



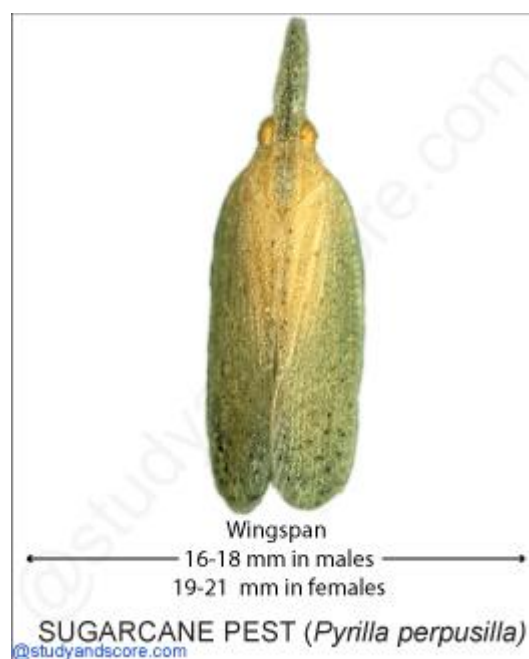
Udai Pratap (Autonomous) College, Varanasi

E-learning Material

Module/Lecture	07
Subject	Zoology
Year/Semester	B.Sc. 5 th Semester
Unit	VI
Topic	Applied Zoology
Sub-topic	<i>Pyrilla perpusilla</i>
Key-Words	Life Cycle, Pathogenecity and Control
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Pyrilla perpusilla :

Phylum : Arthropoda
Class : Insecta
Order : Hemiptera: Homoptera
Family : Lophopidae: Fulgoridae
Genus : *Pyrilla*
Species : *perpusilla*
(Walker, 1851)



Distribution:

The pest is found throughout the Indian subcontinent from Afghanistan to Burma and Thailand. Bangladesh, Borneo, Cambodia, Indonesia, Java, Nepal, Laos, Pakistan, South China, Sri Lanka, Sumatra, Thailand, Vietnam.

This insect is a serious pest of sugarcane in northern India where it also occasionally feeds on maize, millets, rice, barley, oats, sorghum, bajra and wild grasses.

Damage:

The damage to sugarcane is caused by both adults and nymphs. Millions of adults and nymphs of this parasite attack the field and suck the sap of the leaves. The infected leaves become pale and wilted. The “**honey dew**” excreted by the pest attracts **shooty mould** which interfere with the proper functioning of the leaves and render them unfit even for cattle consumption. The amount of juice content in the cane is not much affected but its sucrose content is reduced as low as 35% while the glucose ratio may be trebled. In case of severe infestation the sugar recovery may fall to as low as 75% than the normal.

The pest is found gregariously on the under surface of the leaves where they suck up plant sap that causes yellowing and eventually drying of leaves. Under low infestation yellow patches appear on the leaves. Photosynthesis is reduced resulting in the

reduction of sucrose content of the juice by up to 30%. Hoppers secrete a sweet substance called honey dew that coats the leaves and attracts a blackish fungus, which reduces photosynthesis resulting in yield loss.

Sugarcane is subjected to attack by a number of insect pests, resulting in loss of yield, poor juice quality and low sugar recovery. Sugarcane leaf hopper *Pyrilla perpusilla* is the most destructive sap-sucking pest of sugarcane but it has also been recorded as a pest of other crops such as wheat, maize and millet. This pest occurs in epidemics in sub-tropical areas every 5 - 6 years. *Pyrilla perpusilla* sucks phloem sap from leaves and excretes honeydew onto foliage, leading to fungal diseases. This direct and indirect damage affects sugar yield and quality.

Transmission :

Nymphs are reported to migrate to other host crops (eg. wheat) after sugarcane harvest, where they assume adult form a couple of months later. The adults then migrate back to sugarcane (**Khanzada, 1992**).

Morphology :

The adult insect is straw coloured bug with the head projecting forward in the form of rostrum. The rostrum encloses the stylets. Tarsi

are two jointed and there is a pair of elongated, twisted anal process. The two pairs of wings generally remains folded over the back.

Adult *Pyrilla perpusilla* is a pale tawny-yellow soft bodied insect with the head prominently drawn forward, forming the snout. Wingspan varies from 16 - 18 mm for males and 19 - 21 mm for females. Females bear bundles of cretaceous threads - the anal pads on the terminal segment. The forewings are semi-opaque, yellow-brown and sparsely covered with minute black spots. The cephalic process is about $2/5^{\text{th}}$ of the body length and its dorsal margin is generally parallel with the body. The dorso-lateral margin of the ninth segment is provided with a dome shaped elevation in the centre, whereas the tenth tergum bears an anal tube which is slightly concave and broadly truncated at the apex (Mathur, L.M.L. 1988).

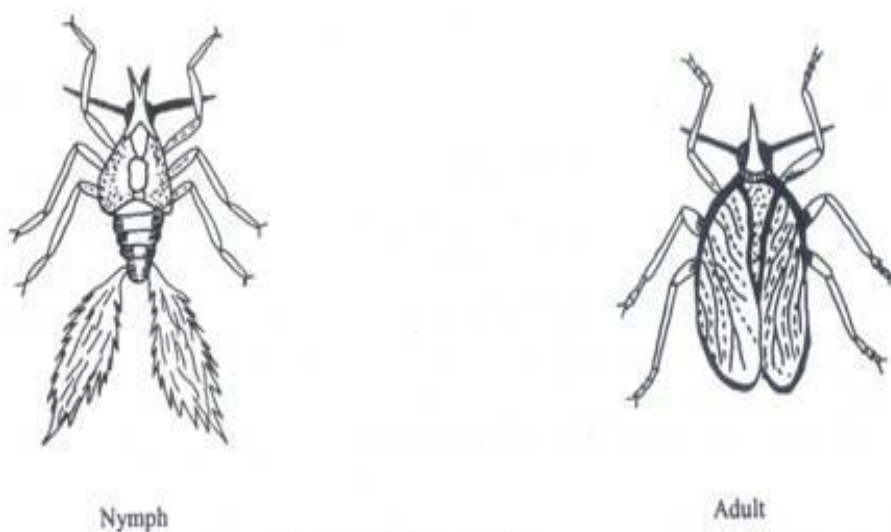


Fig. 67. *Pyrilla perpusilla*.



Life Cycle :

Adult hoppers are straw coloured to brownish, 7-8 mm long, with a pointed snout bearing piercing and sucking mouthparts. They are found gregariously and jump off readily when disturbed. Adults are active fliers, migrating from one crop to another and breed throughout the year.

Eggs are light yellowish in colour, oval, one mm long and laid during the day on the ventral surface or lower surface of the leaf, near the midrib in groups of about 20 eggs, which hatch in 6-15 days depending on temperature. They are deposited in four to five rows and covered by a pale waxy material. During the winter, eggs are laid on the inside of the base of the leaf sheath, giving some protection from adverse climatic conditions.

The female usually uses a lower, shady, concealed site for

oviposition. Eggs are laid in clusters of 30 - 40 on the underside of the leaf blade and sheaths, and are covered with white fibrils of wax. A female may deposit 600 - 800 eggs in her lifetime (**Patel *et al.* 1993, Khanzada, 1992, Kumarasinghe & Wratten 1996**).

Freshly laid eggs are oval in shape, pale whitish to bluish green and darken to brown prior to hatching. The average length and breadth of eggs has been found to be 1.059 ± 0.0788 and 0.517 ± 0.0425 mm and the average incubation period 7.50 ± 0.849 days (**Patel *et al.* 1993**).

In contrast, **Ganehiarachchi and Fernando (2006)** quote the egg dimensions to be 0.8 - 1.3 mm in length with a mean of 1.04 ± 0.148 mm.

Nymphs are initially greenish, later turn pale brownish, wingless and with a pair of anal filaments covered with whitish fluffy waxy material. There are 5 nymphal instars which take 40-60 days to complete development. Multiplication of the pest is favoured by high humidity and luxuriant plant growth as in heavily manured and irrigated field or in rainy season.

The first instar nymph is greenish-white with dark red eyes and two joint antennae on the head. The thorax is whitish with a thin transverse pale brown band on the posterior end. The last segment of the abdomen is green with whitish threads. It has 2 anal filaments.

The length and breadth of **first instar nymphs** averages 1.431 ± 0.0836 mm and 0.694 ± 0.0729 mm. Duration of the first instar nymph varied from 5 to 7 days (Patel *et al.* 1993).

The **second instar nymph** is slightly larger than the first instar and pale white to brown in colour. The eyes are watery translucent with a black spot toward the posterior end of each eye. There are dark brown strips along the lateral margin. Anal threads are basally white and fawn dorsally. The average length and breadth of second instar nymphs is 2.166 ± 0.2217 and 0.949 ± 0.1295 mm. The average duration of the second instar nymph is 5.08 ± 0.277 days (Patel *et al.* 1993).

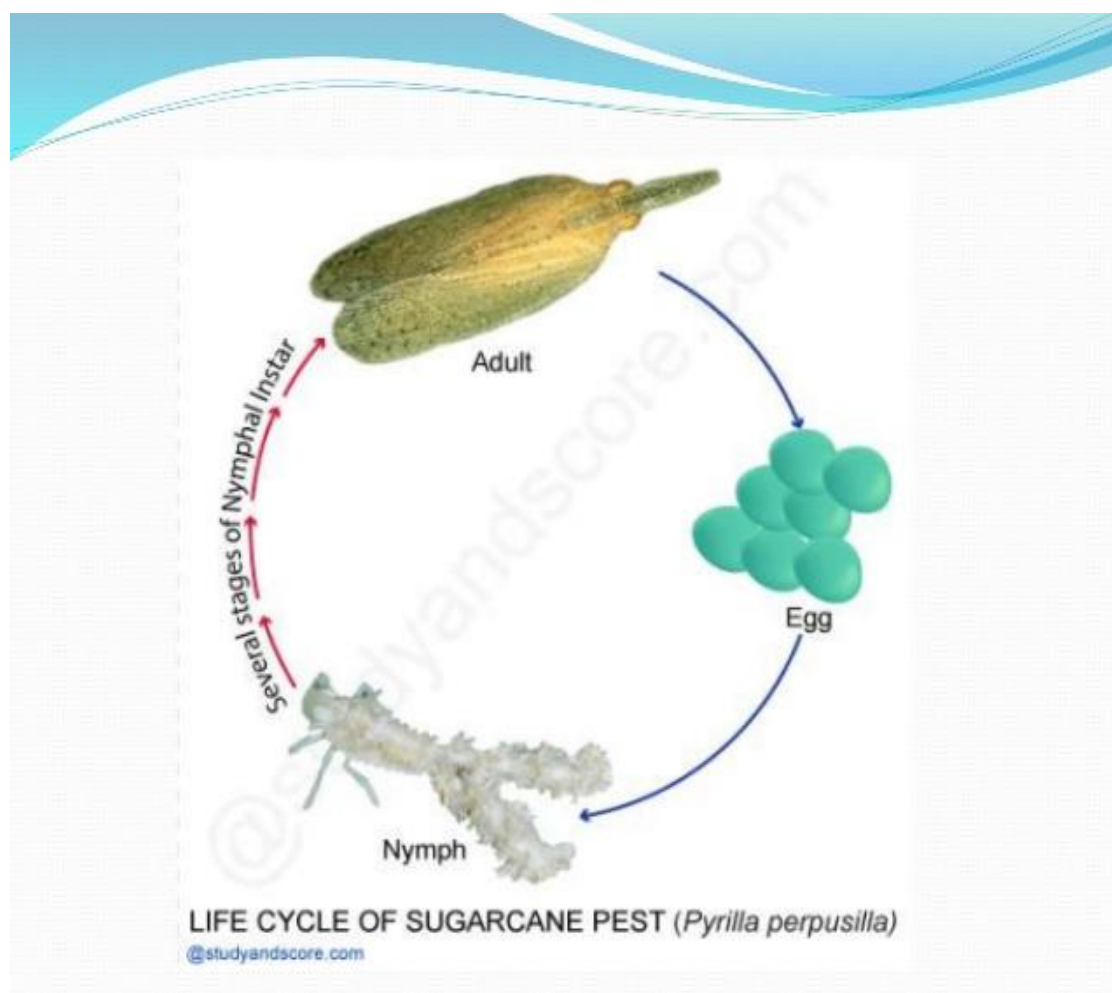
The **third instar nymph** is pale brown with grey-green eyes.

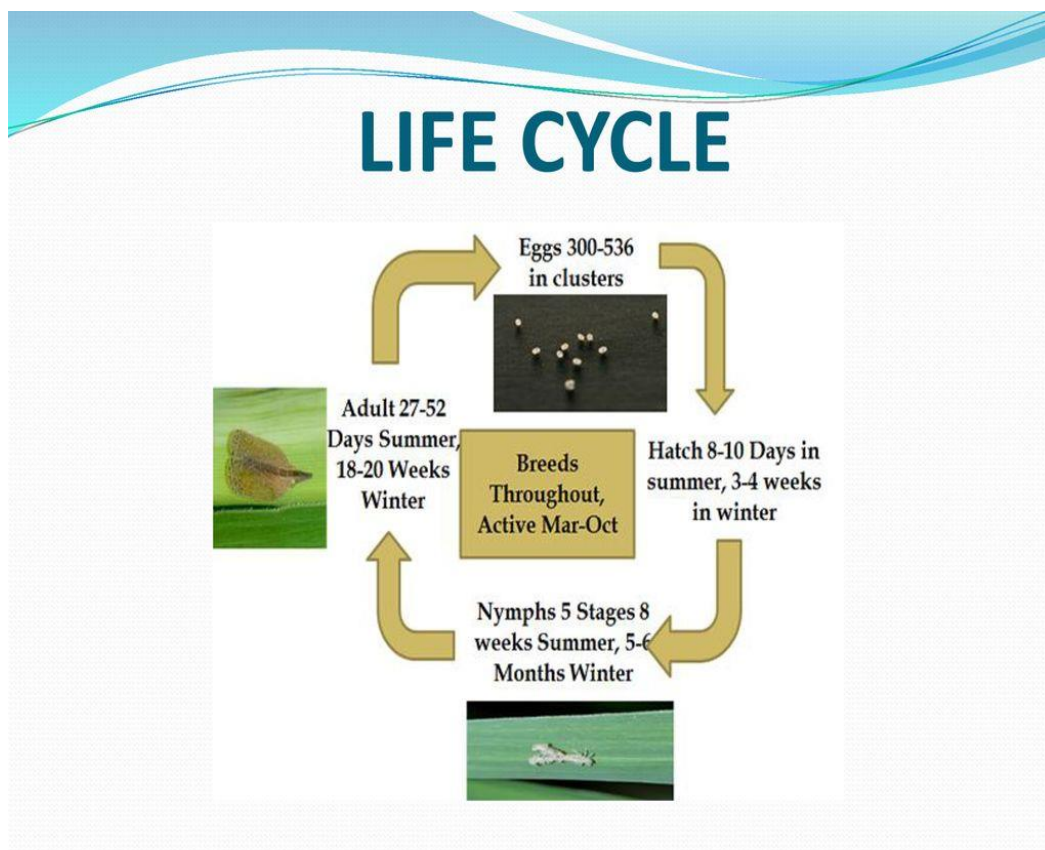
The thoracic region is buff-white with one dark brown dorsal patch on either side of the posterior end. The abdominal segments are pale blue dorsally and pale yellow ventrally with grey anal tufts. The third instar nymph is 2.725 ± 0.1973 mm length and 1.259 ± 0.058 mm breadth. Average duration of the third instar nymph is 5.44 ± 0.583 days (Patel *et al.* 1993).

The **fourth instar nymph** is dark brown, with prominent wing pads and watery green eyes. The abdominal segments have a dark brown band on the dorsal surface and pale green ventral surface. They measured 3.385 ± 0.2103 mm length and 1.608 mm breadth. Average duration of the fourth instar nymph is 6.44 ± 1.121 days.

The **fifth instar nymph** is pale to dark brown with watery green eyes. They are much more active than previous instars. Abdominal segments have a dark brown transverse band on the dorsal surface and pale white ventral surface. Anal tufts are buff coloured. The nymphs measured 4.971 ± 0.435 mm length and 2.328 ± 0.273 mm breadth. Average duration of the fifth instar nymph is 9.88 ± 1.129 days.

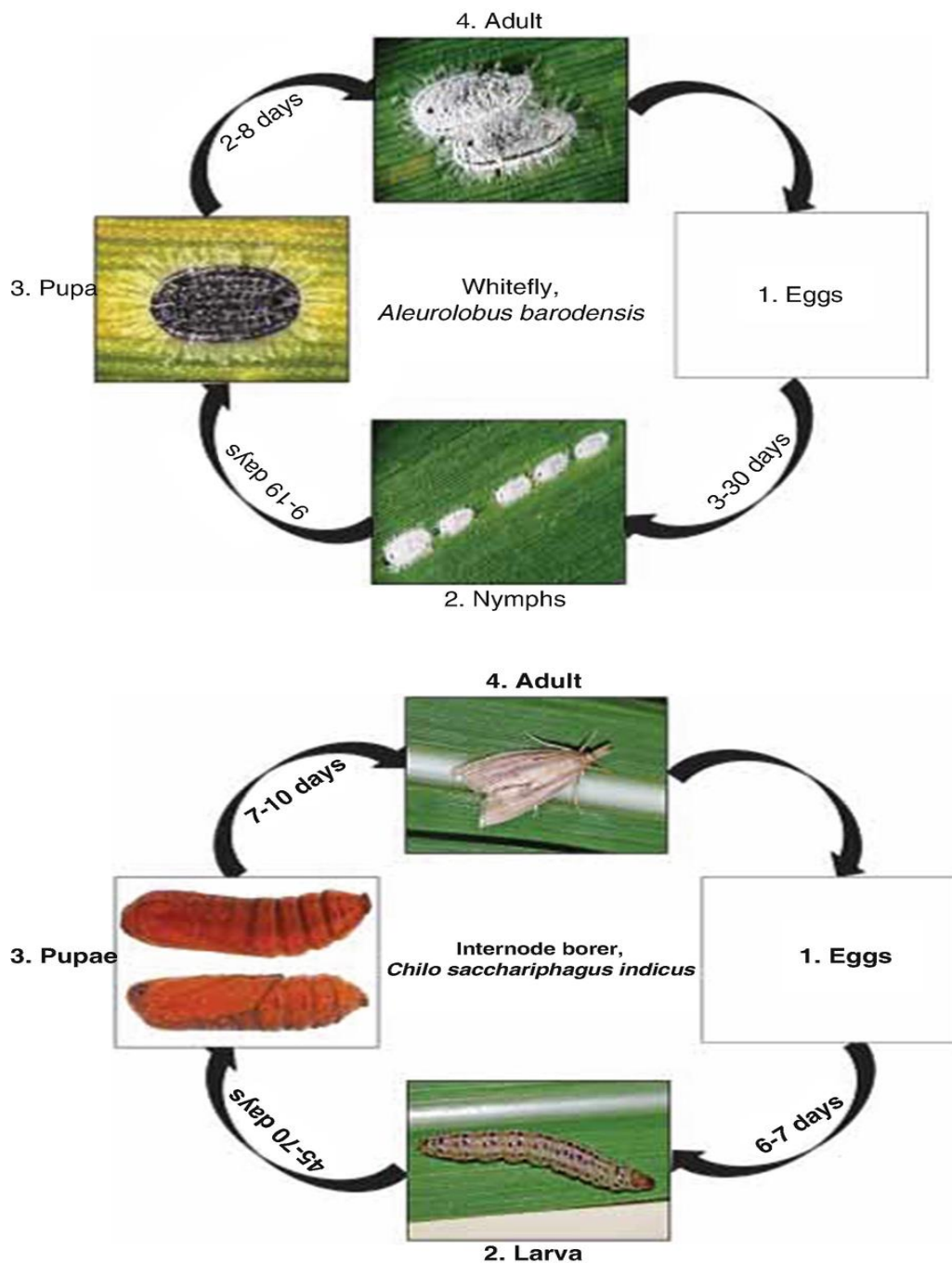
Under laboratory conditions, total nymphal period varied from 30 - 36 days, averaging 32.44 ± 1.960 days (**Patel et al. 1993**).





Adults were white immediately after moulting but gradually turned straw coloured, with pale green eyes, snout-like head with black spot positioned posteriorly. The apical area and the outer cleval wing margins have minute black spots.

Average measurements for female and male adults were 10.051 ± 0.495 mm and 8.768 ± 0.253 mm length and 3.599 ± 0.338 mm and 2.213 ± 0.169 mm breadth respectively. The average longevity of females was 31.36 ± 3.695 days and for males was 20.81 ± 2.75 days (**Patel *et al.* 1993**).



In contrast, **Ganehiarachchi and Fernando (2006)** report that the sexes differ in size; the female has an average length of 1.7 ± 0.2 mm, the male is slightly smaller with an average length of 1.5 ± 0.3 mm. The female also has characteristic circular pads at the tip of the abdomen.

Both the adults and nymphs are very active, jumping from leaf to leaf on slight disturbance. Both life stages suck sap from the leaves of sugarcane but most of the damage is caused in the nymphal stage.

Newly emerged adult females are ready to mate 2 days after emergence from the **5th nymphal instar**.

Females carry an egg cluster for about 60 - 90 minutes at the tip of their abdomen before depositing it on a leaf. Females oviposit mainly during the day.

Prevention and Control:

Prevention and control of Sugar cane bugs through following methods-

Mechanical Method:

1. Burning of all thrash after harvesting the sugarcane crop in an infected field.
2. Removal of the leaves bearing egg-clusters in October-planted crop during March-April.
3. Uprooting and destruction of seriously infected plants.
4. The quantity of nitrogen should be well balanced in the soil.
5. Ratoon crops should be avoided.
6. The resistant varieties of sugarcane should be taken e.g. Co. 385.

Chemical Method:

The pest can be controlled by spraying 0.05% of parathion,

malathion, thiodon, fenitrothion or rogor. Dusting the plants with 10% Aldrin or dieldrin also helps.

1. Dusting the infected crop with 10% BHC, 10% Toxaphane and 10% Carbaryl or 5% Malathion @ 20-40 kg/ha.
2. Spraying with Endrin, Endosulfan Trithione, Phosphamedon, Malathion or Formothion @ 0.5 – 1.0 kg/ha.

Biological Method:

Introducing hyper parasites. *Tetrastichus pyrillae* & *Ooencyrtus* spp parasitize the eggs of this pest whereas nymphs are parasitized by *Dryinus pyrillae*, *Pseudogonatopus pyrillae* etc. Caterpillars of *Epipyrops melanoleuca* are predacious on nymphs and adults of leaf borer.

Conservation of the following natural enemies helps in containing the pest:

Egg parasitoids:

Tetrastichus pyrillae, *Cheiloneurus pyrillae*, *Ooencyrtus pyrillae*, *Ooencyrtus pipilionus*, *Agoniaspis pyrillae*.

Nymphal parasitoid:

Lestodryinus pyrillae, *Pyriloxenos ompactus*, *Chlorodryinus pallidus*.

Predators:

Coccinella septempunctata, *C. undecimpunctata*, *Chilomenes sexmaculata*, *Brumus suturalis*.

Egg-predators:

Nimboa basipunctata, *Goniopteryx pusana*.

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