



A case study on Pests of Eri (*Philosamia ricini*) and Mulberry (*Bombyx mori*) Silk Worms in Sericulture farm, Sille, Arunachal-Pradesh, India

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Abstract

A project work on study on various pest of eri and mulberry silk worm has been carried out during January 2019 to May 2019. The report reveals that rearing of silkworms is important to study the pest of silkworm. Pest is an organism who harm the economically productivity of other organism. Silkworms are larvae of silk moths that produce silk threads. Pests of silkworms are parasitoid organisms. Pest's management is important to productivity of silk threads crops.

Keywords: silkworms, rearing, pests, life cycles, managements

Introduction

Silk is a finest natural and earliest discovered fibres by human amongst wool, linen and cotton. It is continues protein filaments secreted by specific types of caterpillars commonly known as silkworms. These types of silkworms, which can be cultivated indoor, produce about 90 percent of the world's commercially silkworms, used mulberry raw silk. The other types of silk obtained from wild silk worms are Tassar, Eri, and Muga. Silk has several natural properties that make it distinct from all other fibres both natural and man-made (Meth T and Gogoi H, 2016) [4].

Various types of silk are produced today for a diverse range of application like fashions apparel, furnishing and upholstery, carpets and rugs. Silk is also blended with others fibres to manufactures fabrics. Another important use of silk is in the sewing, knitting and embroidery sectors among other. The origin of silk is shrouded in mystery. Legend has it that the fibres was discovered in china by accidents that design by the Chinese Queen His-Ling-Shih, wife of the emperor Huang-Ti, in 2500 BC. The Queen Ling-Shih accidentally dropped some pierced cocoons into a hot water bathe and a shimmering mass of fibers emerged. The Chinese zealously guarded this discovery for many years and traded silks with spices along the famous "Silk Route". (Reddy, 2000; Debaraj *et al.*, 2002) [10, 3].

Today China and India are two largest producers of silk together accounting for about 110,350 MT output. Continuous technological advancement across the value chain has made it possible to mass-produces a wide variety of silk fabrics for consumptions in leading markets like the US, UK, Italy, French, Japan, Middle East and India amongst others. Silks continue to remain a hot favorite of most international fashion designers of repute.

India is the only country in the world to produce all the four known varieties of silk including Mulberry, Eri, Tassar, and Muga. (M.M. Hata, *et al.* 2005) [6]. The Mulberry is the largest practiced sericulture industry accounting for almost 90 percent of the entire silk production. Now sericulture is practiced in the tropical and temperate climates. India, major silk producing states-Karnataka, Tamil Nadu, Andhra Pradesh and West Bengal are in tropical zone, where silk worms are reared four to six times in a year, while Jammu

and Kashmir is in the temperature zone, where rearing is practiced in spring season only of recent, silkworms rearing on commercial lines is practiced in utter Pradesh, North-Eastern states, Maharashtra, Kerala, Rajasthan and Punjab substantially (R.R. Patil. *et al.*, 2009) [9].

The textile industry provides employments to more 5.8 millions peoples across 54,00 villages, who operates 258,000 handlooms and 29,340 power looms, producing 5 million squares meters of silk fabrics per annum (Census of India 2011). Its exports of silk are worth about USD 641 millions of which 70 percent compromises natural silk yarn and fabrics, 13 percents made-ups and 26 percent garments. Domestic demand stands at 26,000 MT Compared to production of 16,500 MT annually. (Govt. of A.P., 2015)

The North Eastern region of India for its diverse topography, offers a tremendous complex variety of habitat and ecosystem. The north eastern states of India have temperate climatic condition which is suitable for to growth of four type's silk worms. According to legend the two of silkworms (Eri and Muga) are discovered from state of Assam. (B. Gogoi, and B.C. Goswami, 1995) [7]. The states of Arunachal Pradesh have suitable to growth of four kind of silk worms like Eri, Muga, Mulberry, and Tassar. (D.N. Borthakur 1992) [1]

Methods and Methodology

Study Site

1. Sericulture Farm Sille.

This sericulture farm is located at Sille village, 21 KM from Pasighat town under the East Siang district, Arunachal Pradesh. The sericulture farm was established on 1977 and governing by directorate of textile and handcraft Govt. of Arunachal Pradesh.

2. Research Extension Centre (REC) Sille.

REC- Sille is located at just behind the sericulture farm Sille and it monitors by regional sericulture research station (RSRS) Jorhat, Assam in advice of central silk board (CSB). Methods:

REARING: Rearing of silkworms is only the method to fine out the pest of silk worms. The equipments require for rearing the silkworms are mention as follows:

1. Rearing House: It should be proper ventilation and

- disinfected or clean with lime powder solution before start the process.
- Food Plants: Food plants are primary require for rear of silk worms. A particular species of silk worms is require to particular species of food plants; for example the mulberry silk worm (*Bombyx mori*) required mulberry plants (*Morus ulba*, *Morus indica* etc.) only and in case of eri silk worms (*Philosamia ricini*) required specific species of food plants that is castor (*Recinus communis*), kesseru (*Heteropanax fragrans*) etc.
 - Rearing Stands: These are made up of wood use for placing the rearing trays containing silk worms.
 - Feeding Basin: These are using for transport the chopped leaves.
 - Rearing Trays: These are made up of plastic use for rear in larvae stage of silk worms.
 - Paraffin Paper: It to be covering the rearing tray for maintaining moisture.
 - Feathers: It is use for brushing together newly hatched worms.
 - Mountages: These are used for mounting last instars larvae for spinning the cocoon on them.

Result

Pest: Pest is an organism which detrimental the crops, livestock etc. The most of the pest are insects, some are plants and very few are fungi. Pests are cause the stunt growth of their hosts and damage the survival of hosts. Some common pests are ants, snail, slugs, caterpillars, spiders, mites, whiteflies, fungus, gnats, aphids etc.



Plate 1: Mulberry Silk Worm (4th Instar)



Plate 2: Eri silk worm (4th Instar)

The Various Pests of Silk Worms are

- Uzi fly (*Exorista bombycis*)**
 - It is belong to order Diptera.
 - The flies lay eggs on grown up larvae of silk worm and maggots grown up on larvae and mature on pupae stage of silk worms.

The ozi fly, is a serious endo larval parasitoid (pest) of the silk worms. This pest attack or incubate in larvae stage and

mature at pupae stage with completely damaging of silk moths. Ozi fly is black and grey stripes and dark ebony color.



Plate 3: Uzi fly (*Exorista bombycis*)

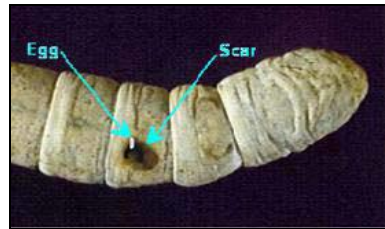


Plate 4: Uzi fly's egg laid on mulberry silkworms & formed black scar.

Occurrence

They are occurs in the throughout the year, most favorable season of these insects are pre monsoon and early monsoon season in India.

Symptoms and types of damages:

One or two cream colored eggs (of the size of a pin head) are laid by the uzi fly on the each of the silkworm larva. It prefers grown up larva (i.e. at 4th and 5th Instar) for egg laying.

The eggs of the uzi fly hatch in 48 to 62 hours. At the point where the egg hatches, a black is formed and the uzi larva (maggot) enters the silkworms using the hooks (prothoracic hook) attached to the mouth. The pest attack can be identified from black scar on surface of silkworms.

Life Cycle of Uzi Fly

The female fly lies around the 300-400 eggs on among the 200-300 host larvae. Incubation periods: 2-3 days and young maggot hatch in the body of silkworms. Maggot: 5-7 days they grown as maggot in the body of silkworm after that transformed into pre- pupae stage (20-24 hours). Pupa: The pupa stage is occurring in 10-12 days after that the life cycle is completed in 18-22 days.

Management:

Exclusion method

- The rearing house is provided with wire mesh/nylon net to all windows and doors.
- Doors should be provided with automatic closing mechanism.
- The silk worms should be reared under nylon net enclose.

Physical Method

- The ozi trap solution should be kept both inside and outside the rearing house near doors and windows at base.
- The uzi trap solution should be used in 3rd instar onwards up to spinning.

2. Dermestid beetles

- Dermestid beetles are attracted to smell of the cocoons. They eat the adults and grubs of *Dermestes cadaverinus* (Coleoptera) and cocoons, enclosed pupae and often the eggs of silk worms.
- Females lay eggs in the crevices, organic matter and wooden boards.

These are the group of coleopterous insects which mainly damage stored cocoons. Most of the damages is done by the larvae when cocoons are stifled and stored for a long time. The females lay about 150-250 eggs in the floss of the cocoons, the larvae bore through the cocoons and eat the pupae of silkworms.



Plate 5: Dermestid beetle (*Dermestes ater*)



Plate 6: Hole exited from Eri silk cocoons

Activities

These beetles attacked pierced cocoons in the cocoons storage rooms. These places are the breeding centres for the beetles in grainages. The beetle's forms pierced cocoon storage rooms migrates and damages the green cocoons and also inflict damages to the moths. The abdominal region of the moth is generally attacked by the beetles.

Life Cycle

Life cycle is completed in 40-50 days at room temperature. Hatching of eggs: 3-6 days. Larval period 4 weeks with 5-7 instars. Pupal periods: 8-10 days.

Managements

- As soon as the moth emergence is complete, the cocoon preservation trays should shifted to pierced cocoon storage rooms for further storage.
- To avoid the migration of the beetles to a new lot of cocoons, no transfer of pierced cocoons from one tray to another tray should be done in moth emergence room.
- Immediately after the grainages operation is over, pierced cocoons should be disposed.

3. Ants

- The ants are belonging from the order Hymenoptera.
- These are feed the silk worm mainly at larvae stages.
- Mainly red ants are special enemies of silk worms in

among the ants.

Managements

- The legs of the rearing stands should be dipped in ant wells (water+kerosene).
- Use of ash or kerosene at the handles of the mountages at the time of spinning.

4. Lizards, Birds, Rats and Squirrels

- These are the outdoor and indoor pests of silk worms at larvae stages.
- They feed on silk worms.

Managements

- The rearing rooms should be kept free from lizards.
- Setting of traps for rat and squirrels control.
- Scaring of birds from the vicinity.

Observations

The observation is imply that these pests in silkworms are done their parts in ecosystem and participating as important members in ecosystem but for human it has no meant for value instead damage their crops. In the field of sericulture, the proper management and control over growth of pest in sericulture is much important for good production of silkworm crops. Mainly proper caring should be taking in time of rearing. The rearer should be proper trained to control the pest over growth for well productions of crops. If labour or rearer were not proper trained then the rearing will be failed. So pests can be said to be enemies of farmers in the field of crops productivity.

Conclusion

The pests are key threat to farmers of any crops especially in sericulture the pests are very dangerous for the growth of silkworms. Therefore, proper training of rearer before rearing the silk worms is important key. With knowledge the proper management system of rearing equipments is very an important for to control the pest's growth in the fields. The cleaning of rearing house is mandatory for the control of pests.

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