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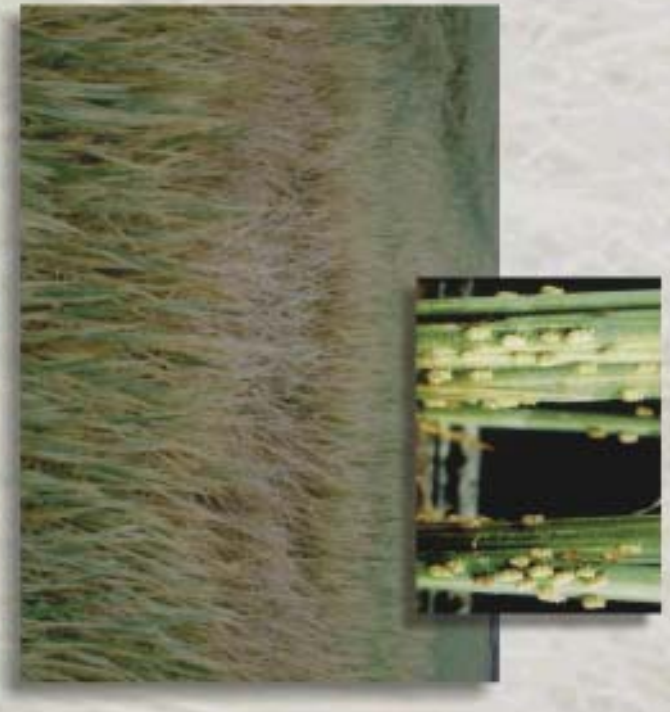

Management of Planthoppers and Leafhoppers

Rice Technology Bulletin Series

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Foreword

Many insect pests attack rice at its different stages of growth but only few are of national importance. Among these are the planthoppers and leafhoppers, which remove plant sap. These are commonly referred to as sap feeders.

This technology bulletin is designed to assist extension workers, farmers, and non-specialists to identify sap feeding insects, the ecosystem they dominate, the nature of damage they inflict, and their life cycle. Management options to reduce their ability to cause economic damage are also provided.

It is known that most sap feeders' outbreaks are induced by poor crop management practices. The misuse of insecticides triggers planthopper and leafhopper populations to multiply rapidly in the absence of the beneficial organisms, thereby, causing *hopperburn*. Asynchronous planting also contributes to their sustained population growth in the field. Aside from their direct feeding injury to the plant, planthoppers and leafhoppers transmit several rice viruses.

With this technology bulletin, it is hoped that our extension workers and farmers will be able to manage these insect pests properly.

LEOCADIO S. SEBASTIAN
Executive Director

Planthoppers and leafhoppers as pests

Planthoppers and leafhoppers are serious insect pests of rice. They damage the plants directly by sucking the plant sap, resulting in complete drying of the plants, which is called *hopperburn*. They also damage the plants indirectly by serving as vectors for the transmission of several virus diseases of rice.

The rice planthoppers and leafhoppers are characterized by having two pairs of membranous wings, mouthparts adapted for removing the plant sap, and short bristle-like antennae. There are three stages in the life cycle — egg, nymph, and adult. The nymphs resemble the adults but instead of wings, they have wing pads.

Leafhoppers generally feed on the leaves and upper parts of the plants, while the planthoppers usually infest the basal portions of the plants. However, when planthopper populations become high, they are distributed all over the plant including the panicles.

PLANTHOPPERS

Brown planthopper (BPH)

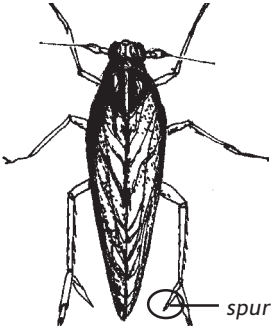
Nilaparvata lugens (Stål)

Local name(s)

Tagalog: *Kayumangging ngusong kabayo*
Cebuano: *Ulmog*

Insect characteristics

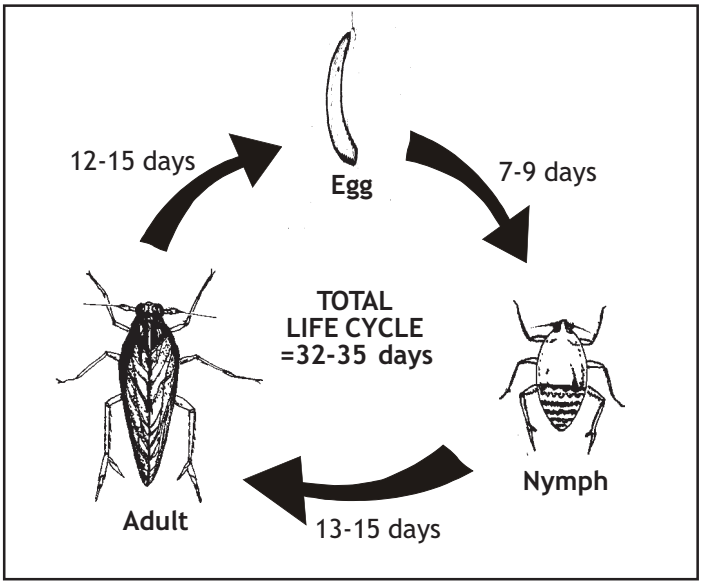
- Adults are 2.5-4.0 mm long, with either short or long wings.
- Hind legs have large and mobile spur.
- Food shortage, overcrowding, and unfavorable environment favor the development of long wings.



- Capable of long distance migration.
- Prefers lowland rice over upland rice.

Life cycle

- Eggs are laid in batches inside the leaf sheaths and on the leaf midribs.
- Nymphs are brown.
- Nymphs molt 5 times within 13-15 days before becoming adults.
- It takes 7-9 days for the eggs to hatch into nymphs.



Life cycle of a brown planthopper.

BPH population fluctuation

In a study conducted by Estoy *et al*. (2000), BPH population was generally low except in San Mateo, Isabela, where a peak was noted in August-September 1999. However, this was not observed in the following year (Fig. 1).

Knowing the peak of planthopper population in your locality will help you in deciding for proper management options.

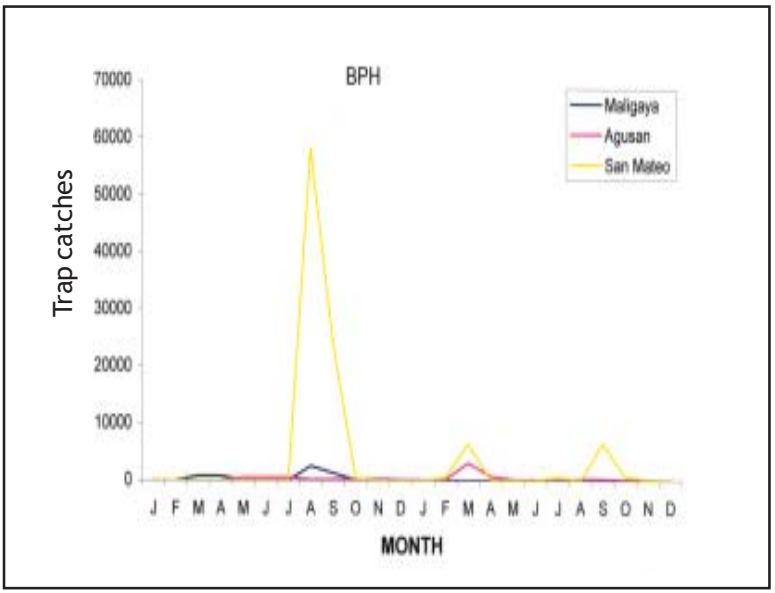


Fig. 1. Light trap catches of brown planthoppers observed at PhilRice Experiment Stations, 1999-2000.

White-backed planthopper (WBPH)

Sogatella furcifera (Horvárth)

Local name(s)

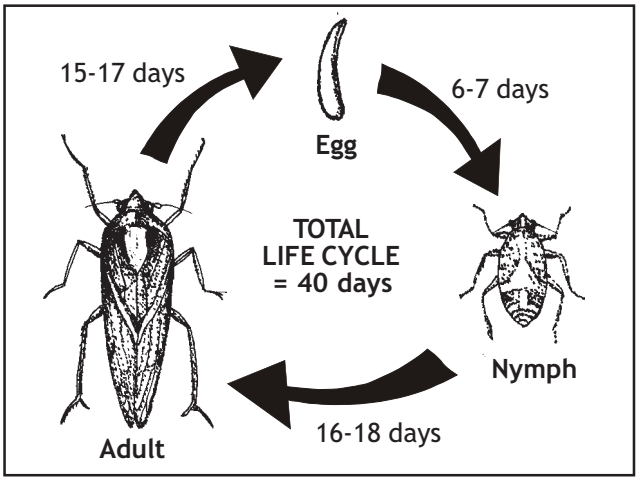
Ilocano/Cebuano: *Ulmog*
Tagalog: *Puting likod na ngusong kabayo*

Insect characteristics

- Adults are 3-4 mm long, either with short or long wings.
- Adults and nymphs resemble BPH but are pale brown with a white mark on its back.

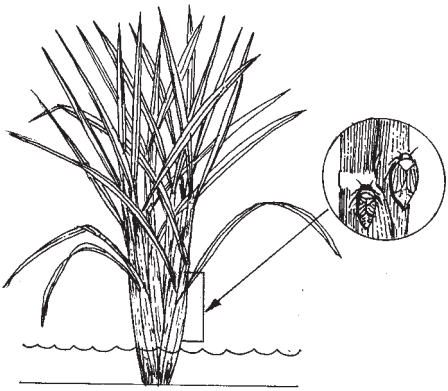
Life cycle

- Eggs are laid in batches inside the leaf sheaths.
- Nymphs become adults in 16-18 days.
- Adults live for about 18-30 days, with females living a little longer than the males.



Life cycle of a whitebacked planthopper.

Where to look for planthoppers



- Adults and nymphs conggregate on the basal part of leaf sheaths and stems of the plant.
- When disturbed, they move to the other side of the tiller or jump.
- Their presence can be detected by tapping plants with hand. They can also be detected in sticky traps. Adults with long wings are attracted to light sources.

Damage symptoms of planthoppers

- Adults and nymphs feed at the base of the tillers and remove the plant sap.
- Plants turn yellow and dry rapidly.
- Heavy infestations are characterized by patches of dried plants in circular manner. This condition is referred to as *hopperburn*.
- Honeydew excreted on infested plants becomes a medium for growth of sooty mold fungus, which interferes with normal plant functions.
- BPH transmit virus diseases such as ragged stunt and grassy stunt.

What favors them

- They prefer rainfed and irrigated wetland fields.
- Dense planting is prone to heavy planthopper damage.
- They attack at all plant growth stages, but plants are most susceptible from early tillering to flowering.

- High nitrogen levels, closer plant spacing, and higher relative humidity stimulate BPH to reproduce fast.
- Indiscriminate application of insecticides cause resurgence (by killing the insects' natural enemies).

Management Options for Planthoppers

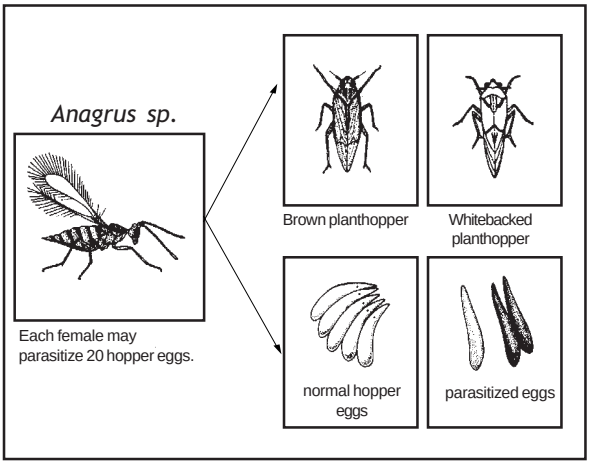
Biological, coupled with cultural control such as the use of resistant varieties and proper crop management practices, is the most ideal planthopper management strategy.

Cultural control

- Use varieties that are resistant to planthoppers.
- Grow early maturing varieties to have a rice-free period of more than 1 month to break pest cycle.
- Plow under ratoons and volunteer crops after harvest as these may serve as inoculum for viral diseases.
- Avoid dense planting in areas with history of recent planthopper infestations.
- Practice appropriate and balanced fertilizer application. Split nitrogen fertilizer into three applications during crop growth to reduce BPH build-up.
- Raise the level of irrigation water periodically to destroy the eggs that are deposited at the lower portions of tillers and in leaf sheaths.
- Intensify weeding to reduce hopper density. Straight row planting with proper spacing does not favor multiplication of planthoppers.
- Maintain low water level to enhance killing action of useful organisms.

Biological control

- Useful organisms should be encouraged to build-up by avoiding early application of insecticides.
- Small wasps (e.g. *Anagrus* sp. and *Oligosita* sp.) attack eggs.
- Mirid bugs prey on eggs.
- Dragonflies and damselflies prey on nymphs and adults during flight.
- Spiders, water bugs, and lady beetles prey on nymphs and adults.
- Dryinids kill nymphs.
- Some entomophagous fungi kill nymphs and adults.



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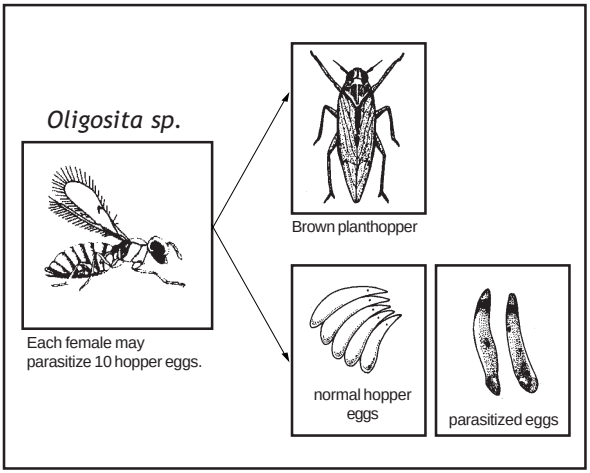


Courtesy of IRRI

Chemical control

- Applying insecticides when population is mostly young nymphs is wasteful because useful organisms usually keep their numbers under control.
- Indiscriminate use of insecticides causes BPH resurgence.

- Selective insecticides can also be used on strategic areas with very high population. However, proper application must be observed.

  In a study conducted by R.C. Joshi et al. in 1986 at Caloocan, South Cotabato, they found that after insecticide applications against defoliators, the population of the spiders (major brown planthopper [BPH] predator) decreased while the population of BPH dramatically increased.

Source: IRRN 17:3 (June 1992)

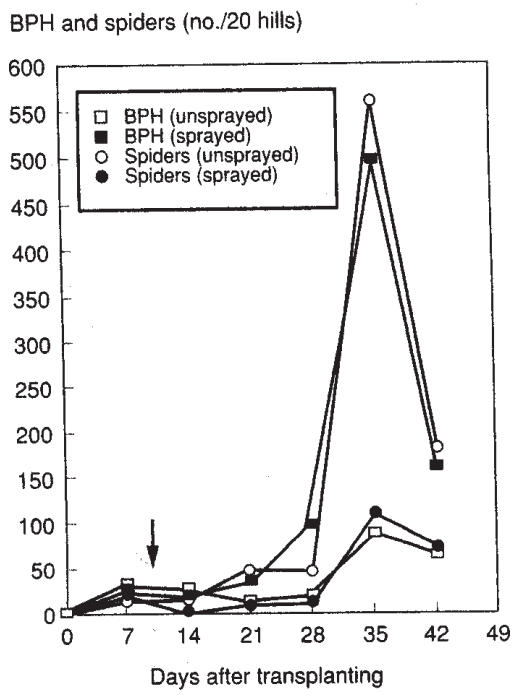


Fig. 2. Total number of BPH and spiders sampled by D-vac, Caloocan, South Cotabato, Philippines. 1986 wet season.

LEAFHOPPERS

Green leafhopper (GLH)

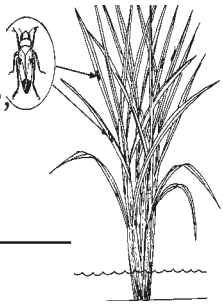
Nephotettix spp.

Local name(s)

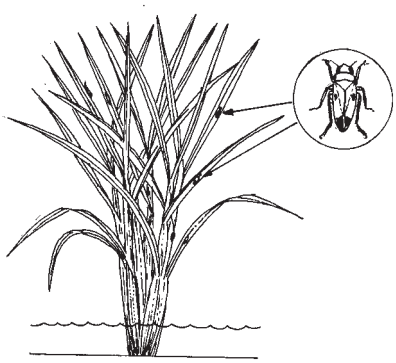
Tagalog: Berdeng ngusong kabayo
Ilocano: Ulmog
Cebuano: Ulmog

Insect characteristics

- Adults are 3.2-5.3 mm long, active, and mobile.
- Green with black markings on the head, face, wings, and wing tips.



Where to look



- Mostly on the leaves and leaf sheaths.
- Jump readily when disturbed.
- Hand tapping of plants and use of an insect sweep net are rapid detection methods.
- Adults are attracted to light.

Damage symptoms

- Adults and nymphs rarely cause serious feeding damage to rice plant, unlike planthoppers.

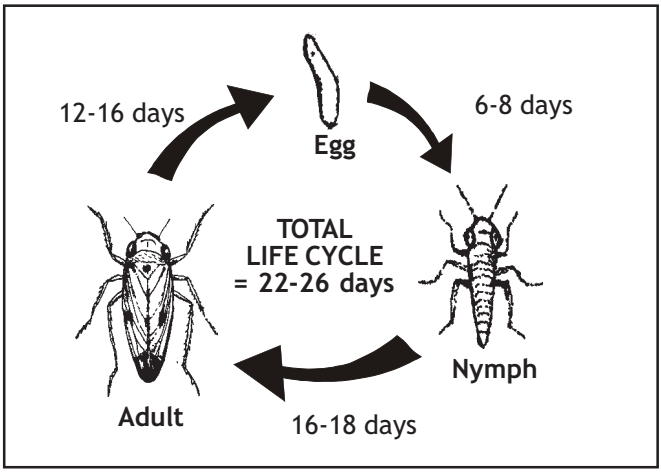
- GLH transmit viruses (tungro and dwarf) and mycoplasma agents of yellow dwarf and orange leaf diseases.

What favors them

- Grasses near irrigation canals and levees, rice ratoons, and re-growths provide food and are egg-laying hosts.
- Tillering stage is most favorable for rapid population build-up; seedling to booting stages are susceptible.

Life cycle

- Eggs are laid in small slits made in the soft parts of the leaf sheaths.
- Newly laid eggs are barely visible and are cylindrical, banana-shaped, and pale yellow.
- Nymphs emerge from eggs in 6-8 days.
- Nymphs have varied color pattern on the noctum (neck).
- The first instar nymphs are numerous on the lower surface of older leaf blades, but from second instar onwards, they distribute themselves evenly on the leaves.
- There are five instars before they become adult.
- The total life cycle from egg to adult is 22-26 days.



Life cycle of the green leafhopper.

GLH population fluctuation

In a study conducted by Estoy et al. (2000), GLH population showed peaks during March, August-September, and December in 1999. In 2000, peaks were observed in March, July, and December. Population fluctuations follow the same trend in the four monitoring sites. However, higher populations were obtained in Midsayap throughout the monitoring period. The high population of GLH in Midsayap could be one factor for the high incidence of tungro in the area.

Knowing the peak of leafhopper population in your locality will help you in deciding for proper management options.

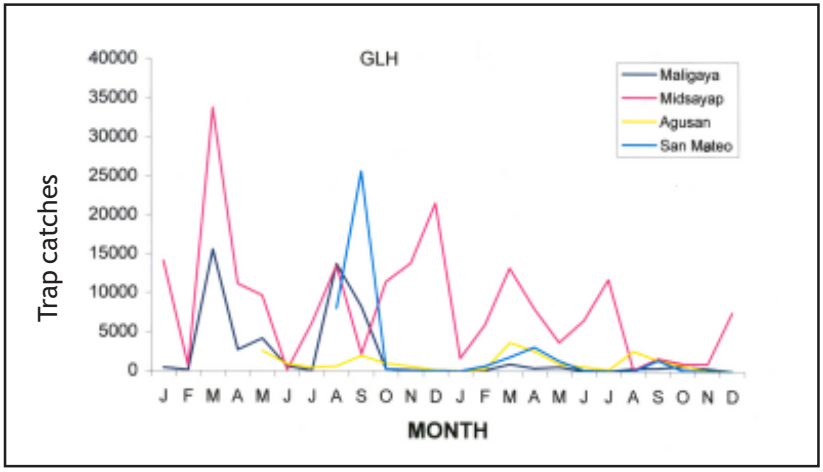


Fig. 3. Light trap catches of green leafhoppers observed at PhilRice Experiment Stations, 1999-2000.

Zigzag leafhopper (ZLH)

Recilia dorsalis (Motsch.)

Local names

Tagalog: *Sigsag na ngusong kabayo*
Cebuano: *Ulmog*

Insect characteristics

- Slender, small insects; active and mobile.
- Adults are 3.5-4.0 mm long.
- Forewings are white with pale brown bands forming the shape of a "*W*" giving the zigzagged pattern.
- Like GLH, they jump readily when disturbed.
- They are present in all rice ecosystems.

Where to look

- On leaves and tillers near the base.
- On seedbeds and early growth stages of rice.

What favors them

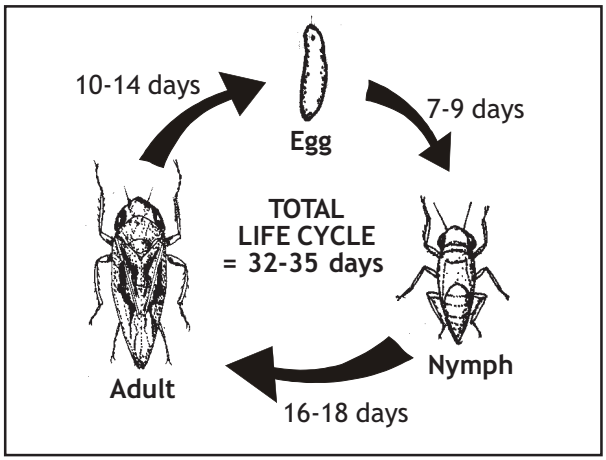
- A weed-covered levee between planting seasons.
- Dense rice growth.

Damage

- Nymphs and adults suck plant sap.
- Nymphs and adults excrete honeydew which causes sooty mold.
- They transmit orange leaf, tungro, and dwarf viruses.

Life cycle

- Eggs are laid in rows within the leaf sheaths.
- Eggs hatch to nymphs in 7-9 days.
- Nymphs are white to yellowish brown.
- There are five instars lasting for 16-18 days before they become adult.
- Adults live for 10-14 days.



Life cycle of a zigzag leafhopper.

Management options for leafhoppers

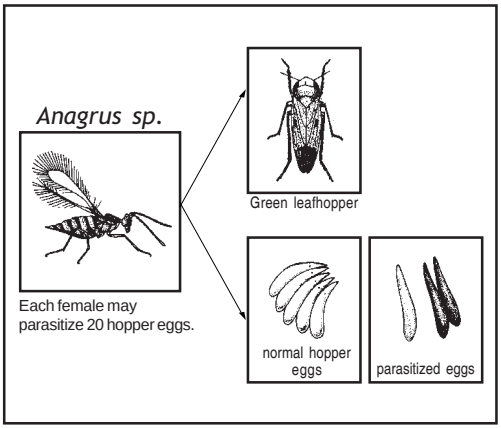
Cultural control

- Sanitation. Remove ratoons and volunteer plants because these may become a source of inoculum for virus diseases.
- Use resistant varieties.
- Transplant older seedlings to reduce the plants' susceptibility during the vegetative period.
- Practice synchronous planting to reduce the risk of insect transmitted diseases.
- Avoid the use of high nitrogen fertilizer rate because it makes rice tillers more succulent, thus, more attractive to leafhoppers.

- Practice crop rotation with a non-rice crop during the dry season.
- Grow not more than two crops of rice per year.
- Avoid dense planting as it increases the population of leafhoppers.
- Know the peak of leafhopper population in your locality to determine possible management options (Fig. 3).

Biological control

- Conserve and enhance naturally occurring biological control agents such as parasitoids, predators, and microbial agents. This could be attained through reduced or judicious use of pesticides.
- Small wasps (*e.g.* *Anagrus* sp. and *Oligosita* sp.) kill eggs.
- Biological control agents such as dryinids, water bugs, dragonflies, damselflies, spiders, and nematodes attack nymphs and adults.



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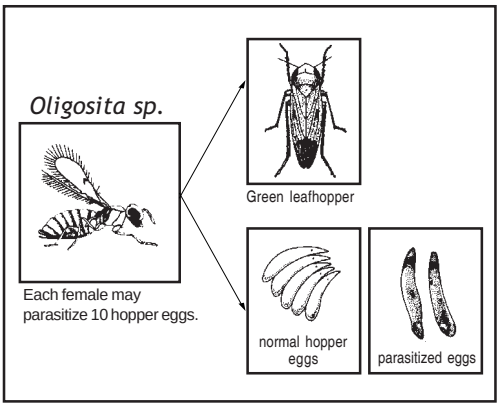

Courtesy of IRRI

Chemical control

- Apply insecticide if tungro virus disease is prevalent in the area.
- Use insecticides judiciously to maximize the beneficial effects of useful organisms.

Diagnostic key to Leafhoppers/Planthoppers

1. The leaves turn pale, yellow, and later wither leading to total drying of the plant. The drying plants are found in patchy form. It is caused by **Leafhopper/Planthoppers** (Go to 2).

2.1 When plants are gently tapped or swept with insect collection net, a large number of greenish colored hoppers with or without black spots on forewings are seen. Small greenish nymphs fall on water surface when plants are tapped. Hindlegs have hairs. These are nymphs and adults of **Green leafhopper**.

2.2 When basal parts of the plants are tapped, brown colored hoppers fall on the water. They may be winged or wingless. Outgrowth are observed on the hindlegs. These are nymphs and adults of **Brown planthopper**.

2.3 When the basal parts of the plant are tapped, light gray hoppers with white stripes on the middle of the thorax fall on water surface. Outgrowths are observed on the hindlegs. These are the nymphs and adults of **White-backed planthopper**.

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DA-PhilRice

The Philippine Rice Research Institute (PhilRice) is a government corporation attached to the Department of Agriculture (DA). Executive Order 1061 approved on November 5, 1985 and amended by EO 60 dated Nov. 7, 1986, created PhilRice to help develop high-yielding technologies so that farmers can produce enough rice for all Filipinos. PhilRice accomplishes this mission through research, technology promotion, and policy advocacy, which are implemented through a network that includes 57 agencies and 115 seed centers strategically located nationwide.

Its interdisciplinary programs include the following: (1) direct-seeded and (2) transplanted irrigated lowland rice; (3) hybrid rice; (4) rice for adverse environments; (5) rice-based farming systems; (6) rice and rice-based products; (7) policy research and advocacy; and (8) technology promotion. With these programs, PhilRice aims to develop and promote technologies that are ecosystem-based, location- and problem-specific, and profitable to the Filipino farmers.

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