

UZI FLY

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Pests and diseases are important factors affecting the cocoon production. Many kinds of pests and diseases of silkworm, along with appropriate measures to control them, have been identified. Besides being susceptible to different diseases, the silkworm, *Bombyx mori* L. is also attacked by a number of pests. Among the insect pests of silkworm, the most formidable (threatening, dangerous) one is a dipteran parasitoid, *Exorista bombycis* (= *Exorista sorbillans* = *Trycolyga bombycis* = *Exorista sorbillans*), otherwise called the Uzi fly, is a major pest of silkworm.

This parasitoid is a member of the family Tachinidae and order Diptera. The presence has been reported in India, China, Japan, Bangladesh, South Korea, Thailand and Viet Nam.

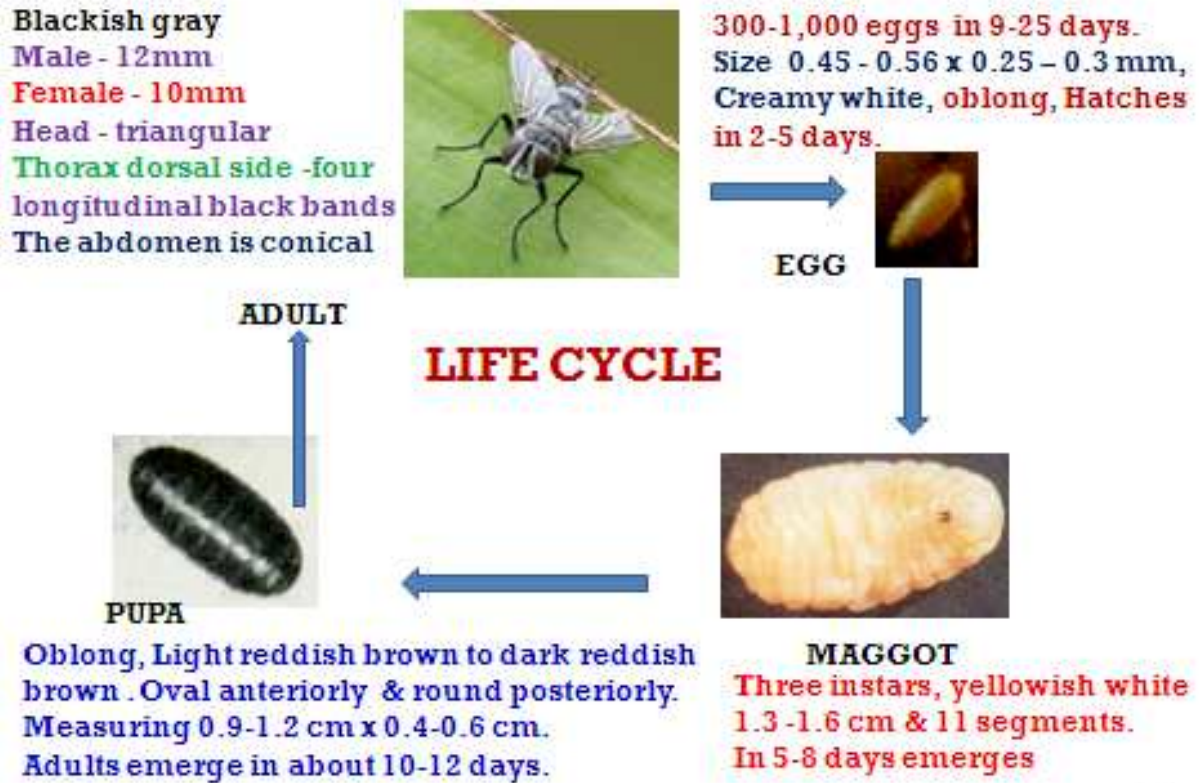
The incidence of this fly is very high in the topical Sericultural region, viz. Bangladesh, Southern part of China, India, Thailand and Viet Nam. The extent of damage ranges from 10-30 percent.

Life Cycle

Adults are blackish gray in colour. Male is longer in body length (about 12 mm) than female (about 10mm). The Head is triangular in shape. On the dorsal side of the thorax, there are four longitudinal black bands. The abdomen is conical. Of the abdominal segments, the first one is black and the rest grayish-yellow. Life span of adult flies varies with sex and season. Males survive for about 10-18 days. Females live 2-3 days longer than the males. Survival period is less during summer months.

Male can be distinguished from the female by the presence of external genitalia covered with brownish orange hairs on the ventral side of the abdominal tip. Lateral region of the abdomen are covered with bristles more dense in male than in female and in the latter restricted mostly to last two segments. The width of the frons (the forehead or equivalent part of an animal, especially the middle part of an insect's face between the eyes and above the clypeus) of the male fly is narrower than that of the female one. Longitudinal lines on the dorsum of the thorax of the male are more vivid than female. The pulvilli of male is larger than

female. (Pulvilli- a soft structure located at the base of each claw on the feet of certain insects).



Adults exhibit a definite courtship behavior. Males have no distinct orientation posture towards the females and they strike the resting and walking females. Mating strike by male is followed by agitated state of the female before the pair establishes the successful genital contact. Premating period is about 4-6 hours. The adults are polygamous. They mate 1-2 times and 3-7 times within 24 hours of the adult emergence and in the entire life respectively. Mating generally takes place during early morning or in the late evening. The duration of mating ranges between half an hour to two and half hours. A minimum of one hour mating is required for full fecundity and maximum hatchability. Mating is not a prerequisite for eggs deposition since virgin female also lays unfertilized eggs.

Oviposition in both the mated and unmated females start 44-45 h after their emergence, Female usually approaches the host larvae and after repeated survey settles down on the body of the host. At the time of releasing the eggs the female fly bends her abdomen touches the host integument. After releasing each of the

egg the female fly withdraws its posture, walks over the host body and similar steps are followed before releasing every successive egg. Under normal condition, 1-2 eggs are laid per host larvae. Flies oviposit practically anywhere on the body of the host larva. However, less number of eggs is laid on the ventral side of the body. This parasitoid prefers to lay eggs on later age host larvae which are also larger in size. The oviposition on young instars larvae depends on the age, distribution of host larval population and the relative area of the silk worm body.

A single mated female uzi fly lays about 300-1,000 eggs over a period of about 9-25 days depending upon the seasons. The fertilized eggs are laid throughout the life span of the female. Initially the number of eggs laid are few. Gradually, it increases to reach the peak between fourth and seventh day after adult eclosion. Subsequently, a gradual decline takes place with advancing age of the females. Eggs are macro type and creamy white in colour. The eggs measures 0.45-0.56 mm in length and 0.25-0.30 mm in width. They are oblong in shape and hatch in about 2-5 days after oviposition depending upon the climatic condition. Once hatched, the maggot penetrates into the body of the silkworm.

The young maggot hatches out of the eggs shell through the operculum which generally faces the silkworm body. The newly hatched maggot directly penetrates into the silkworm body. On penetration a sheath surrounding each maggot is formed by granulocytes and proliferating tissues at the site of the wound. The size of this sheath keeps the pace with the growth of the maggot, becoming thicker and black in colour, so as to discernible on the surface as black lesion or scare (Fig.2) sometimes bearing the attached egg shell. Maggots pass through three instars. In the first two instars. they develop just below the skin of the host body and in the final instar they leave this site and move into the body cavity. Maggots of first and second instars are yellowish- white in colour and measure 1.3- 1.6 cm in length. Maggots have eleven body segments. The mature maggots escape from the host body by piercing the integument by its prothoracic hooks in about 5-8 days depending upon season and number of maggots developing per host larva. They feed on various tissues of the silk worm body and the host larva dies by the time the maggots are mature to escape out from the host body

The escaped mature maggots which are negatively phototropic and positively geotropic, pupate in about 10-20 h depending upon the season. Pupation takes place in the darker area in and around the silkworm rearing house like corners, crevices, silk worm rearing beds, cracks of the rearing stands or trays, below the ant wells or in the superficial layer of the soil. Maggots just before pupation become motionless and the body shrinks. In certain areas where the temperature goes below 10 Degree Centigrade, this fly mostly passes the winter season in the pupal form. Pupae are oblong in shapes somewhat oval anteriorly and round posteriorly. They are light reddish brown to dark reddish brown in colour. Body segments are eleven in number and measuring 0.9-1.2 cm in length and 0.4-0.6 cm in lateral width. Adults emerge in about 10-12 days. The male adults always emerge out earlier than females.

Type of damage and symptoms

The silkworm larvae infested up to early fifth instar die before they reach the spinning stage. If infestations take places in the late fifth instar the mature maggot comes out by piercing the cocoons and thereby rendering the cocoons unfit for mass reeling. Infested silkworms or pupae can be identified by the presence of black scar on the part of the skin where the maggot penetrates into the body of the host larvae. Sometimes, an egg shell is left behind in the center of the black scar. At the initial stage of infestation minute creamy white oval eggs smaller than pin head are observed on the skin of the larvae.



Uzi laying egg on silkworm



Uzi Egg on silkworm Body



Silkworms bearing black scars



Uzi maggot emerging from silkworm Uzi maggot emerging from cocoon



Uzi pierced cocoons

Period of occurrence

The number of generations per year differs depending upon the climatic condition. In arctic region, there are four to five generations, in temperate regions six to seven generations and in tropical regions ten to fourteen generations. In tropical countries it generally occurs throughout the year

Prevention and control

For the prevention of Uzi fly, sanitary and hygienic measures are of utmost importance. Care should be taken first to see that uzi fly maggots do not get access to the holes and crevices of the rearing room and the places around where from they normally come out and perpetuate the life cycle. Care should be taken to see that the early spinning cocoons, most of which are uzi infested are not mixed with normal cocoons and are stifled to kill the uzi maggots inside them. While taking the cocoons to the market, it should be seen that uzifly maggots are frequently swept and killed by putting them into hot water/ formalin water or kerosene/ insecticide mixed water. As far as seed cocoon transportation is concerned it should be seen that the uzi infested cocoons are not transported to uninfested areas and are disposed off at the nearest possible point.

For further prevention and control of uzi fly an integrated approach involving physical, Chemical and biological control methods are suggested as follows:

Physical: Creation of a physical barrier by providing wire mesh in the doors and windows of the rearing rooms or mosquito net curtains around the rearing stands. These methods have been found to be quite effective in preventing the uzi fly from getting access to the silk worms and laying eggs on them reducing the crop loss to a considerable extent. Care should be taken to see that doors are not kept open and curtain covers are not disturbed. A physical barrier can also be created between the uzifly and the silkworm by dusting levigated china clay on the body of the silkworm during mounting which prevents the oviposition by the fly. Doses recommended are 3-4 g per 100 spinning larvae per sq. ft. area of the spinning tray.



Chemical: A commercial formulated uzicide containing 1 per cent of Benzoic acid has been developed in India which kills the eggs of the uzifly when applied within 48h of egg laying. This treatment has to be repeated on alternate days. The dosage recommended is 7-8 ml/sq. ft. area. A similar spray of 3 percent phenol has been suggested by Bangladesh scientists for killing the eggs of uzifly.









Chemical control of uzi fly has also been found to be effective through the use (dusting) of diflubenzuron at 2.5 % and levigated china clay may be used as diluents/carrier. Maggots/pupae collected from the cocoon market when treated with this material (covered with a dust layer 2.54 cm thick) give rise to sterile adults which mate but are not able to produce offspring. While treating, maggots/pupae should be spread in a single layer on a shallow tray with 200 maggots /

pupae per sq. ft. Release programme of such flies which emerge from treated maggots/pupae could have a good impact on the reduction of the uzi fly population.

Caution: Diflubenzuron should be handled with same care and caution exercised for agricultural pesticides.

Biological control: Biological control has been used for the control of many insect pests either individually or as a part of integrated pest control programme. Control of uzi fly through biological means (except hyperparasitoids) however, has a special relevance since the host itself is an insect and insecticidal measures cannot be taken against a pest associated with an insect host. A number of parasitoids parasiting on uzi fly have been identified as follows;

Sl. No.	Name	Family	Nature	Status
1	<i>Nesolynx thymus</i> 	Eulophide	Ecto-Pupal parasitoid	Gregarious
2	<i>Trichopria spp.</i> 	Diapriidae	Endo-Larval-Pupal parasitoid	Gregarious
3	<i>Exorista philippinensis</i>	Encyrtidae	Endo-Larval-Pupal parasitoid	Gregarious
4	<i>Dirhinus himalayanus</i> 	Chalcididae	Ecto- Pupal parasitoid	Solitary
5	<i>Brachymeria lugubris</i> 	Chalcididae	Ecto- Pupal parasitoid	Solitary

6	<i>Spilomicrus karnatakensis</i>	Diapriidae	Ecto- Pupal parasitoid	Solitary
7	<i>Spalangia cameroni</i> 	Pteromalidae	Ecto-Larval pupal parasitoid	Solitary
8	<i>Pachycrepoideus vindimmae</i> 	Pteromalidae	Ecto-Larval pupal parasitoid	Gregarious
