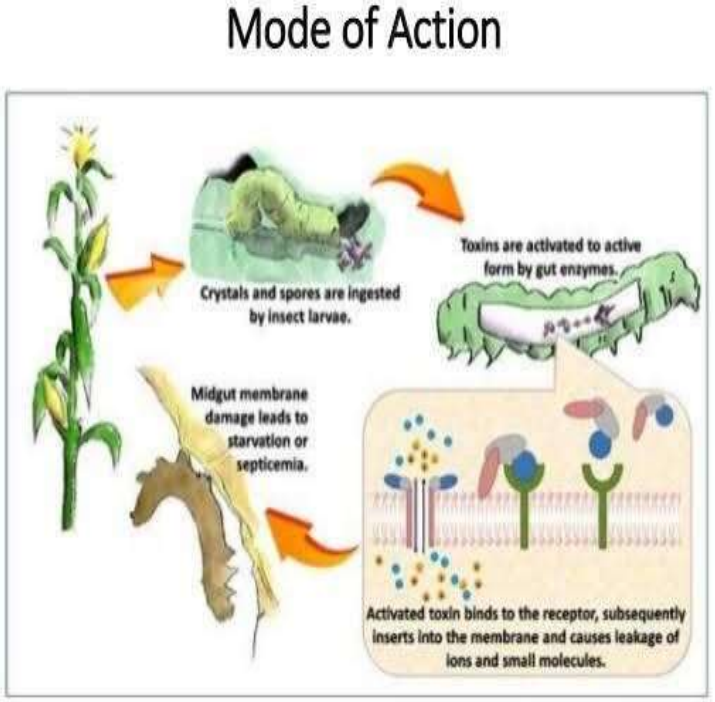


Fig. Showing the mode of action of crystals produced by *bacillus thuringiensis*

1. http://muou.sc.mahidol.ac.th/images/mechanism_bt.jpg

- Dead larva head appears hook shaped.
- Body becomes dark brown and organs areliquefied.
- Body starts rotting producing foul smell.
- **Control**:
- Prevention of swallowing of toxic substance
- Destruction of diseased larvae.

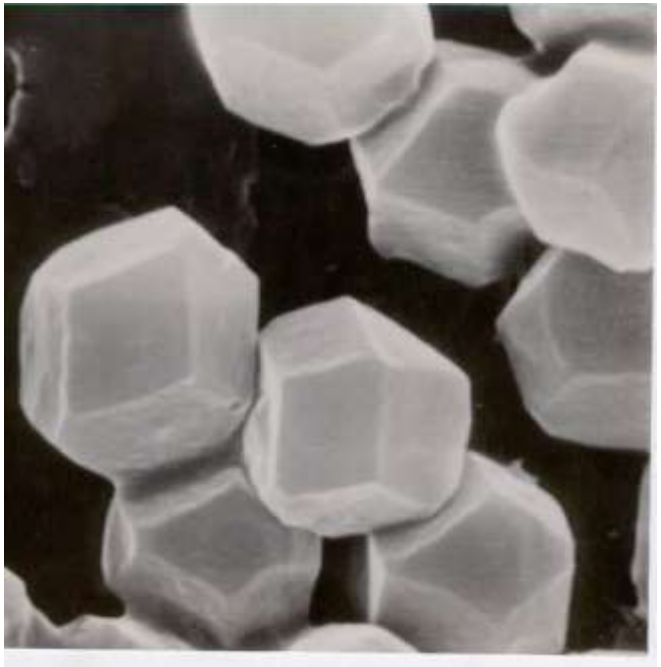
c) Septicaemia

- **Causative agent and infection**
- *Bacillus sp.*
- Caused due to multiplication of bacteria in haemolymph.
- Infection through wounds or injury in skin
- **Symptoms**
- Swollen thorax, vomiting, abdominal legs looses gripping.
- Body becomes soft and discolored, body wall ruptures producing foul smell.
- Worms appear black in color.
- Quick rotting of body of worms.

- **Control**:
- Avoid high temperature and humidity
- Care to avoid injury to worms , overcrowding etc.

Viral disease- A)Grasserie,Nuclear polyhedrosis virus disease

- **Causative agent and infection**:
  Borrelina bombycis
- Silkworm gets infected when it feed on contaminated mulberry leaves.
- The milky white fluid released by the grasserie larvae, contaminated silkworm rearing house and appliances are the sources of infection.
- After ingestion protein coat dissolves and viral rods are released.
- Rods attack midgut cells, releasing infectious subunits .
- These subunits enters nucleus of cells as well.



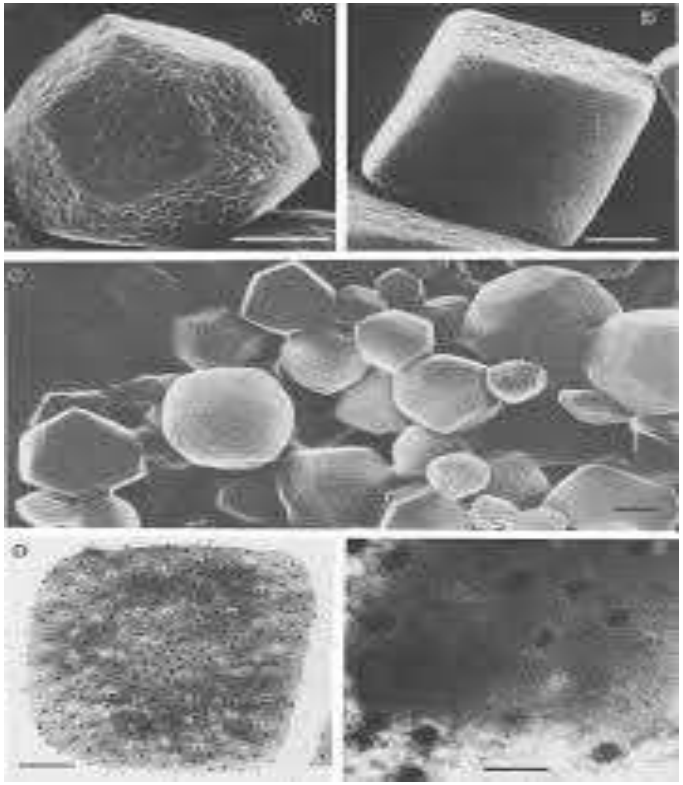
- **Symptoms** : Skin shows oily and shining appearance.
- Skin becomes thin and fragile. Inter- segmental regions are swollen
- Skin ruptures easily releasing body fluids containing polyhedra of viruses.
- Younger instars loose coordination, fails to moult and dies.

B)Infectious flacherie viral disease

- **Causative agent and infection-**
- Infectious flacherie virus type I or *Morator* virus
- The virus is globular in shape and measures 30-32nm in diameter
- Infection occurs orally.
- Virus infects goblet cells.
- **Symptoms**: transparent body, retarded growth
- Vomiting of gastric juice, diarrhoea.
- Spreads through contaminated leaves.

C) Cytoplasmic polyhedrosis

- **Causative agent and infection-**
- *Smithia* virus.
- Polyhedra found in cytoplasm of midgut cells
- Size is 0.5-1.5 micrometer . Appears hexagonal in shape.
- Infection through polyhedra contaminated mulberry leaf.



- **Symptoms**:
- Slow stunted growth, larval stage is prolonged.
- Midgut becomes opaque and pale yellow.
- Worms expells whitish excreta and spoils bed.
- Goblet cells ruptures releasing polyhedra into alimentary canal.
- It passes out with excreta, spreading the disease.

D) Kenchu disease

- **Causative agent and infection-**
- Kenchu virus
- Spherical / tetragonal virus of about 0.27nm in diameter.
- Single oral ingestion is sufficient .
- **Symptoms**: After 2-3 hrs. Worms appear pale and dull
- worms display vary large head.
- After death, body shows brownish patches
- Infected larvae produces flimsy cocoons.

Control :

- Rearing of silkworms under hygienic conditions
- Proper ventilation and spacing.
- Practicing personal and rearing hygiene.
- Collect the diseased larvae and ensuring its proper disposal.
- Maintaining optimum temperature and humidity in the rearing house.

Silkworm pests- Uzi fly

- The **uzi fly**, ***Exorista bombycis*** is a serious parasitoid of the silkworm, *Bombyx mori*, causing 10-15% damage to the silkworm cocoons.
- Adult is blackish grey, with four prominent longitudinal lines on thorax.
- The female uzi fly enters into rearing house, settles on silkworm body for egg laying.
- Female lays creamy white eggs, one at a time.

- She lays one or two eggs on each silkworm larva in intersegmental regions
- After 2-3 days, egg hatches into maggots . Maggots enters inside the larva by making small holes and feed on internal contents
- The fully grown maggot cuts the integument of Silkworm and comes out
- The maggot pupates in a dark corner or cracks & crevices and transformed into adult.
- Early instar infection - death of worms before spinning.
- Infection after middle of 5th instar, worms mature 2 days earlier producing poor quality cocoons.

- **Control Measues**
- Exclusion method: Provide wire mesh/nylon net on all windows/doors.
- Cracks and crevices should be sealed
- Place uzi traps inside the rearing house to trap uzi flies emerging inside.
- Biological control: Release *Nesolynx thymus* (a pupal parasitoid of the uzi fly) inside rearing house on 2nd day of V instar.

Dermestid beetles

- Some important species are- *Dermestes cadverinus, D. valpinus, D. vorax* etc.
- Adults - oval , elongated dark brown in colour.
- Larva - reddish brown covered with hairs.
- **Damage**: larva and adults attracted by smell of stifled cocoons and dried pupa
- They Bore into cocoons to eat dried pupa
- Damaged cocoons are unfit for reeling.
- Also damage pierced cocoons stored in grainages.

- **Control:**
- Rearing house and storage rooms should be cleaned periodically
- Storage of rejected cocoons should be avoided
- Wooden equipments dipped in 0.2% malathoin solution
- Fumigation with methyl bromide kills beetles.