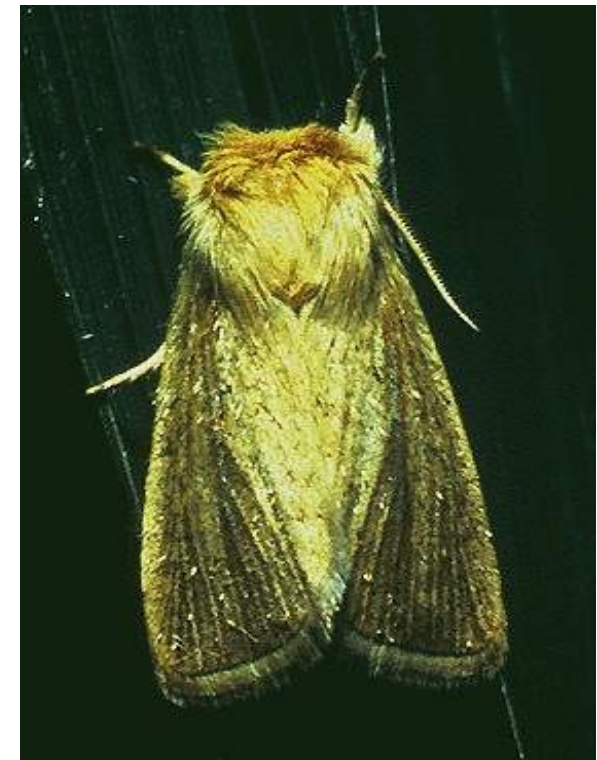


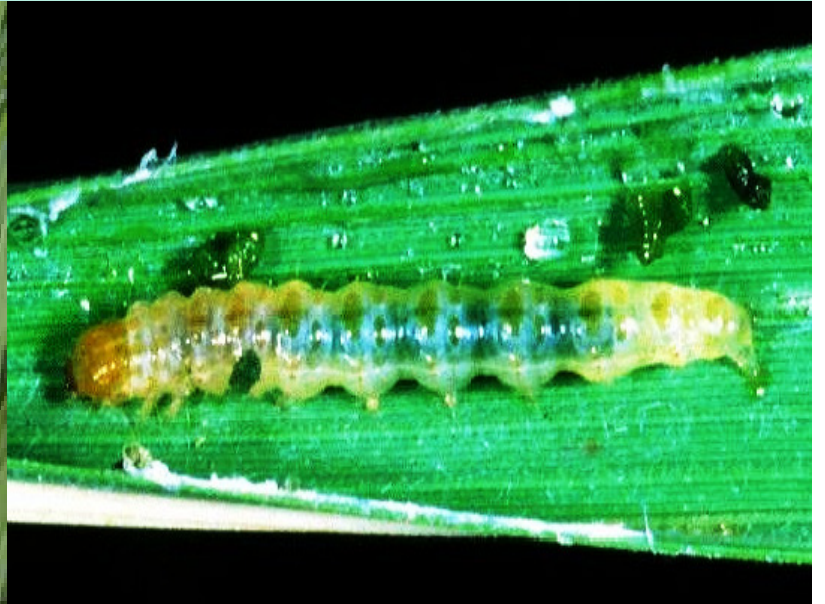


Important Pests of Paddy (*Oryza sativa*)



Rice Leaf Folder Fact Sheet

(also known as rice leaf roller, grass leaf roller)



| Cultural Control | Biological Control | Chemical Control |
|--|---|---|
| <ul style="list-style-type: none">• Not to use too much fertilizer• Surrounding grass habitats should be maintained because these serve as temporary reservoirs of natural enemies like crickets, which are egg predators of leaf folders• | <ul style="list-style-type: none">• Among the biological control agents, there are small wasps and crickets that attack the eggs• The larval and pupa stages are parasitized by many species of wasps. Damselflies, ants, beetles, wasps, mermithids, granulosis virus, and nucleopolyhedrosis virus prefer the larval stages• Spiders and mermithids attack the adults | <ul style="list-style-type: none">• Control of leaffolders using chemicals during the early crop stages is not advisable. A general rule-of-thumb is “spraying insecticides for leaffolder control in the first 30 days after transplanting (or 40 days after sowing) is not needed.• Pyrethroids and other broad-spectrum insecticides can kill the larvae but can put the crop at risk because of the development of secondary pests, such as the brown plant hopper• If infestations of the flag leaves are extremely high (>50%) during maximum tillering and maturity stage, insecticide sprays may be useful |

Rice Stem Borer Fact Sheet

(Yellow stem borer (YSB), *Scirpophaga incertulas* , Dark-headed stem borer (DHSB), *Chilo polychrysus* & Pink stem borer (PSB), *Sesamia inferens*)

| Cultural Control | Biological Control | Chemical Control |
|--|---|--|
| <ul style="list-style-type: none"> Cultural control measures include proper timing of planting and synchronous planting. The crops should be harvested at ground level to remove the larvae in stubble. Likewise, stubble and volunteer rice should be removed and destroyed. Ploughing and flooding the field can kill larvae and pupae in the stubbles. At seedbed and transplanting, egg masses should be hand-picked and destroyed. The level of irrigation water can be raised periodically to submerge the eggs deposited on the lower parts of the plant. Before transplanting, the leaf-top can be cut to reduce carry-over of eggs from the seedbed to the field. Application of nitrogen fertilizer should be split following the recommended rate and time of application. | <ul style="list-style-type: none"> Biological control agents include braconid, eulophid, mymarid, scelionid, chalcid, pteromalid and trichogrammatid wasps that parasitize the eggs of yellow stem borer. Ants, lady beetles, staphylinid beetles, gryllid, green meadow grasshopper, and mirid bug also eat eggs. The larvae are parasitized by phorid and platystomatid flies, bethylid, braconid, elasmid, eulophid, eurytomid and ichneumonid wasps. They are attacked by carabid and ladybird beetles, chloropid fly, gerrid and pentatomid bugs, ants, and mites. Bacteria and fungi also infect the larvae. A mermithid nematode also attacks the larvae. Chalcid, elasmid and eulophid wasps parasitize the pupae. Ants and earwigs also eat the pupa. Bird, asilid fly, vespid wasp, dragonflies, damselflies, and spiders prey upon the adults | <ul style="list-style-type: none"> Between hatching and penetration into the stem, the larvae are exposed to insecticide sprays for only a few hours. In general, systemic insecticides are more effective against <i>S. incertulas</i> than non-systemic ones The economic threshold for <i>S. incertulas</i> is 2 egg masses per 20 hills up to panicle initiation stage, and 1 egg mass thereafter (Reissig et al., 1986). Egg masses may be counted on 20 random hills along the diagonal of the field. When the threshold is reached, egg masses need to be collected and reared in vials or jars. If more parasitoids emerge than <i>S. incertulas</i> larvae, then there is no need to apply insecticide. However, if the larvae are more numerous than the parasitoids then the application of insecticide is justified. Light traps may be used to catch <i>S. incertulas</i>, the occurrence of which can be used as a signal to start monitoring for egg masses in the field. However, the economic threshold level practiced in Bangladesh is 3 egg mass and/or female moths/m² or 10-15% deadhearts (Anon., 1999). |

Brown Plant hopper (BPH), (*Nilaparvata lugens*) Fact Sheet

| Cultural Control | Biological Control | Chemical Control |
|--|--|---|
| <ul style="list-style-type: none"> • For example, draining the rice field for 3-4 days is recommended during the early stage of infestation. Nitrogen application can be split to reduce BPH buildup. Synchronous planting within 3 weeks of staggering and maintaining a free-rice period could also decrease the build-up of BPH. • There are varieties released by IRRI, which contain genes for BPH resistance, like IR26, IR64, IR36, IR56, and IR72. | <ul style="list-style-type: none"> • The common parasites of the eggs are the hymenopteran wasps. Eggs are preyed upon by mirid bugs and phytoseiid mites. Both eggs and nymphs are preyed upon by mirid bugs. Nymphs and adults are eaten by general predators, particularly spiders and coccinellid beetles. • Hydrophilid and dytiscid beetles, dragonflies, damselflies, and bugs such as nepid, microveliid, and mesoveliid eat adults and nymphs that fall onto the water surface. • Fungal pathogens also infect brown planthoppers. • BPH is a secondary problem due to insecticide spraying for leaf-feeding insects in the early crop stages. To reduce the risk of hopperburn, application of early season insecticide should be avoided. | <ul style="list-style-type: none"> • Insecticides from the three major classes (carbamates, organophosphates and synthetic pyrethroids) have been found to increase densities of <i>N. lugens</i> after treatment • Buprofezin is an insect growth regulator active against the BPH nymphal stages but not against the egg and adult stages. It should be used only when the majority of the field population are second or third instar. For control of adults and other insects in rice, BPMC and MICP (carbamates) are advised due to their lower toxicity to natural enemies of <i>N. lugens</i>. Granular carbofuran (3G) has been indicated to cause resurgence although it is commonly recommended for high infestations of stem borers. |