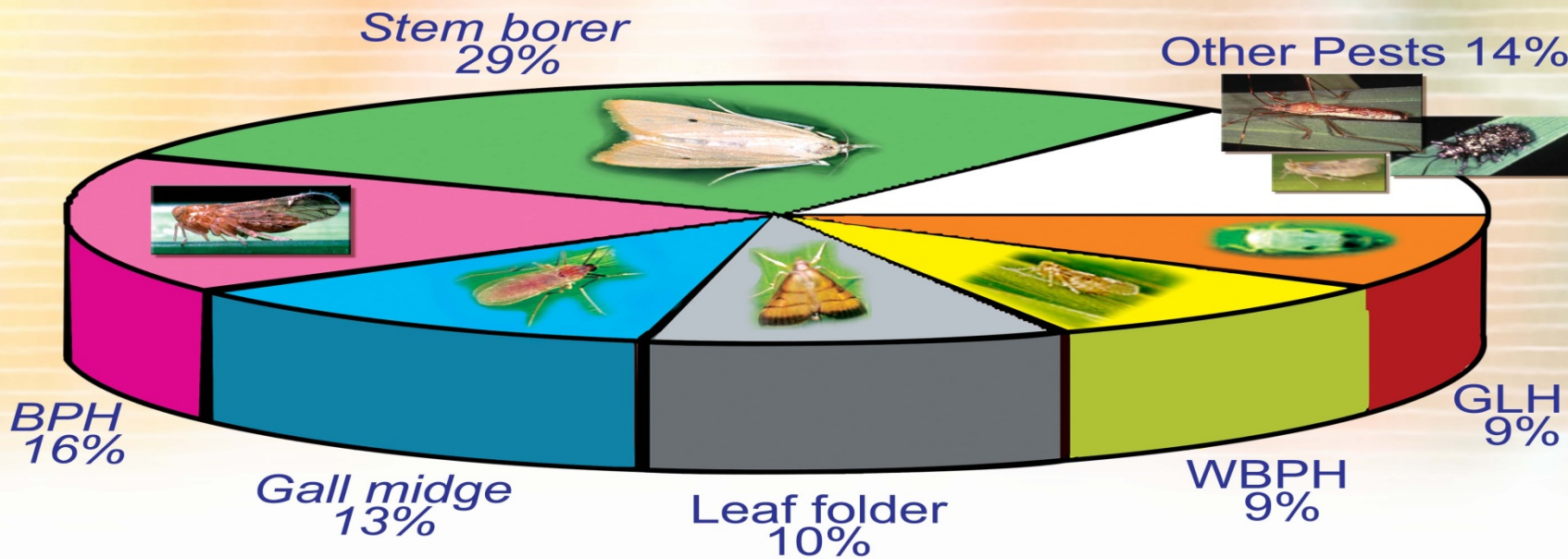


A wide-angle photograph of a vibrant green rice paddy field. The field is divided into several long, narrow rows by narrow, dark furrows. The rice plants are in the early stages of growth, appearing as a dense carpet of bright green. In the background, a line of trees and utility poles with power lines stretches across the horizon under a sky filled with soft, white clouds. The overall scene is bright and clear, suggesting a healthy agricultural environment.

Integrated Pest Management in rice

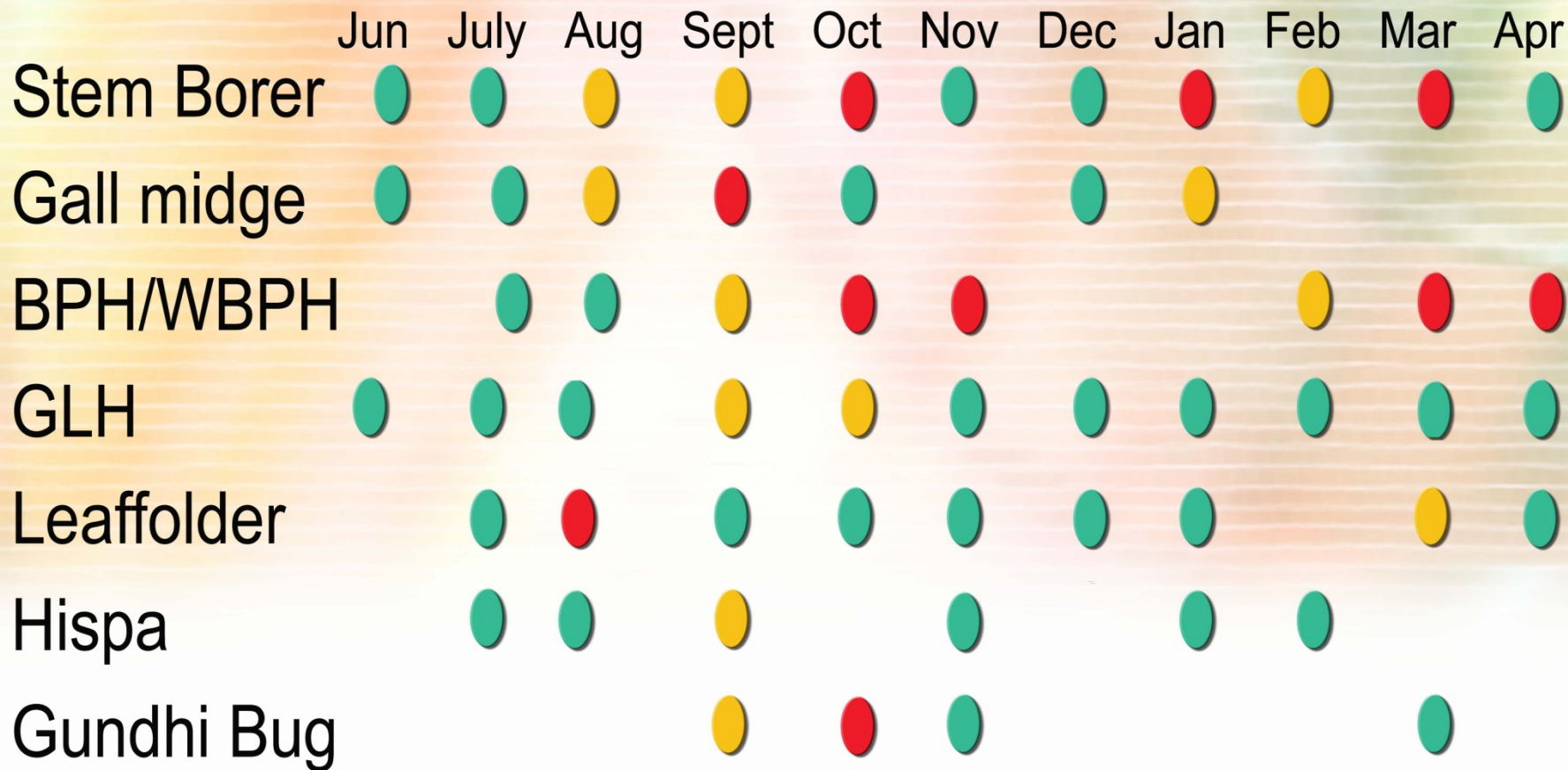
Relative Importance of Insect Pests of Rice in India*



* BASED ON YIELD LOSSES



Seasonal Profile Of Rice Insect Pests



 - Low;
  - Medium;
  - Severe



Stem borers

Yellow stem borer (*Scirpophaga incertulas*)`

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.



Male

Female

Egg mass



Dead hearts



White ears

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

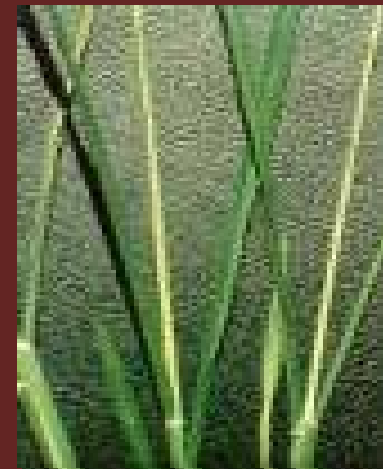
- Gall midge (*Orseolia oryzae*) - A key pest
- Six biotypes of this pest are reported in the country
- The maggot feeding induces an elongation of the leaf sheath into a 'gall'.



- The 'silver shoot' or 'gall' resembles an onion leaf. Profuse tillering is seen and resulting tillers do not bear panicles.

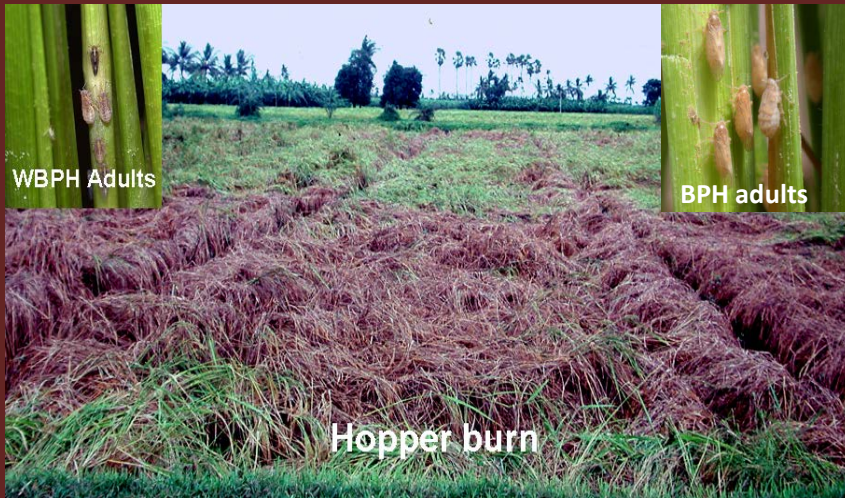
Nature and symptoms of damage

- 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.)

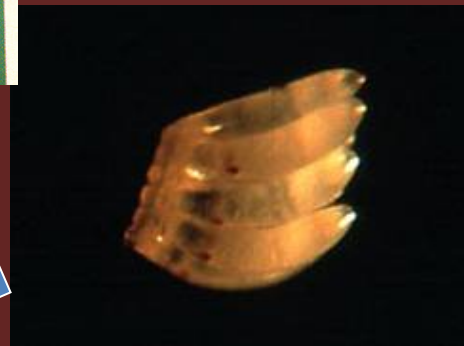
Delphacidae:Hemiptera



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



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

White backed Plant hopper, *Sogatella furcifera*

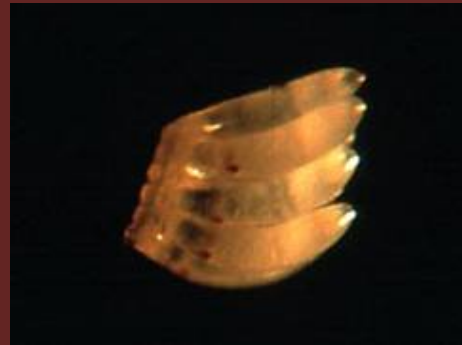
Delphacidae:Hemiptera



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

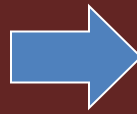


Brachypterans are prolific breeders

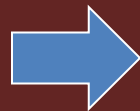


Eggs are elongated, cigar shaped inserted by female in two rows on either side of the **midrib of the leaf sheath**

Damaging symptoms



- **Stage of attack**:- Early growth stage but some times 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 is between **Nov-Dec** and not cause damage to **summer crop**.



They are also vectors of **grassy stunt virus disease**.

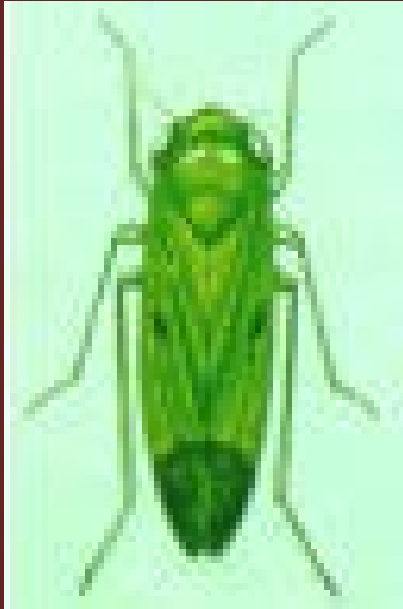
Causes for outbreak

- **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)



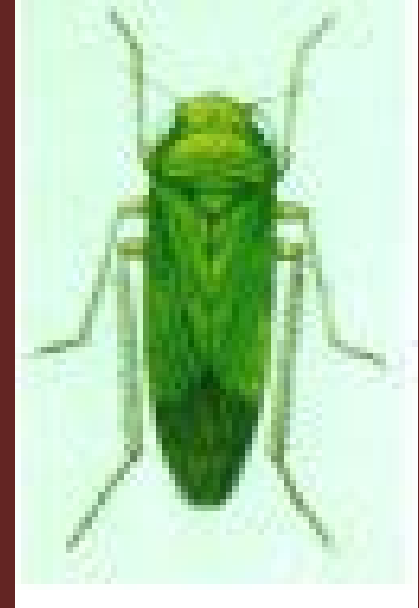
N. virescens

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* Guenee) 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 (*Dycladispa 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.



Rice caseworm

- ❖ 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

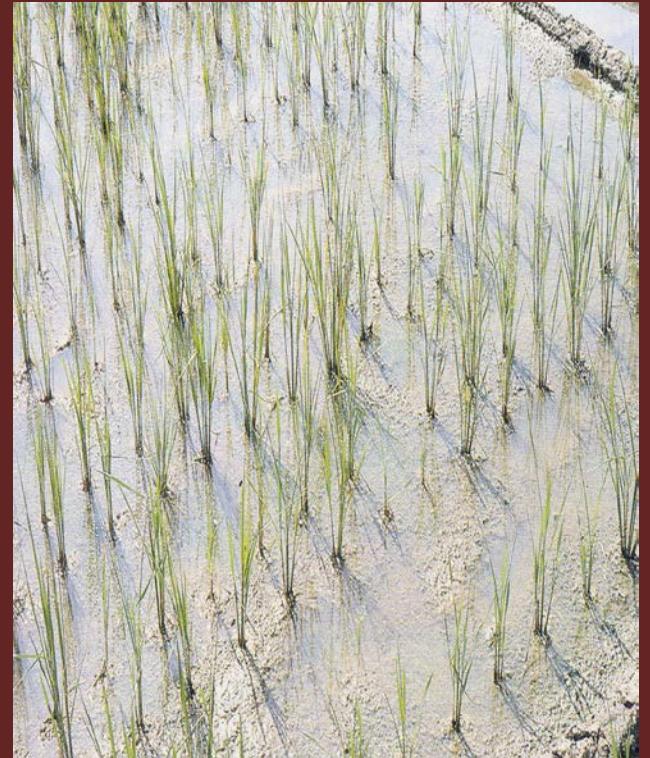


Cut worms



- 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



Gundhi bug



- 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



MITES

Leaf Mite



Panicle Mite

