Integrated Pest Management in rice
Relative Importance of Insect Pests of Rice in India*

- Stem borer: 29%
- BPH: 16%
- Gall midge: 13%
- Leaf folder: 10%
- WBPH: 9%
- GLH: 9%
- Other Pests: 14%

* BASED ON YIELD LOSSES
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- Low; - Medium; - Severe
Male Female

Most dominant and destructive species

The larvae of the borers enter the tiller to feed, grow and cause the characteristic symptoms of:

Dead hearts - Vegetative phase
White ears - Reproductive stage.

Yellow stem borer (*Scirpophaga incertulas*)
Nature and symptom of damage

Vegetative stage

- Larvae feed on green tissue of leaf sheath for 2 to 3 days.
- Bore into the stem at the nodal position and feed on inner tissue of plant – Under Severe conditions, it bores at the base and move upwards – Central leaf whorl does not unfold, turns brown – dries off.
- Lower leaves remain green.
Heading stage

- Larvae bore at the peduncle node.
- White heads are the resultant effect.
- Damage is maximum at this stage.
Yield loss

- Early planted crop 1-19%
- Late planted crop 38-80%
Gall midge (Orseolia oryzae) - A key pest

Six biotypes of this pest are reported in the country.

The maggot feeding induces an elongation of the leaf sheath into a ‘gall’.

The ‘silver shoot’ or ‘gall’ resembles an onion leaf. Profuse tillering is seen and resulting tillers do not bear panicles.
Damaged tillers turns into **tubular galls** which dry off without bearing panicles.

Main external symptom is **SILVER SHOOT** or **GALL** which resembles onion leaf.

Fully developed gall is a **silvery white hallow tube** 1 cm wide and 10 – 30 cm long.

Attack to rice seedlings leads to **profuse tillering** and these new tillers often become infested.
Planthoppers

- Brown planthopper (BPH) is common in rainfed and irrigated rice.

- Originally confined to southern states, it has spread to eastern & northern states - Uttar Pradesh, Bihar, Punjab, West Bengal etc.

- In the last decade, whitebacked planthopper (WBPH) has tremendously increased in low land areas where BPH resistant varieties are grown.
Brown Plant hopper, *Nilaparvata lugens* (Stal.)
Delphacidae: Hemiptera

Adults are brown in colour; 4-5 mm long and more or less wedge shaped. Macropterans are strong fliers; Hind tibia with a long movable spur. 

Biology: IP – 5 days; NP – 15 days

Eggs are elongated, cigar shaped inserted by female in two rows on wither side of the midrib of the leaf sheath.

Brachypterans are prolific breeders.
White backed Plant hopper, *Sogatella furcifera*

**Delphacidae: Hemiptera**

The body colour is creamy white; adult measures 3.1-4.0 mm in length; the forewings are uniformly hyaline with darker veins. There is a **conspicuous black dot** around the middle of the posterior edge of each forewing; the pronotum is pale yellow.

Brachypterans are prolific breeders.

Eggs are elongated, cigar shaped inserted by female in two rows on either side of the midrib of the leaf sheath.
Damaging symptoms

- **Stage of attack**: Early growth stage but sometimes serious infestation occurs at post flowering stage.
- **Damaging stages**: Adults (especially brachypterans) and nymphs.
- **Nature of damage**: Congregate at the base of the plant causing hopper burn.
- **Peak occurrence**: Between Nov-Dec and not cause damage to summer crop.

They are also vectors of **grassy stunt virus disease**.
Causes for outbreak

- Use of heavy doses of nitrogenous fertilizers
- Heavy irrigation with constant standing water
- Use of heavy pesticides specially pyrethroids resulting in resurgence
- Continuous cropping of paddy (in both the seasons) (monocropping)
- Close planting will result in prevention of aeration & light.
- Use of susceptible varieties.
- In low lying areas severity is more
Green leafhoppers
Paddy green leaf hoppers (Cicadellidae; Hemiptera)

**N. virescens**

The black spots in the forewing do not extend up to the black distal portion

**N. nigropictus**

Male has two black spots extending up to the black distal portion on the forewing

**N. cincticeps**

No black spot distal ends of the wings transparent
The leafhoppers attack all the aerial parts of rice plant.

This pest is distributed in Bangladesh, Burma, Hongkong, Indonesia, Malaysia, Pakistan, Philippines, Taiwan and India.

In India it is severe in Andhra Pradesh, Madhya Pradesh, Orissa and moderate to low in other rice growing states.
Nature and symptoms of Damage

- The nymphs and adults cause direct damage to rice crop by sucking sap from leaf sheaths and blades.
- The feeding marks predispose plants to fungal and bacterial infections.
- The affected leaves and plants turn to yellow colour and growth is retarded.
- They indirectly acts as vectors by transmitting virus diseases such as Tungro and Yellow dwarf.
- They also feed on some grasses like Cynodon dactylon, Echinochloa crusgalli and Eleusine indica, etc.
Leaf folder

- Rice cultivation with HYV’s and applications of high levels of N fertilisers helped leaf folder (*Cnaphalocrocis medinalis* Guenée) becoming a major pest.

- The larvae fold the leaves longitudinally and feed resulting in linear pale white stripe damage.
- In cases of severe infestation, the crop gives whitish appearance.
Rice hispa

- Hispa (*Dicladispa armigera*) is a major pest of rice in Assam, Meghalaya, Tripura, Manipur, A.P., M.P and U.P.

- The adult beetles feed on the epidermal tissue of the leaves and the grubs mine the leaf tissue.

- White blotches appear on leaves and in severe epidemics leaves dry up and the crop presents a scorched appearance.
Caseworm (*Nymphula depunctalis*) is commonly found in rice fields in low populations.

Due to continuous water stagnation in fields, it can build up and cause severe loss in early stage.

In severely damaged areas the whole crop may have to be resown/replanted.

Feeding damage includes cutting off the leaf tips to make leaf cases, patches of severe defoliation, stunted growth and death of plants.
Caseworm damage
Cut worms

- They are sporadic pests mainly causing damage in coastal and northeastern states.

- Larvae are polyphagous - feed on leaves during vegetative stage and cut the panicles at maturity.

- Severe infestation leads to deskeletonisation of leaves.
Rice Thrips
Of the three species of gundhi bug, *Leptocorisa oratorius* is common.

- Adults and nymphs suck the milk from developing grains

Infestation is characterised by:
- discolored panicles with brownish spots
- empty or ill-formed grains in the panicles.
Rice Blue beetle