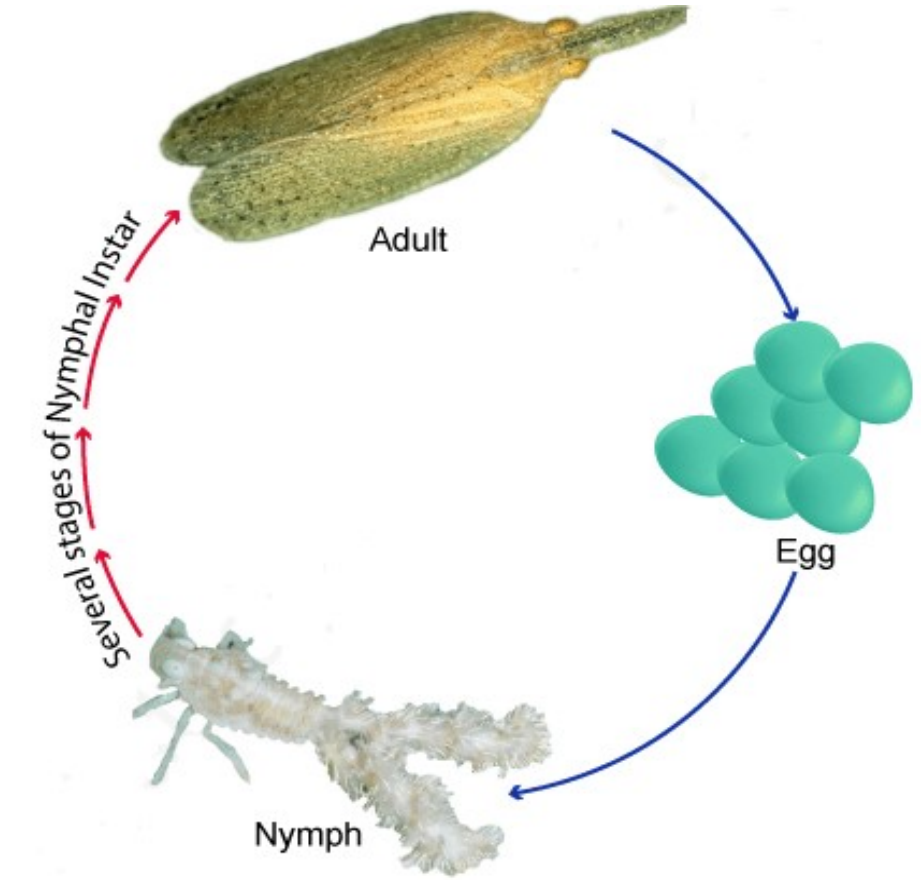
PEST OF SUGARCANE

Pyrilla perpusilla (Leaf hopper)

(Order : Hemiptera; Family : Lophopidae) ANUPAM SIR

Scientific classification

- **Kingdom:** Animalia
- **Phylum:** Arthropoda
- **Class:** Insecta
- **Order:** Hemiptera
- **Family:** Lophopidae
- **Genus:** Pyrilla



LIFE CYCLE OF SUGARCANE PEST (*Pyrilla perpusilla*)

PYRILLA PERPUSILLA

❖

Identification :

- ❖ Adult Pyrilla is straw coloured and is very active.
- ❖ Head with a long beak like proboscis and prominent red eyes.
- ❖ It measures about 20mm long.
- ❖ A pair of whitish brown anal processes, covered with white mealy wax, are also found which help in up and downward active movement of the insect.
- ❖ Two pairs of wings are folded like a roof.



Host Plants :

- ❖ Sugarcane, bajra, jowar, maize.

- Females have cretaceous threads called anal pads, arranged as bundles on terminal segment.
- The fore wings are semi-opaque in nature, with yellow-brown color.
- The fore wings are lightly covered with minute black spots.
- Both adults and nymphs are very active and suck sap from the leaves of sugarcane.
- On the slightest disturbance, they jump from leaf to leaf.

1. Distribution

- *Pyrilla perpusilla*, commonly known as the **sugarcane leafhopper**.
- It is widely distributed across India and other Southeast Asian countries such as **Pakistan, Bangladesh, Sri Lanka, and Nepal**.
- It is considered one of the most destructive pests for sugarcane in these regions due to favorable climatic conditions, particularly in tropical and subtropical areas.
- The temperatures ranging from 20°C to 30°C, ideal for its rapid development.
- In India, it is predominantly found in the states of Uttar Pradesh, Punjab, Haryana, Bihar, Karnataka, Tamil Nadu, and Andhra Pradesh.

2. Life Cycle

- The life cycle of ***Pyrilla perpusilla*** is complex, involving egg, nymph, and adult stages.
- Its development is rapid, and the insect can complete multiple generations within a year under favorable conditions.

Egg Stage:

- Females lay oval-shaped eggs in clusters on the underside of sugarcane leaves.
- The eggs are yellowish-white initially and turn brownish as they mature.
- A single female can lay 200–800 eggs in her lifetime.
- The eggs typically hatch within 7–10 days.

Nymph Stage:

- The nymphs are small, wingless, and grayish-white in color.
- They undergo five nymphal stages, each progressively larger than the previous one.
- This stage lasts for 20–40 days, depending on environmental conditions.
- During the nymphal stage, the insects feed aggressively on plant sap.
- Nymphs are often seen congregating on the lower parts of the sugarcane plant.

- Nymph passes through five nymphal instar stages to reach adult stage.
- The following table gives the information about the features of each instar nymph.

	Body Size	Body Color	Eyes	Duration
I Instar Nymph	L-1.4 mm B-0.6 mm	Greenish white	Dark red	7 Days
II Instar Nymph	L-2.1 mm B-0.9 mm	Pale white to brown	White and translucent with black spot	5 Days
III Instar Nymph	L-2.7 mm B-1.2 mm	Pale brown	Grey green	5 Days
IV Instar Nymph	L-3.3 mm B-1.6 mm	Dark brown	Watery green	6 Days
V Instar Nymph	L-4.9 mm B-2.3 mm	Pale to dark brown	Water green	9 Days

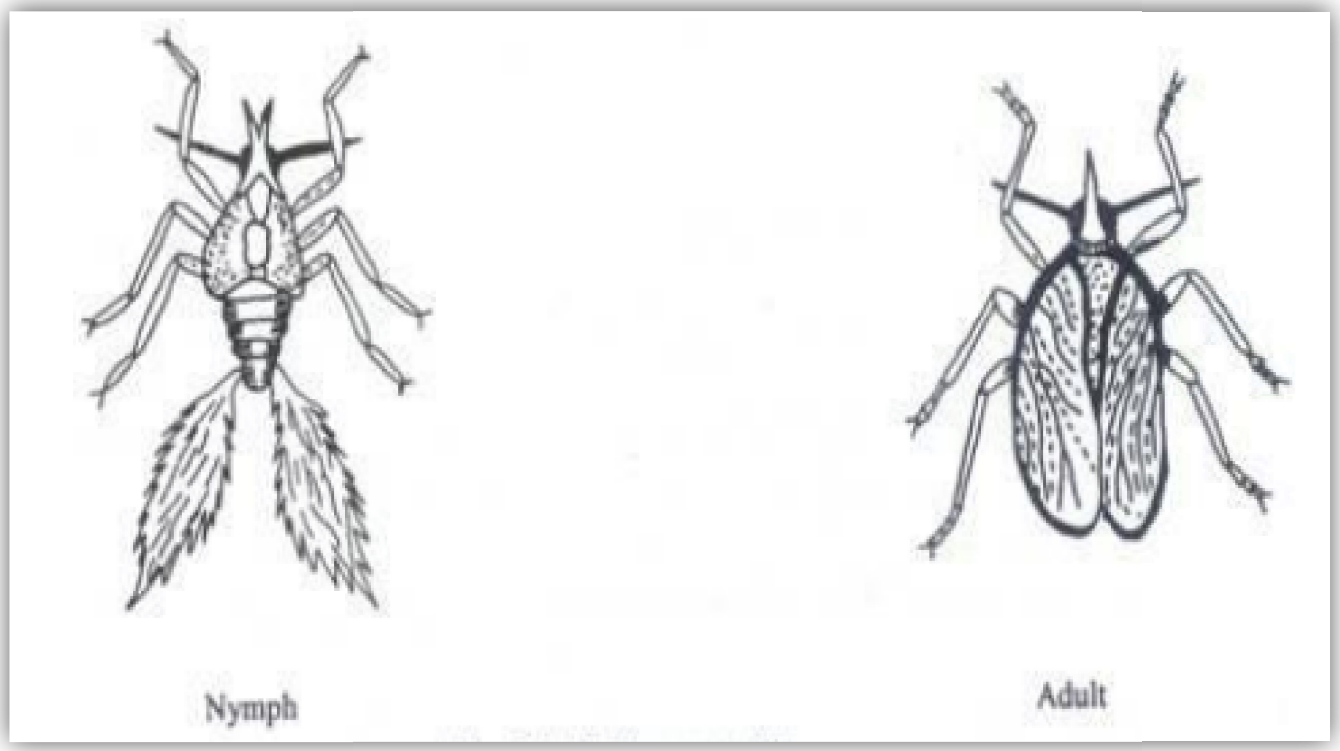
- First instar nymph has Whitish thorax with a thin transverse pale brown band on the posterior end.
- Last abdominal segment is green with whitish threads.
- Second instar nymph has dark brown strips along the lateral margin.
- Third instar nymph has a thoracic region with one dark brown dorsal patch on either side.
- Abdominal segments are pale blue on dorsal side and pale yellow on ventral side.
- Abdominal segments of fourth instar nymph have a dark brown band on the dorsal surface and pale green ventral surface.

- Abdominal segments of fifth instar nymph have a dark brown transverse band on the dorsal surface and pale white ventral surface.
- Anal tufts are buff colored.

Adult Stage:

- Adults are winged and resemble small moths, with pale brown to yellowish bodies.
- The wings are membranous and folded back over the body when at rest.
- Adult lifespan can last between 30 to 50 days, and they continue to feed on the plant, weakening it further.
- Adults are highly mobile and can easily disperse to other plants, causing infestations to spread quickly.

❖ This life cycle, from egg to adult, can be completed in 4 to 6 weeks under favorable conditions, enabling multiple generations per year, making management of this pest difficult.



3. Nature of Damage

Pyrilla perpusilla causes significant damage to sugarcane crops, primarily through its feeding habits and secondary effects:

Direct Damage:

- Both nymphs and adults feed by sucking sap from the sugarcane leaves.
- This feeding leads to chlorosis, where leaves turn yellow due to the loss of chlorophyll.
- As feeding continues, the leaves begin to dry out, causing stunted plant growth.
- Severe infestations can lead to the drying of entire fields, drastically reducing sugarcane yield.

Indirect Damage:

- The excretion of a sticky substance called **honeydew** by the nymphs and adults promotes the growth of sooty mold fungus.
- This black fungal coating covers the leaves, blocking sunlight and further inhibiting photosynthesis.
- The mold also attracts ants, which may protect the pest from its natural enemies.

Impact on Yield:

- Heavy infestations can result in up to 20-30% loss in sugarcane yield.
- The quality of sugarcane juice is also affected, leading to reduced sugar content and decreased profitability for farmers.

Impact on Juice and Sugar Content:

- Prolonged infestations reduce the plant's ability to produce sugar by impairing its photosynthetic capacity.
- As a result, the juice becomes less rich in sucrose, leading to lower sugar recovery during processing.
- In areas of severe outbreaks, sugarcane plants may have to be prematurely harvested to salvage any remaining sugar content.

4. Control Measures

❖ Managing ***Pyrilla perpusilla*** involves integrated pest management (IPM) approaches that combine **biological, cultural, and chemical control methods.**

4.1 Biological Control

❖ Biological control involves using natural enemies of *Pyrilla perpusilla* to keep its population in check. Key biological agents include:

- **Parasitoids**:

  Parasitoid wasps such as ***Epipyrops melanoleuca*** **and** ***Tetrastichus pyrillae*** lay their eggs in or on the eggs and nymphs of *Pyrilla*, killing them in the process.

- **Predators**:

  Ladybird beetles (*Menochilus sexmaculatus*) and spiders feed on nymphs and adults of *Pyrilla perpusilla*. Encouraging the presence of these predators in fields can naturally reduce pest numbers.

- **Pathogens**:

  Certain fungal pathogens, like ***Beauveria bassiana***, infect and kill ***Pyrilla*** **nymphs** and adults. These fungal applications can be sprayed on infested plants.

4.2 Cultural Control

- **Field Hygiene**:

  Removing crop residues after harvest can reduce the chances of pest survival and overwintering.

  Removing weeds and plant debris that harbor pests helps reduce the pest load.

- **Crop Rotation**:

  Rotating sugarcane with non-host crops like legumes or cereals can disrupt the life cycle of *Pyrilla perpusilla* and minimize pest buildup.

- **Monitoring and Early Detection**:

  Regular field scouting for egg masses and nymphs helps in the early detection of infestations. Sticky traps and pheromone traps can be used to monitor adult populations.

4.3 Chemical Control

❖ Chemical insecticides are often used when pest populations exceed economic thresholds. However, their use should be carefully managed to prevent resistance and protect beneficial insects.

- **Systemic Insecticides**:

  Chlorpyrifos, imidacloprid, and dimethoate are commonly used to control *Pyrilla perpusilla*. These chemicals can be

applied as foliar sprays, targeting the feeding stages of the insect. Care should be taken to avoid overuse, as it may harm non-target species.

- **Natural Pesticides**:

  Neem-based products (Azadirachtin) can be used as a safer alternative to synthetic insecticides, reducing environmental impact.

5. Prophylaxis (Preventive Measures)

❖ Proactive management practices can help prevent infestations of *Pyrilla perpusilla*. Key prophylactic measures include:

- **Resistant Varieties**:

  Cultivating sugarcane varieties that are resistant or less susceptible to *Pyrilla* can significantly reduce pest pressure. Agricultural research institutes often recommend suitable varieties for different regions.

- **Intercropping**:

  Intercropping sugarcane with crops like legumes or marigolds can reduce pest incidence. This practice disrupts the monoculture environment that favors *Pyrilla* proliferation.

- **Timely Planting**:

  Sowing sugarcane at the right time can avoid peak pest periods. Delayed planting can make crops more vulnerable to pest infestations.

- **Field Sanitation**:

  Regular removal of plant debris, especially after harvest, can prevent the pest from laying eggs in leftover plant material. Ensuring that sugarcane fields are weed-free also reduces breeding grounds for pests.

- **Monitoring and Forecasting**:

  Farmers should be educated to regularly monitor their fields for signs of *Pyrilla perpusilla* presence. Early detection allows for timely intervention before infestations become severe.

Conclusion

❖ The sugarcane leafhopper, *Pyrilla perpusilla*, is a major pest of sugarcane that can severely impact crop yields and sugar content.

- ❖ However, with effective integrated pest management practices that combine biological, cultural, and chemical controls, infestations can be managed.
- ❖ Preventive measures like crop rotation, field sanitation, and the use of resistant varieties further enhance control and help sustain sugarcane productivity.

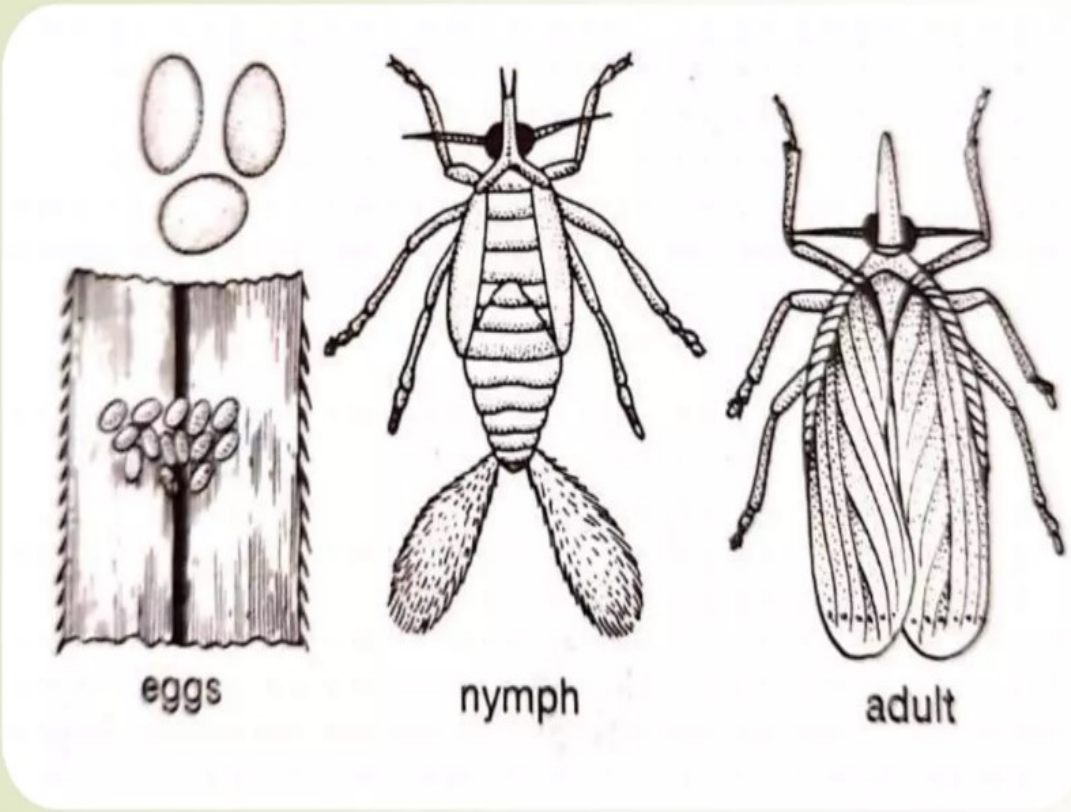
Functions of the Anal Ped

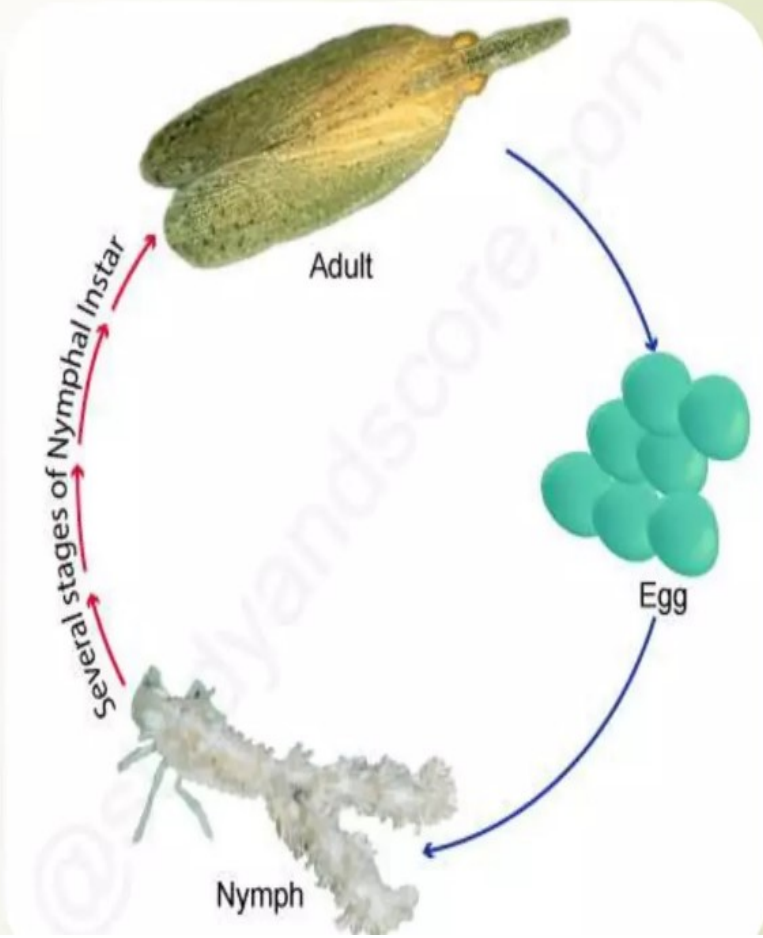
The **anal ped** is a term used in entomology to refer to a specialized structure or projection found in the anal segment of certain insect larvae, particularly caterpillars. Its primary function is related to movement and stability. Here's a breakdown of its functions:

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1. **Support and Stability**:
   The anal ped helps the larva anchor itself to surfaces. It acts like a grip or a hook, allowing the insect to remain attached to leaves, stems, or other surfaces while feeding or resting.
2. **Movement**:
   Some larvae use the anal ped to assist in locomotion, particularly when moving across vertical surfaces. It provides additional traction and helps prevent slipping.
3. **Defense Mechanism**:
   In some species, the anal ped can be used as a means of defense, enabling the larva to cling tightly to surfaces when disturbed, making it harder for predators to dislodge or attack them.
4. **Pupation Support**:
   During the transition to the pupal stage, the anal ped can help the larva secure itself to a substrate, allowing for a stable transformation into the pupa stage.

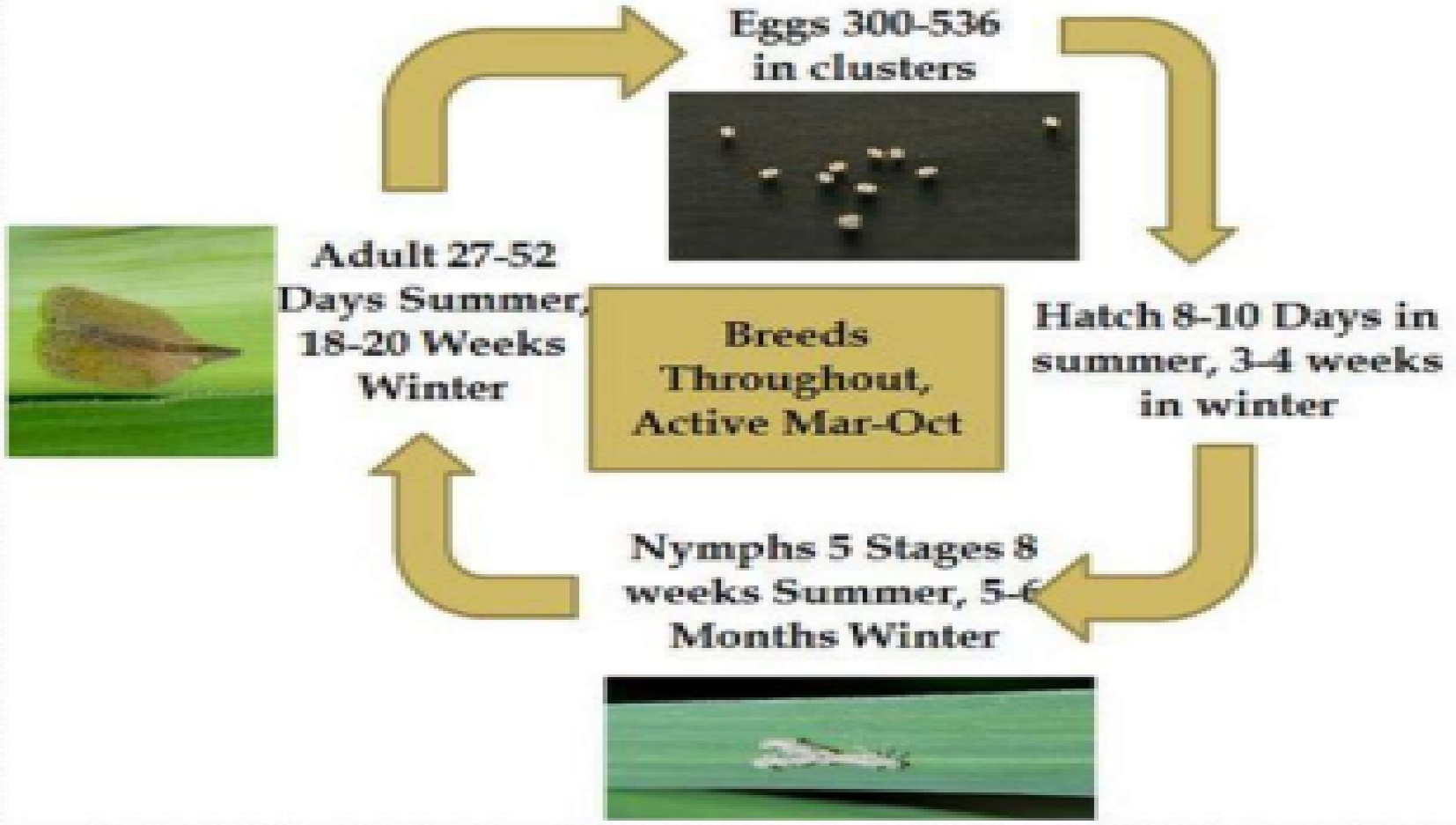
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DR ANUPAM DUBEY