

Major Insect Pests of Rice and Their Management through Integrated Pest Management Approaches

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Rice (*Oryza sativa* L.) is a staple food for more than half of the world's population and plays a vital role in global food security. Its productivity, however, is constantly threatened by several insect pests that reduce plant vigour, grain quality and yield. This article describes the major insect pests of rice, namely brown planthopper (*Nilaparvata lugens*), yellow stem borer (*Scirpophaga incertulas*), gall midge (*Orseolia oryzae*), leaf folder (*Cnaphalocrocis medinalis*), green leafhopper (*Nephotettix virescens*) and gundhi bug (*Leptocoris acuta*), along with their nature of damage and management options. Integrated Pest Management (IPM) strategies are discussed, including resistant varieties, crop rotation, water and fertilizer management, timely planting, mechanical and physical control, biological control using natural enemies such as *Trichogramma chilonis* and *Chrysoperla carnea*, botanical pesticides, pheromone traps and judicious use of chemical insecticides at the economic threshold level (ETL). Adoption of IPM reduces crop losses, conserves beneficial organisms and supports sustainable rice production.

Keywords: Rice, Insect Pests, IPM, ETL

Introduction

Rice is an important cereal crop belonging to the family Poaceae and plays a vital role in global food security, serving as a staple food for more than half of the world's population. As a tropical crop, rice can be cultivated during both wet and dry seasons, provided that sufficient water is available. Although rice is generally grown as an annual crop, it may survive as a perennial crop under tropical conditions and produce a ratoon crop. Despite considerable advancements in agricultural technology and crop production practices, rice cultivation continues to face serious challenges from various insect pests and diseases. These biotic stresses can adversely affect plant growth, grain quality, and overall crop productivity, leading to significant economic losses when they are not effectively managed. Therefore, timely and appropriate management of insect pests and diseases is essential for maintaining healthy rice crops, improving yield and quality, and ensuring sustainable rice production and food security. This article highlights the major insect pests and diseases affecting rice crops and discusses practical and effective approaches for their management and control.

Major Rice Pests and Their Management

Brown Plant Hopper (*Nilaparvata lugens*)

Symptoms: Sucks sap from rice plants, affected plant dries up and gives a scorched appearance called "hopper burn". Circular patches of drying, lodging of matured plant and plant death.

Management

- ✓ Avoid close planting and provide 30 cm rogue spacing at every 2.5 to 3.0 m.
- ✓ Apply recommended insecticides such as



Imidacloprid (0.2 ml l⁻¹) or Buprofezin (1 ml l⁻¹) or Thiamethoxam (0.3 g l⁻¹) or Pymetrozine (0.6 g l⁻¹).

- ✓ Apply Neem oil 3% 6 lit acre⁻¹ or Azadirachtin 0.03% 400 ml acre⁻¹
- ✓ Set up light traps during night or yellow pan traps during day time.

Rice Stem Borer (*Scirpophaga incertulas*)

Symptoms: Larvae bore into rice stems, causing dead hearts and whiteheads. **Management**

- ✓ Spray Neem seed kernel extract 5% or Azadirachtin 0.03% 400 ml acre⁻¹.
- ✓ Spray Acephate 75 % SP 267-400 g acre⁻¹ and Cartap Hydrochloride 50 % SP 400 g acre⁻¹.
- ✓ Plant resistant varieties i.e. IR20, IR36, IR50 and Ratna.
- ✓ Clip the seedling tips before transplanting to eliminate egg masses.
- ✓ Install light trap @ 1 ha⁻¹ and pheromone trap @ 5 acre⁻¹.



Rice Gall Midge (*Orseolia oryzae*)

Symptoms: Feeding causes formation of a gall that is similar to “onion leaf” or “Silver-shoot”. Resulting in stunted growth and reduced grain production.

Management

- ✓ Remove the alternate hosts and adopt early planting.
- ✓ Spray Phosalone 35 EC 600 ml acre⁻¹ or Carbosulfan 25% EC 320-400 ml acre⁻¹.
- ✓ Use resistant varieties i.e. Rajendranagar Vari 28361, Warangal Vari 1119, KNM 1638, Surekha, and Phalguna.
- ✓ Setup Infrared light trap and monitor the adult flies.



Rice Leaf Folder (*Cnaphalocrocis medinalis*)

Symptoms: Larvae fold and eat rice leaves, reducing photosynthesis and yield.

Management

- ✓ Avoid excessive nitrogenous fertilizers.
- ✓ Spray NSKE 5 % or Azadirachtin 0.03% 400 ml acre⁻¹



Green Leafhopper (*Nephotettix virescens*)

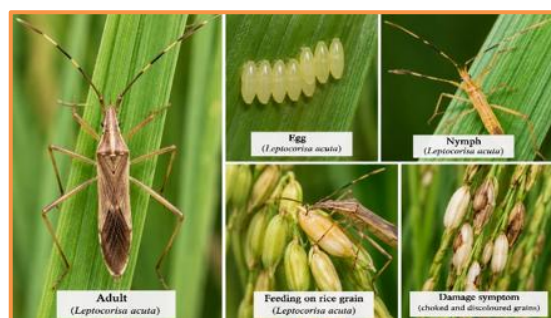
Symptoms: Both nymphs and adults suck sap from rice leaves, causing yellowing, stunted growth, and reduced plant vigour. It is also an important vector of rice tungro virus, which causes yellow-orange discoloration and severe stunting.

Management

- ✓ Spray Imidacloprid 17.8 SL or Thiamethoxam 25 WG as per the label-recommended dose for rice.
- ✓ Use light traps for monitoring adults.
- ✓ Conserve natural enemies such as spiders and predatory insects.
- ✓ Monitor the crop regularly and apply insecticide only after reaching ETL.

Gundhi Bug (*Leptocoris acuta*)

Symptoms: Nymphs and adults suck sap from grains at the milky stage, causing chaffy, shrivelled, partially filled and discoloured grains.



Management

- ✓ Malathion 50 EC or Lambda-cyhalothrin 5 EC can be used against Gundhi bug in rice.
- ✓ Keep the field and bunds free from weeds and grasses.
- ✓ Use synchronous/timely planting to reduce infestation.
- ✓ Avoid excess nitrogen fertilizer.
- ✓ Monitor the crop carefully during the flowering and milky-grain stages.

Integrated Pest Management (IPM) practices in rice

Use of Resistant Varieties: Plant pest-resistant rice varieties such as IR64 or Swarna Sub1 to combat brown planthopper (BPH) and rice blast disease.

Crop Rotation: Rotate rice with legumes or vegetables to break the life cycle of rice root nematodes and stem borers.

Proper Water Management: Maintain alternate wetting and drying (AWD) to control rice stem borers and golden apple snails, which thrive in continuous flooding

Balanced Fertilizer Application: Avoid excessive nitrogen application, as it increases susceptibility to brown planthopper (BPH) and leaf folder outbreaks.

Timely Planting and Harvesting: Synchronize planting in an area to reduce overlapping generations of pests like gall midge and yellow stem borer.

Mechanical and Physical Control: Use light traps to attract and kill adult leaf folder moths and stem borer moths. Remove and destroy egg masses of rice hispa and dead hearts caused by borers.

Biological Control: Encourage natural enemies like *Trichogramma chilonis* (parasitic wasp) to control stem borers and *Chrysoperla carnea* (lacewing) to reduce planthoppers.

Use of Botanical Pesticides: Spray neem oil or Azadirachtin-based products to deter brown planthopper (BPH) and leaf folders without harming beneficial insects

Pheromone Traps: Set up pheromone traps to monitor and trap male yellow stem borers, reducing their reproduction.

Judicious Use of Chemical Pesticides: Apply insecticides only when pest populations exceed economic thresholds (ETL) using selective pesticides like Buprofezin for BPH and Cartap Hydrochloride for stem borers to avoid harming beneficial insects.

Conclusion

Rice production is affected by several insect pests that can cause significant yield losses. Integrated Pest Management (IPM), combining resistant varieties, cultural practices, biological control and need-based chemical application, provides an effective and sustainable approach to pest management. Regular monitoring and application of insecticides only at ETL can reduce crop losses, protect beneficial organisms and improve rice productivity.

References

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