

Any organism, which interferes with human welfare and leads a loss upto an economic threshold level, is termed as a pest. Especially related to silkworm crop, two important pests are found to cause economic loss. In the traditional silk producing states of the country, the silkworm in larval stage is attacked by a tachinid fly (*Exorista bombycis*), commonly known as Uzi fly, leading to considerable decline in cocoon yield. In cocoon stage (seed/ stifled/ moth pierced cocoons), the silkworms are attacked by dermestid beetles (*Dermestes* spp). These beetles are commonly referred to as carpet beetles. They are reported to cause considerable reduction in egg production in silkworm, egg production centres (grainages).

I. PESTS OF SERICULTURE

A. Uzi fly (*Exorista bombycis*)

1. Occurrence & Symptoms. The Uzi fly, *Exorista bombycis* belongs to order Diptera and family Tachinidae of Class Insecta. It is a serious endo-larval parasitoid of the silkworm, *Bombyx mori*, inflicting 10-20% damage to the silkworm cocoon crop in the premier silk producing states of Karnataka, Andhra Pradesh and Tamil Nadu. Uzi fly occurs throughout the year, but is severe during rainy season. In other parts of the country, it does not prevail throughout the year because of discontinuous rearing of silkworm and environmental extremities.

2. Symptoms of attack and extent of damage

- (i) The Uzi fly lays one or two cream coloured eggs (size of a pin head) on the silkworm larva. Generally, it prefers grown up larva (i.e., 4th or 5th instars) for egg laying.
- (ii) The eggs hatch in 48 to 62 hours. The presence of black scar formed at the point where the egg hatches and the uzi larva (maggot) enters the body of the silkworm.
- (iii) A black emergence hole of maggot at the tip of the cocoon are the typical symptoms of Uzi fly attack.

3. Characteristics of Uzi Fly

- (i) The adult Uzi fly is blackish grey in colour.
- (ii) It is bigger than the common housefly, *Musca domestica* and is more efficient in flight.
- (iii) It has four longitudinal black stripes on the dorsum of the thorax and three cross-wise stripes on the abdomen.
- (iv) Males are 11.9 mm to 12.00 mm and the female 10.20 mm to 10.40 mm in length. Width varies from 3.60 to 3.90 mm.

- (v) Wing span is about 10 mm and the wings are covered with dark grey hairs.
- (vi) Eyes are chocolate brown in colour.

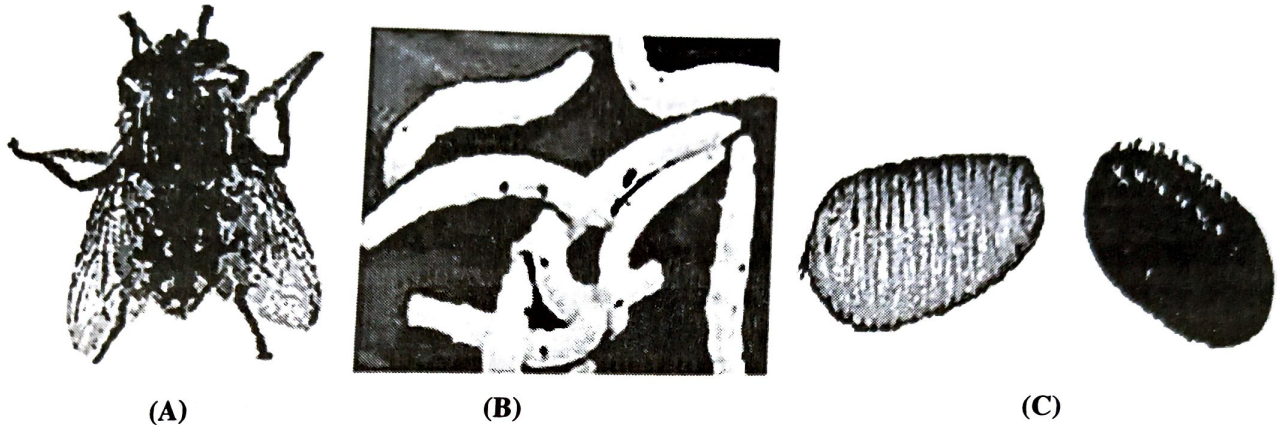


Fig. 1. (A) Adult Uzi fly, (B) Black scars on silkworm, (C) Pupae

- (vii) The lateral margins of the abdomen are covered with bristles, which are thicker and longer in males than in females.
- (viii) Males can be easily distinguished from the females by the presence of external genitalia (pinkish brown in colour) at the tip of the abdomen on the ventral side and well developed tips of the legs (tarsal pads).

4. Life Cycle of Uzi Fly

- (i) A female lays 500-600 eggs during her lifetime (18-22 days), each day laying about 20-30 eggs.
- (ii) Eggs hatch in 48-60 hours.

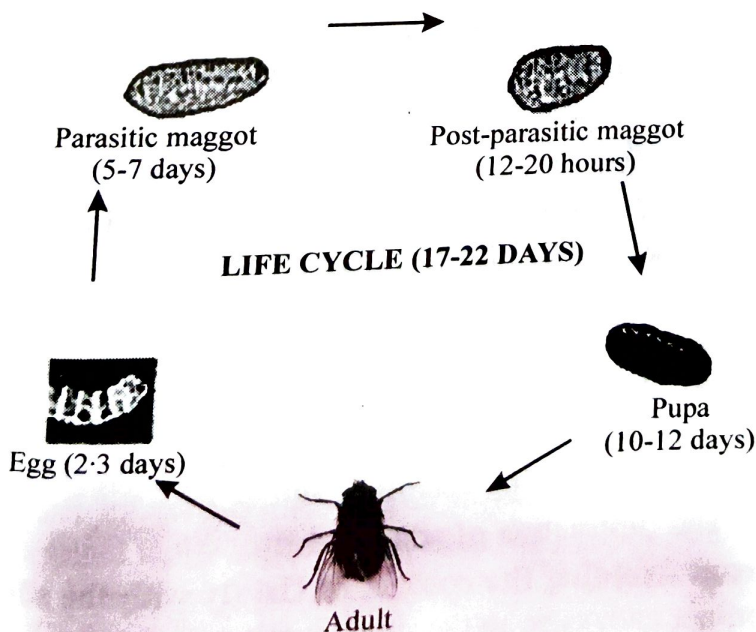


Fig. 2. Life cycle of Uzi fly

- (iii) The maggot after hatching from the egg immediately pierces into silkworm body using the pro-thoracic hook attached to the mouth. The place of entry of maggot into silkworm body develops a black scar.
- (iv) The maggot feeds on the silkworm tissues for 5-7 days, and during this time it moults twice.
- (v) The maggot comes out of silkworm body by creating an opening on the body (integument) and spends 12-20 hours-time as post-feeding (post-parasitic) maggot and becomes pupa in dark places like cracks, crevices, corners of the rearing house, loose soil, etc.
- (vi) Adult Uzi fly emerges from the pupa after 10 to 12 days.
- (vii) Life cycle is completed in 17-22 days.
- (viii) Adult fly survives for 10-18 days (males) and 18-22 days (females).
- (ix) Adult fly feeds on pollen, rotten fruits, nectar, etc.

5. Factors responsible for outbreak of Uzifly

- (i) Large scale and overlapping rearing of host (silkworm).
- (ii) Favourable climatic conditions (temperature range of 20-30°C and relative humidity of 60-90%) facilitates continuous host/silkworm rearing which in turn helps the host availability.
- (iii) Increased adult (Uzi fly) longevity.
- (iv) Higher egg production and egg hatchability.
- (v) Reduced activity of the natural enemies like parasitoids, predators and pathogens in nature.

6. Uzi fly management

Various management methods have been evolved for the suppression of the Uzi fly incidence. These are classified as cultural/ mechanical, exclusion, physical, chemical, biological and legislative/quarantine methods

(a) Cultural/Mechanical

- (i) Silkworm rearing in a village should be conducted at a time by all farmers.
- (ii) A minimum gap of 20 days should be maintained between the two silkworm rearings.
- (iii) The cracks and crevices on the rearing house floor must be kept closed.
- (iv) Collection and destruction of uzi infested silkworm larvae.
- (v) Collection and destruction of uzi maggots and pupae from rearing in house, grainage, cocoon market and reeling establishment.
- (vi) Collection and destruction of adult Uzi fly.

(b) Exclusion means avoiding the contact of Uzi fly with the silkworm.

- (i) Use nylon net enclosure to the rearing stand.
- (ii) Fix wire mesh to windows and doors.
- (iii) Provide a small ante-room at the entrance of rearing house. Cover the individual rearing tray with nylon net.

(c) Physical

Keep uzi-trap solution in white trays near doors and windows (3 ft above ground level) both inside and outside the rearing house to trap adult Uzi fly.

(d) Chemical

- Spray/dust the ovicides like uzicide/uzipowder to kill the uzi eggs laid on silkworm body.
- Spray 2% bleaching powder solution on the body of silkworm larvae to detach/kill the uzi egg.

(e) Biological control

- Release *Nesolynx thymus* (a pupal parasitoid of the Uzi fly) inside rearing house on 2nd day of V instar (50 ml \times 2 packets/100 dfls) of silkworm rearing.
- After mounting of all spinning worms, transfer the same pouches near the chandrikes.
- After harvesting of cocoons, keep the same pouches near the manure pit.
- Two pouches are required for 100 dfls.

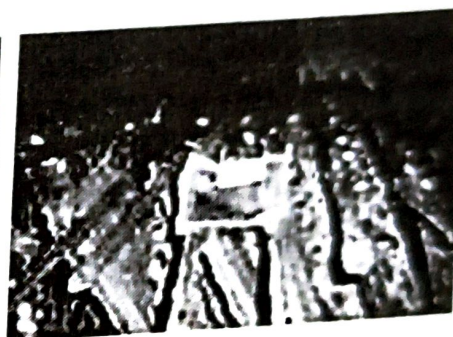
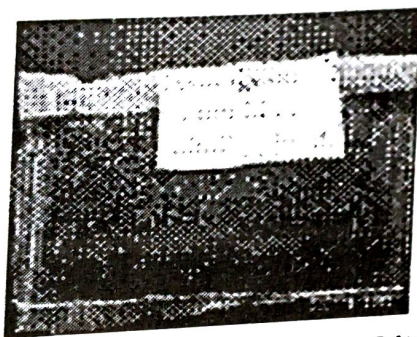
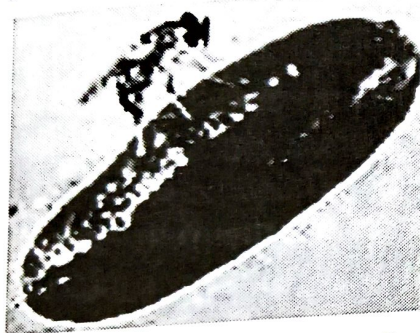


Fig 3. *Nesolynx thymus* on pupa of the Uzi fly and its pouches in rearing house

Proper disposal of silkworm litter after cocoon harvest

- Separate the silkworm litter from mulberry twigs.
- Do not throw silkworm litter in open space/litter pit, as it contains hundreds of Uzi fly pupae. Instead, pack it in plastic bags and keep for 15 to 20 days to prevent the emergence of Uzi fly from litter. Alternatively, it can be buried in soil or burnt immediately.

Availability of *Nesolynx thymus*

Available at Pest Management Lab., CSRTI, Mysore. Place indents on the day of brushing, indicating the number of pouches required and brushing date of silkworms. Supply is made by courier on receipt of advance

(f) Legislative/ Quarantine

Avoid transportation of uzi infested cocoons from an infested area to a new area. The above management methods when applied individually do not keep the pest incidence below the economic injury level (5%). Hence, an Integrated Pest Management (IPM) package is developed for the suppression of the pest by selecting a few effective management strategies listed above. The IPM package for the control of Uzi fly comprises mechanical (use of nylon net enclosure), physical (use of an adult trap – uzi-trap), chemical (spraying of uzicide or bleaching powder solution/dusting of uzi powder) and biological (release of an ecto-pupal parasitoid, *N. thymus*) methods.

B. Dermestes Beetle (*Dermestes ater*)



Fig 4. Dermestes beetles

Damage to silk moths

Damage to cocoons

1. Occurrence & Symptoms- Dermestes beetles, *Dermestes ater* are known to attack pierced cocoons in cocoon storage rooms. It belongs to the order Coleoptera and family Dermestidae. It is found throughout the country and is present all over the year. But it is a minor pest. The female beetles lay about 150-250 eggs in the floss of cocoons. The beetles migrate from cocoon storage room to grainage and attack green cocoons as well as moths also. Generally, they attack the abdominal region of the moth. The damage is estimated to be 16.62% on cocoons and 3.57% on moths.

2. Identification of pest

- (i) Adults of *D. ater* are black in colour, elongate oval in shape and about 7 mm in body length.
- (ii) Grubs (larvae) are also black in colour and are covered with bristles ('hairs').

3. Life cycle

- (i) The female lays 150-250 eggs in the floss of the cocoons.
- (ii) Egg hatching duration: 3-6 days
- (iii) Larval (grub) duration (5-7 instars): 28-40 days
- (iv) Pupal duration: 7-8 days
- (v) Total life cycle: 38-54 days

4. Period of Occurrence. The pest prevails throughout the year.

5. Symptoms of pest attack and extent of damage

- (i) The grubs cause more damage than adults.
- (ii) The infested cocoons (especially seed and stifled cocoons) show the presence of multiple irregular holes on them.
- (iii) Though they show preference for feeding on the left over/dead matter in the cocoons, they do attack the green cocoons as well as the egg laying moths whenever their population gets increased.
- (iv) The estimated damage level due to the beetle attack to the pupae is 16.62% and moth 3.57% with 20.19% reduction in egg production in grainages, especially those coming under government sector.

6. Factors responsible for pest outbreak

Storage of large quantities of moth pierced as well as stifled cocoons over a long period of time (more than 6 months).

7. Dermestes Beetle Management

(a) Preventive measures

- (i) Storage of rejected cocoons and perished eggs for long period should be avoided.
- (ii) Rearing house and cocoon storage rooms should be cleaned periodically.
- (iii) Grainage premises should be cleaned before and after moth emergence.
- (iv) Provide wire mesh to door & windows in pierced cocoon (PC) storage rooms.
- (v) Wooden articles of storage room & grainage should be dipped in 0.2% malathion solution for 2-3 minutes. Trays etc., should be thoroughly washed and sun dried for 2-3 days before reusing.

(b) Control measures

1. **Mechanical.** Collect the grubs and adults either by sweeping or by using a vacuum cleaner and destroy them by burning or dipping in soap solution.

2. **Physical.** Exposure of beetle infested (grubs and adults) pierced/stifled cocoons packed in HDPE (black) bags to sunlight for a period of 6 hours.

3. **Chemical.** Wooden articles of the cocoon storage room and grainage should be dipped in 0.2% malathion solution for 2-3 minutes. After 10 days, the trays should be thoroughly washed in water and sun dried for 2-3 days before reusing.

- (i) Store pierced cocoons in Deltamethrin treated bags (bags soaked in 0.028% Deltamethrin solution and dried in shade).
- (ii) Spray 0.028% Deltamethrin solution on walls and floor of PC storage room once in 3 months.
- (iii) Sprinkle commercial grade bleaching powder @ 200 gm/m² in the PC storage room (close to wall) to prevent migration of grubs from PC storage room.

(c) **Vertebrates.** Some vertebrate animals like, rats, squirrels, birds may enter the rearing room to feed the larvae or pupae. Their entry may be prevented by putting wire mesh on the windows and holes of rearing rooms.

(d) **Hime Uzi fly (*Ctenophrocero*).** Order Diptera. It is more common in April-May to beginning of winter. It is most common in Himalayan belt or may be in eastern or western Himalaya.

(e) **Straw mite (*Pediculoides*).** Order Arachnida. It found in September-October and is minor pest of silk moth throughout the country.

II. PATHOGENS

Silkworm suffers from several diseases. The silk cocoon crop failure or low harvest is due to the diseases in silkworm. Silkworm diseases are caused by germs and are highly infectious.

The development of diseases in silkworm is influenced by environmental and nutritional factors such as temperature, humidity and mulberry leaf content.

The common diseases in silkworm are Grasserie, Flacherie and Muscardine. There is also an uncommon but dangerous disease, Pebrine. The incidence of diseases not only damages the crop but also causes financial loss to the farmers. The proverb "Prevention is better than cure" is applicable for disease and pest attack of silkworm also. The occurrence of disease also destroys the rearing environment. In case correct steps of disinfection are not taken, the disease may prevail in the rearing appliances or rearing house.

Various diseases caused by Microbes

Name of disease	Infecting agent	Symptoms of disease	Controlling methods
Pebrine	Protozoan	Death of under nourished larvae and less silk production	Treatment of eggs in water (47°C) or rejection of infected and defective eggs
Flacherie	Bacterial	Softening of skin and physical disability	Careful rearing in healthy conditions
Grassarie	Viral	Moulting is affected, skin becomes yellow and blood becomes milky, putrefication of internal organs and death of larvae	General cleanliness, separation of affected worms and immediate disposal
Muscardine	Fungal	Worms body becomes hard	Maintenance of stock which are resistant to the disease and by using disinfectants.

A. Grasserie Disease

Nuclear polyhedrosis is commonly known as 'Grasserie or Milky disease'. It is a major viral disease in silkworm.

1. **Causative agent.** *Bombyx mori* Nuclear Polyhedrosis Virus (BmNPV).

2. **Occurrence.** The disease prevails all through the year, but its severity is more during summer and rainy seasons. Among the different diseases in silkworm, this disease prevalence ranges from 33-55%.

3. Source of Infection

- The milky white fluid released by the grasserie larvae, contaminated silkworm rearing house and appliances are the sources of infection.
- Silkworm gets infected when it feed on contaminated mulberry leaves.
- Alternate host insects for BmNPV.

4. **Route of Infection.** The mode of infection is *per os* (through mouth). The silkworm gets infected when it feeds on mulberry leaf contaminated with BmNPV.

5. **Predisposing factors.** High temperature, low humidity and poor quality mulberry leaves.

6. Symptoms

- (i) It is endemic disease and larvae crawl aimlessly.
- (ii) The skin of infected larvae becomes oily or shining before moult and fails to moult.
- (iii) At the early stage of infection, the infected silkworm appears normal, but during the later stage of infection, the diseased larvae will have characteristic "swollen inter-segmental" region.
- (iv) The integument will be fragile and breaks easily oozing turbid milky fluid.
- (v) The microscopic examination of milky fluid indicates the presence of millions of polyhedral occlusion bodies.

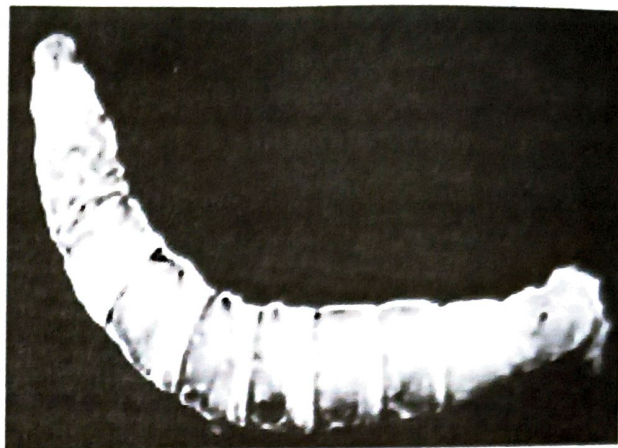


Fig. 5. Infected silkworm

7. Management

- (i) Practice personal hygiene and disinfection in silkworm rearing.
- (ii) Collect the diseased larvae and ensure its proper disposal.
- (iii) A spray of 0.3% slaked lime solution in addition to usual disinfection of rearing house and appliances is recommended in case of high incidence of disease.
- (iv) Apply bed disinfectant Vijetha/Reshamkeet Oushadh/Resham Sanjeevini/Resham Jyothi after every moult before resumption and on 4th day of V instar. Dust slaked lime on silkworm settled for moult.
- (v) Avoid low (10 - 20°C) and high (28 - 35°C) temperature and humidity (below 70 %) as well as drastic changes in temperature and humidity during the rearing.
- (vi) Feed quality mulberry leaf and avoid overcrowding.
- (vii) Feed Amruth as per schedule to control grasserie disease.

(B) Flacherie Disease

Flacherie is a flaccid disease common in silkworm. It is a syndrome caused by either viruses, bacteria or by an association of both.

1. Causative Agent. The disease is caused by *Bombyx mori* infectious flacherie virus (Infectious Flacherie) and *Bombyx mori* denonucleosis virus (Denonucleosis) and in association with bacteria or bacteria alone such as *Streptococci*/*Staphylococci*/*Bacillus* sp./ *Serratia* bacteria.

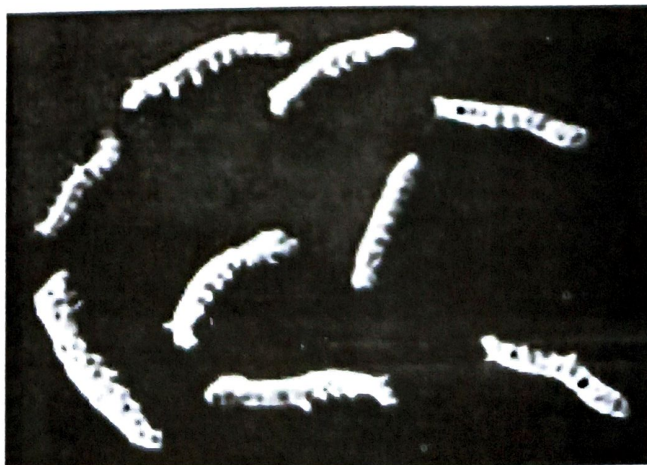


Fig. 6. Diseased larvae

2. Occurrence. The disease is common during summer and rainy seasons.

3. Source Infection. Silkworm gets infected by eating contaminated mulberry leaf. Dead diseased silkworm, its faecal matter, gut juice, body fluid are the sources of pathogen contamination. The infection can also take place through injuries/cuts/wounds.

4. Predisposing factors. Fluctuation in temperature, high humidity and poor quality of leaves.

5. Symptoms

- (i) This disease is generally characterised by indigestion and insect emits foul smelling green fluid.
- (ii) **At the early stage of infection.** Symptoms are atypical at the early stage of infection. Larvae appear lethargic and lose appetite.
- (iii) **At the later stage of infection-** Flacherie disease caused by virus results larvae with retarded growth, dull, soft and flaccid. The cephalothoracic region appears translucent. The larvae vomit gut juice and develop dysentery.
- (iv) In case of flacherie caused by bacteria, the larvae become stunted in growth and develop flaccidity. The larvae on death putrefy, develop different colour and emit foul smell.
- (v) Sometimes, larvae show symptoms of toxicity – diseased larva appear to lift its head up, develop spasm and tremor, vomits gut juice, paralyses, collapses and dies. Cephalic region bends to hook shape, rots and smells foul due to feeding of contaminated mulberry with pathogenic *Bacillus thuringiensis* var.

6. Management of Disease

- (i) Cleaning in the rearing room, tender leaves to the larvae and proper disinfection of apparatus and surroundings.
- (ii) Practice disinfection of silkworm rearing house, appliances and silkworm egg surface.
- (iii) Spray of 0.3% slaked lime solution in addition to usual disinfection procedure in case of high incidence of the disease.
- (iv) Feed good quality of mulberry, provide requisite spacing and ventilation.
- (v) Do not feed wet mulberry. Avoid overcrowded rearing and accumulation of silkworm waste in the rearing bed. Maintain optimum temperature and humidity.
- (vi) Practise hygienic measures during silkworm rearing. Ensure the measures for destruction of diseased silkworm.
- (vii) Apply bed disinfectant Vijetha/Resham Sanjeevini after every moult and on 4th day of V instar.

C. Muscardine Disease

Muscardine is a disease caused by fungus in silkworm. White muscardine is the common fungal disease in India.

- 1. Causative Agent.** White muscardine is caused by a fungus *Beauveria bassiana*.
- 2. Seasonal Occurrence.** The disease prevails during winter and rainy season in all

sericultural areas. Among the diseases, muscardine accounts for 19%. The disease is also common among in many agricultural pests.

3. Symptoms. White spots appear on the skin. Larvae become inactive and lose elasticity. Disease is common during the rainy season. Worms become soft and die. Under microscope we can see the fungal threads.

4. Precautions. Diseased worm should be burnt, proper cleanness and rearing in the grainage (where the eggs are stored).

5. Source of Infection. The infection starts when conidia come in contact with silkworm body. Mummified silkworms/alternate hosts (most are lepidopteron pests), contaminated rearing house and appliances are sources of infection.

6. Route of infection.

The mode of infection is per cutaneous (through skin). The infectious conidia grow and penetrate through the integument and establish infection in silkworm.

7. Predisposing factors. Low temperature with high humidity and overcrowded rearing.

8. Symptoms.

The pathogen infects all stages of silkworm and symptoms are observed in all stages.

(i) **Egg stage.** Infected eggs are paler and conidia may be observed on the egg surface. The fungal mycelium may also be observed inside and outside the infected egg. Infected eggs do not hatch.

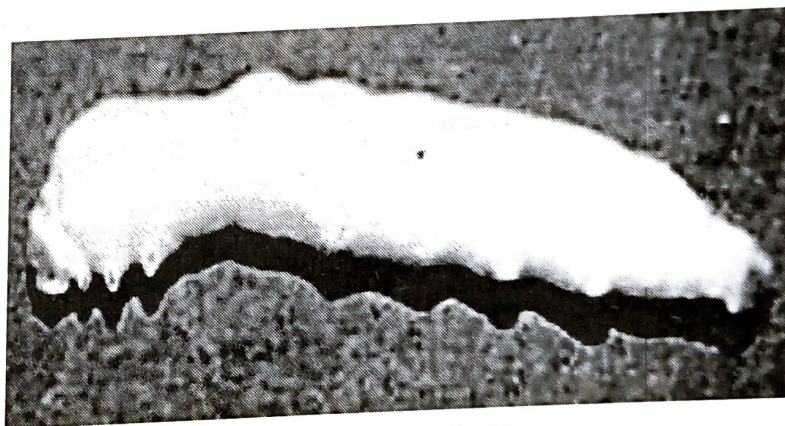


Fig. 7. Mummified larva

(ii) **Larval stage.** The larvae lose appetite, inactive and on death become flaccid. Vomiting and diarrhoea may also be observed. The larval body becomes less elastic and oil stain like or black marks without clear border may be seen on the body surface. Dead larvae gradually become harder and finally hard and mummifies. The fungus overgrow the larvae, develops fruiting body and produces conidia on the surface, giving white colour to the mummified diseased silkworm.

(iii) **Pupal stage.** The pupa may have black spots and the mummified pupa is hard, lighter and white. The fungus is seen coming out through inter-segmental region.

(iv) **Moth stage.** Infected moths are sluggish with deformed wings. The dead moth becomes hard, light, mummified and white.

7. Management

(i) Disinfect the rearing house, its surroundings and equipments with recommended disinfectant as mentioned above.

(ii) Control mulberry pests in the mulberry garden.

- (iii) Pick up diseased larvae before mummification and dispose them by burning.
- (iv) Avoid low temperature and high humidity in the rearing house. If required, use heater/stove to raise the temperature.
- (v) Regulate bed humidity during rainy season by dusting slaked lime powder during moult.
- (vi) Apply bed disinfectant, Vijetha and Vijetha supplement/Ankush/any recommended bed disinfectant as per schedule and quantity.
- (vii) Alternatively, apply Reshamkeet Oushadh/Resham Sanjeevini/Resham Jyothi/Labex after every moult and on 4th day of V instar.

D. Pebrine Disease

Pebrine is a chronic disease in silkworm by protozoan.

1. **Causative agent.** A microsporidian, *Nosema bombycis* and strains of *Nosema* sp.
2. **Occurrence.** The disease is known to occur at any time of the year and is not restricted to any season.
3. **Source of infection**
 - (i) Silkworm gets infected through eggs (transovarian/transovum transmission) or by eating contaminated mulberry leaf.
 - (ii) Infected silkworms, faecal matter, contaminated rearing house and appliances are the sources of infection.
 - (iii) Mulberry and agricultural pests and wild insects as alternate hosts for the pathogen.
4. **Route of infection.** Parasite is very small and found in the body fluid and generally transmitted through eggs of the pebrinised mother.
5. **Factors responsible for disease incidence.** Environmental conditions and nutritional status of mulberry do not cause disease incidence.
6. **Symptoms**

The symptoms of infection could be observed in all stages of silkworm.

- (i) **Egg stage-** The eggs laid by moth are fewer and do not firmly attach to the egg sheet. The hatching of eggs is irregular and fewer, but the number of dead and unfertilized eggs is higher.
- (ii) **Larval stage-** The diseased larvae are comparatively paler, translucent and delays to moult. They have poor appetite, retarded growth, undersized and flaccid. The silk gland will have white pustules on its surface. The dead larvae remain rubbery for sometimes and then turn black.

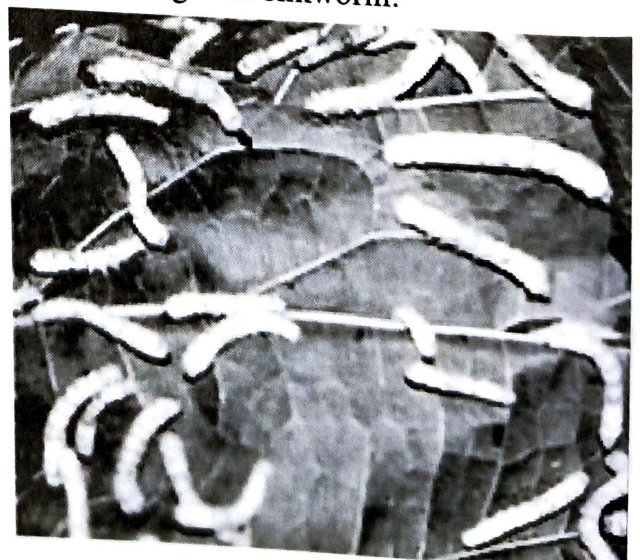


Fig. 8. Pebrine disease

- (iii) **Pupal stage-** The diseased pupa may develop black markings on the surface.
- (iv) **Moth stage-** The moth appears malformed. The wings are stunted and crippled.

7. Management of disease

- (i) Practice disinfection at silkworm seed production centre, silkworm rearing house, surroundings, appliances and silkworm egg surface.
- (ii) Disinfect the rearing house, surroundings and with recommended disinfectant as mentioned above.
- (iii) Conduct strict mother moth examination and surface disinfection of silkworm eggs to produce and rear disease free layings.
- (iv) Follow strict hygiene maintenance during rearing.
- (v) Control mulberry pests in and around the mulberry garden.
- (vi) Apply recommended bed disinfectant, Vijetha/Ankush as per schedule and quantity.
- (vii) Monitor seed crops constantly to eliminate the microspodian infection.
- (viii) Disinfection of rearing house, its surroundings and appliances.
- (ix) Control alternate insect host for *Nosema bombycis* in and around mulberry garden.

E. Septicemia

1. **Causative agent-** It is caused by bacteria *Streptococcus*.
2. **Symptoms-** Silk worm shows sluggish movement, decreased appetite, straightening of the body and swollen thorax.
3. **Precautions-** The proper feeding of worms and hygienic conditions in the rearing room. It is common in summer and rainy season.

III. DISEASE MANAGEMENT IN SERICULTURE

A. Disinfection and Maintenance of Hygiene

1. **Disinfection-** It is the important integral activity in silkworm rearing to prevent the diseases. Diseased silkworms extrude pathogens into the rearing environment and form the source of infection and spread of the diseases. These pathogens are highly stable and persist for longer period in silkworm rearing environment. Destruction of disease causing pathogens is called disinfection. It can be attained by various methods, but, the most effective method is chemical method using chemicals as disinfectants. Disinfection of rearing house, rearing appliances and the silkworm rearing bed and body surface and the practice of hygiene are the most essential activities for successful harvest cocoon crop.

2. Hygiene practices during Rearing

Disinfection of rearing house, its surrounding and appliances aims at destruction of primary and secondary sources of infection before the initiation of silkworm rearing. However, pathogens can gain entry into rearing house through the rearer, through drift and from diseased silkworms. The disease may spread by unhygienic handling of silkworms and bed refuse. Hygienic measures are meant for prevention of these secondary sources gaining entry into the rearing house and also disinfection of them during rearing. Hygienic measures in sericulture could be divided into

personal and rearing hygiene. Following measures are advised to adopt during rearing for maintenance of hygiene :

- (i) **Personal Hygiene-** Wash hands and feet with disinfectant at the time of entry into rearing house and as well as after feeding. Also, wash hands with disinfectant after picking diseased larvae and after bed cleaning.
- (ii) **Rearing Hygiene-** Carefully collect diseased worms from the rearing bed in a basin having disinfectant and destroy them by burning or burying. Collect silkworm bed refuse into litter basket/vinyl sheet meant for it. Never allow the bed refuse to fall on the floor of rearing house during bed cleaning.
- (iii) **Silkworm body and rearing seat disinfection-** Disinfect silkworm body and rearing seat by dusting Vijetha before resumption of feeding after every moult and on the 4th day of final instar @ 3g/sq.ft. (2nd and 3rd instar) and 5g/sq.ft. (4th and final instar). During winter and rainy seasons, if the prevalence of muscardine disease is more, dust Vijetha supplement on 3rd day of IV instar, 2nd day and 6th day of V instar in addition to the Vijetha dusting.

B. Prevention and Control of Silkworm Diseases

1. No control measure for the disease has yet been evolved. The elimination of diseased eggs during grainage by microscopic examination and diseased larvae during rearing is the only preventive measures against the disease. Preventive measures can be taken in case of indoor operations of the cultural process, but in outdoor rearing of muga worm, the infection may come from extraneous sources.
2. Follow the scientific inspection method of individual mother moth testing for detection of pebrine in egg production. Practice disinfection of grainage appliances before and after every grainage operation with 2% formalin.
3. Ensure use of microscopically tested disease free disinfected eggs only.
4. Practice surface sterilisation of the eggs with 2% formalin for 5 minutes.
5. Maintain hygienic conditions in egg production room and rearing sites.
6. For basic stock maintenance, follow cellular method of rearing.
7. Practice disinfection of rearing appliances before use.
8. During rearing, test the faecal matters, unequal/ lethargic/ unsettled/ irregular moulters periodically. If pebrine spores are detected, reject the entire infected crop.
9. Ensure the measures for destruction of diseased silkworm larvae/cocoons/moths/eggs.

QUESTION BANK

I. FILL IN THE BLANKS

1. The Uzi fly, *Exorista bombycis* belongs to order
2. Scientific name of Dermestes beetles is
3. commonly known as 'Grasserie or Milky disease.
4. Swollen inter-segmental region of silkworm is the characteristics of disease.

5. disease is caused by a fungus *Beauveria bassiana*.
6. Pebrine is a chronic disease in silkworm by protozoan
7. disease of mulberry plant is caused by a nematode.

Answers

1. Diptera 2. *Dermestes ater* 3. Nuclear polyhedrosis 4. Grasserie Disease 5. White muscardine 6. *Nosema bombysis* 7. Root knot

II.(v) TICK THE CORRECT ANSWER

1. Which of the following disease is caused by *Nosema bombysis*
 - (a) Pebrine disease
 - (b) Grasserie disease
 - (c) Muscardine disease
 - (d) Flacherie disease
2. *Nesolynx thymus* is used to control which of the following disease
 - (a) Grasserie
 - (b) Uzi fly
 - (c) Pebrine
 - (d) Flacherie
3. Most common and worst disease of silkworm is :
 - (a) Grasserie
 - (b) Flacherie
 - (c) Muscardine
 - (d) Pebrine

Answers

1. (a) 2. (b) 3. (d)

II. LONG ANSWER TYPE QUESTIONS

1. Give an account of Uzi fly pest of sericulture.
2. Describe the disease caused by *Nosema bombysis* in silkworm.
3. Explain various methods of sericulture pests and disease management.
4. Write short notes of the followings in respect of silkworm:
 - (a) Prevention and control of Diseases
 - (b) Flacherie Disease
 - (c) *Nesolynx thymus*
