

## Lecture No. 2

### PESTS OF RICE – BORERS AND FOLIAGE FEEDERS

Yellow stem borer, leaf folder, gall midge, other defoliators are important and cause significant reduction in yield in rice growing areas.

<b>Major pests</b>				
1.	Yellow stem borer	<i>Scirpophaga incertulas</i>	Pyraustidae	Lepidoptera
2.	Gall midge	<i>Orseolia oryzae</i>	Cecidomyiidae	Diptera
3.	Swarming caterpillar	<i>Spodoptera mauritia</i>	Noctuidae	Lepidoptera
4.	Leaf folder	<i>Cnaphalocrocis medinalis</i>	Pyralidae	Lepidoptera
5.	Rice case worm	<i>Nymphula depunctalis</i>	Pyraustidae	Lepidoptera
6.	Rice skipper	<i>Pelopidas mathias</i>	Hesperiidae	Lepidoptera
7.	Spiny beetle / Rice hispa	<i>Dicladispa armigera</i>	Chrysomelidae	Coleoptera
8.	Whorl maggot	<i>Hydrellia sasakii</i>	Ephydriidae	Diptera
9.	Rice horned caterpillar	<i>Melanitis ismene</i>	Satyridae	Lepidoptera
10.	Yellow hairy caterpillar	<i>Psalis pennatula</i>	Lymantriidae	Lepidoptera
<b>Minor pests</b>				
11.	Grasshopper	<i>Hieroglyphus banian</i>	Acrididae	Orthoptera
12.	Short horned grasshopper	<i>Oxya nitidula</i>	Acrididae	Orthoptera
13.	Blue beetle	<i>Halticia cyanea</i>	Chrysomelidae	Coleoptera
14.	Rice root weevil	<i>Echinocnemus oryzae</i>	Curculionidae	Coleoptera
15.	Rice root weevil	<i>Hydronomidus molitor</i>	Curculionidae	Coleoptera
16.	Rice root grub	<i>Arthrodeis</i> sp.,	Tenebrionidae	Coleoptera

## MAJOR PESTS

### 1. Yellow stem borer: *Scirpophaga incertulas* (Pyraustidae: Lepidoptera)

**Distribution and Status:** Afghanistan, Bangladesh, Burma, Cambodia, China, India, Sri Lanka and Indonesia.

**Host range:** Rice

#### Damage symptoms

Larva feeds on the stem and causes drying of the central shoot known as “dead heart” in the young seedlings, and drying of the panicle in grown up plant called “white ear”. Damage ranges from 30-80%.



Whitehead or dead panicles at reproductive stage (IRRI)

#### ETL

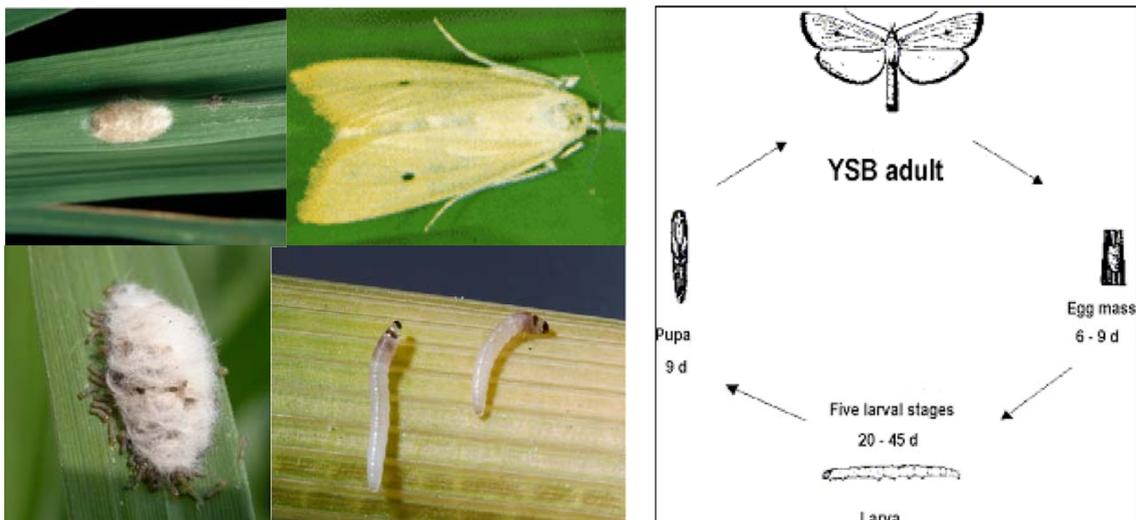
2 egg masses/ m<sup>2</sup>

10% dead hearts - Vegetative stage

2% white ear - Flowering stage

#### Bionomics

Female moth has bright yellowish brown fore wings with a black spot and a tuft of yellow anal hairs while male is smaller with pale yellow forewings without black spot. Each female lays 170-200 eggs in a mass of 15-80 on the upper surface of leaf tips covered with buff coloured hairs.



The egg period 6-9 days; larva pale yellow with dark brown head, swims in water

and bores in to the stem near the node. The larva migrates to other tillers also. Larval period 20-45 days, pupation in white silken cocoon. Pupa dark brown in color, pupal period is 6-10 days.

### **Management**

1. Grow resistant varieties viz., Ratna, Jaya, TKM 6, IR 20 and IR 26, Sayasree, Saket, IET 3127, IET 2812, MTU 5849, PTB 12, PTB 20, PT 321, H 4
2. Clip the seedling tips before transplanting to eliminate egg masses and collect & destroy the egg masses in main field.
3. Avoid close planting and continuous water stagnation at early stages.
4. Collect and destroy the dead hearts and white ears.
5. Set up light traps to attract and kill the moths.
6. Install sex pheromone traps to monitor and mass trap.
7. Release the egg parasitoid, *Trichogramma japonicum* twice on 30 and 37 DAT @ 5 cc/ha/release.
8. Apply *Bacillus thuringiensis* var *kurstaki* and neem seed kernel extract in the combination of 2.5 g/L and 1% to reduce the oviposition by the stem borer.
9. Apply carbofuran 3 G @ 25 kg or benfuracarb 3 G 33 kg or chlorantraniliprole 0.4 G 10 kg or fipronil 0.3 G 17-25 kg or cartap hydrochloride 4 G 18.75 kg or spray acephate 75 SP 666-1000 g cartap hydrochloride 50 SP 1 kg or monocrotophos 36 SL 1.0 L or quinalphos 25 EC 1.0 L or azadirachtin 0.15 W/W 1.5-2.5 L or azadirachtin 5 % 400 ml or carbosulfan 25 EC 800-1000 ml or chlorantraniliprole 18.5 SC 150 ml or ethofenprox 10 EC 500-750 ml or fipronil 5 SC 1-1.5 L or fipronil 80 WG 50-62.5 g or flubendiamide 20 WG 125 g or flubendiamide 39.35 M/M SC 50 ml or lambda-cyhalothrin 2.5 EC 500 ml/ 5 EC 250 ml or phosphamidon 40 SL 1.25 L or thiacloprid 21.7 SC 500 ml or thiamethoxam 25 WG 100 g per ha using water @ 500 L/ha
10. Harvest the crop up to the ground level and disturb the stubbles with plough immediately after the harvest

## **2. Gall midge: *Orseolia oryzae* (Cecidomyiidae: Diptera)**

**Distribution and Status:** India, Burma, Cambodia, Sri Lanka, China, Indonesia, Nigeria, Sudan, Vietnam and Pakistan.

### **Host range**

Rice, wild species of *Oryza* and grasses like *Paspalum scrobiculatum*, *Panicum* spp., Cyanodan *dactylon* and *Eleusine indica*.

### **Damage symptoms**

The maggot feeds at the base of the growing shoot causing formation of a tube like

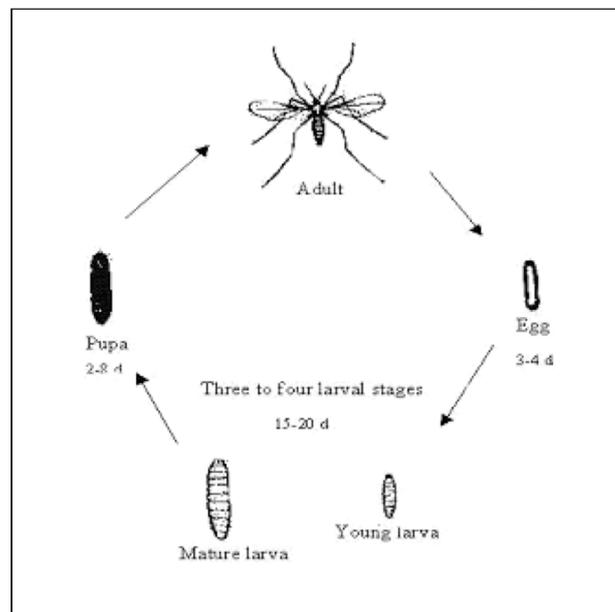
gall similar to “onion needle” or “silver-shoot”. Infested tillers produce no panicles.



**Onion shoots affected tillers (IRRI)**

**ETL:** 10% silver shoots.

**Bionomics**



Orange coloured mosquito like fly is active during night and lays 100-300 reddish, elongate, tubular eggs just near the ligule of the leaf blade. Egg period 3-4 days, maggot pale red during feeding and larval period 8-10 days. Maggot pupates at the base of the gall and moves to tip of the gall and projects outside during emergence. Life cycle lasts for 15-20 days.

## Management

1. Encourage early planting of the crop with quick growing varieties to escape infestation.
2. Use resistant varieties like MDU-3, Shakthi, Vikram, Sureka, IR 36, Kkatiya, Dhanaya Lakshmi, Phalguna, Kunti, Shamlei, Asha, Rajendran, Shrakasha, Erra mallelu, Kavya, Orugallu and R 650 -1820
3. Plough immediately after crop harvest.
4. Remove the alternate host.
5. Apply fertilizers in balanced manner.
6. Set up light trap @ 1 / ha as a monitoring device. Infra red light trap attracts gall midge effectively.
7. Release larval parasitoid, *Platygaster oryzae* through parasitized galls @ 1 per 10 m<sup>2</sup> in the main field at 10 days after transplanting (DAT).
8. The is an effective predator.
9. Conserve predatory spiders like *Tetragnatha*, *Argiope catenulata* and carabid beetle (*Ophionia indica*) in rice ecosystem.
10. Apply carbofuran 3G @ 25 kg or fipronil 0.3 G 16.7 - 25.0 kg or spray endosulfan 35 EC 1.0 L or quinalphos 25 EC 1.0 L or ethofenprox 10 EC 500-750 ml or fipronil 5 SC 1.0 -1.5 kg or lambda-cyhalothrin 2.5 EC 500 ml / 5 EC 250 ml or thiamethoxam 25 WG 100 g in 500 L water/ha

### 3. Swarming caterpillar: *Spodoptera mauritia* (Noctuidae: Lepidoptera)

#### Host range

Rice, maize, jowar, wheat, barley and sugarcane

#### Distribution and status

India, South East Asia, USA, Australia, Africa

#### Damage symptoms

This is a sporadic pest but causes very serious damage to young crops when it appears in large numbers. The caterpillars feed at night and hide during the day.

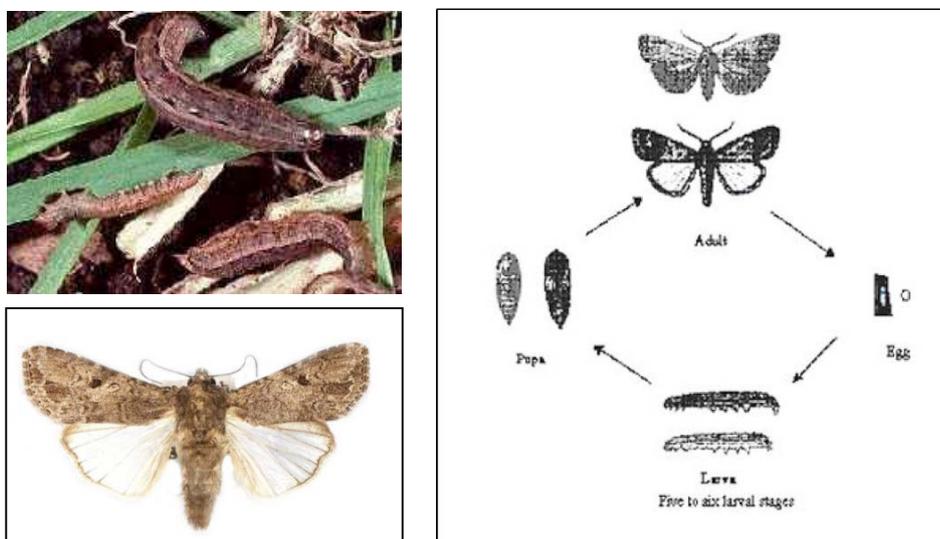


**Damaged leaf blades and Panicles cut off from the base (IRRI)**

Larvae cut the seedlings in large scale and appears as if grazed by cattle by its nocturnal feeding. Peduncles of ears are bitten through in maturing crop. They feed gregariously and march from field to field. The damage is severe in July - September. It breeds on a variety of grasses. Yield loss ranges from 10-20%.

### Bionomics

Adult moth is medium sized stoutly built, dark brown with a conspicuous triangular spot on fore wings. Eggs are laid in masses on leaves and covered with grey hairs. The egg period is 7 days. Caterpillar is cylindrical, dark to pale green with lateral lines along the body. The larval period is 20-25 days. It pupates in an earthen cocoon in soil for 10-15 days.



### Management

1. Conserve larval parasitoids viz., *Apanteles ruficus*, *Meteorus* sp., *Charops bicolor*, *C. dominans*, *Drino unisetosa*, *Pseudoperichaeta orientalis*, *Strobliomyia aegyptia*, *Pseudogonia cinerascens*, *Tachinia analis*, *Cuphocera varia*, *Sturmia inconspicua*, *Chelonus* sp., *Euplectrus euplexiae*, *E. spodopterae* and a parasitic nematode (*Hexamermis* sp.)
2. Conserve pupal parasitoids viz., *Netelia* sp., *Actias* sp., *Drino* sp. and *Isomera cinerascens*
3. Protect vertebrate predators of the larvae viz., House Crow *Corvus splendens*, Jungle Crow *C. macrorhynchos*, Cattle Egret *Bubulcus coromandus*, Indian pond heron or Paddy bird *Ardeola grayi*, white breasted water hen *Amaurovius phoenicocurus*, Indian Myna *Acridotheres tristis*.
4. Flood the nursery to expose the hiding larvae to the surface for birds to pick them up.

5. Kerosenate water during irrigation to suffocate and kill the larvae.
6. Allow ducks into the field to feed on the larvae.
7. Drain water from nursery and spray chlorpyrifos 20 EC 80 ml (or) endosulfan 35 EC 80 ml during late evening.

#### 4. Leaf folder (or) leaf roller: *Cnaphalocrocis medinalis* (Pylalidae: Lepidoptera)

##### Distribution and status

India, Sri Lanka, China, Japan, Madagascar, New Guinea, Pakistan, Bangladesh, South East Asia, Korea.

**Host range:** Grasses



##### Damage symptoms

The caterpillar folds the leaves longitudinally and remains inside. It scrapes the green tissues of the leaves and makes them white and dry. During severe infestation the whole field exhibits scorched appearance.

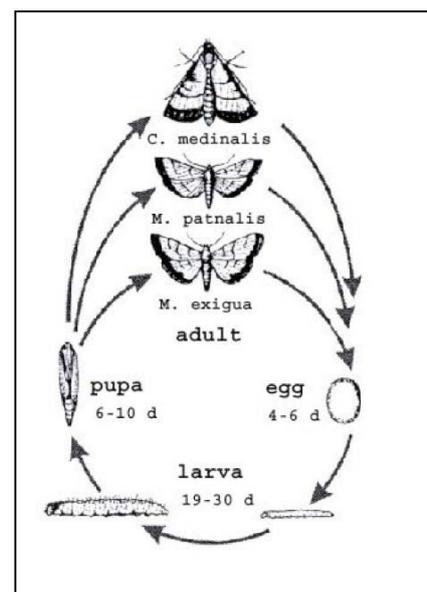
##### ETL

10% damaged leaves in vegetative stage

5% damaged leaves (flag leaf) in flowering stage

##### Bionomics

The adult moth is often seen in the field during daytime. The moth is brownish with many dark wavy lines in centre and dark band on margin of wings. The female moth lays eggs in batches of 10-12, which are arranged in linear row in the lower surface of leaves. The eggs are flat, oval in shape and yellowish white in colour. The egg period is 4-7 days. Larva is 15-20 mm long, pale green, transparent, actively moving caterpillar. The larval period is 15-20 days. It pupates inside the leaf fold. The pupa is greenish brown. The pupal period is 6-8 days. Total life cycle: 25-35 days.





## Management

1. Use resistant varieties like TNAU LFR 831311, Cauvery, Akashi, TKM-6, IET 7511, IET 9225 and IET 9797, ASD 20, VC Dhan 221, PTB 12, PTB 20, PT 321, H 4
2. Clipping of affected leaves reduces the pest population.
3. Trim the bunds and remove grassy weeds.
4. Avoid use of excessive nitrogenous fertilizer.
5. Set up light traps to attract and kill the moths.
6. Release *Trichogramma chilonis* thrice on 37, 44 and 51 DAT followed by three sprays of monocrotophos 36 SL 1.0 L/ha on 58, 65 and 72 DAT.
7. Apply benfuracarb 3 G 3.3 kg or cartap hydrochloride 4 G 1.875 - 2.5 kg /ha
8. Spray any of the following insecticide in 500 L water/ha
 

• NSKE 5% 25 kg	• Chlorpyrifos 20 EC 1.25 L
• Acephate 75 SP 666-1000 g	• Ethofenprox 10 EC 500-750 ml
• Azadirachtin 0.15% w/w 1.5 - 2.5 L	• Fipronil 80 WG 50 - 62.5 g
• Azadirachtin 5% 400 ml	• Phosalone 35 EC 1.5 L

- Cartap hydrochloride 50 SP 1 kg
- Flubendiamide 20 WG 125 - 250 g  
or 39.35 M/M SC 50 ml
- Chlorantraniliprole 18.5 SC 150 ml or 0.4 G 10 kg
- Phosphamidon 40 SL 1.25 L
- Lambda-cyhalothrin 2.5 EC 500 ml  
or 5 EC 250 ml
- Thiamethoxam 25 WG 100 g

### 5. Rice case worm: *Nymphula depunctalis* (Pyraustidae: Lepidoptera)

**Distribution and Status:** India, South East Asia, Australia

**Host plant:** Rice

#### Damage symptoms

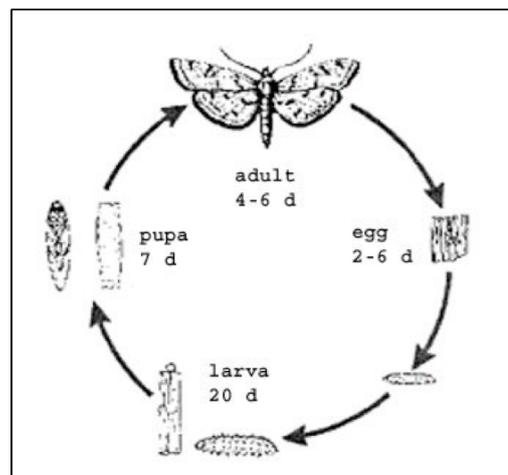


**Floating leaf cases (IRRI)**

The caterpillars feed on green tissues of the leaves and form tubular cases around them by cutting the apical portion of leaves, which float on water. Several tubes are also seen hanging from the plants. In case of severe infestation plants are unable to grow. They damage leaf tips. The apical portion of cut leaves bear whitish papery areas since the chlorophyll is scrapped.

#### Bionomics

Adult is a delicate white moth with pale brown wavy markings. Eggs are laid on leaves. Egg period is 2-6 days. Larva is pale translucent green with orange head. Larva constructs a case. Larval period is 14-20 days. Larva has filamentous gills on the sides of the body that helps to lead a semi aquatic life. It pupates in case it self for 4-7 days. The total life cycle occupies 19-37 days.





### Management

1. Conserve larval parasitoids viz., *Elasmus* sp., *Apanteles* sp., *Bracon* sp.,
2. Conserve pupal parasitoids viz., *Pediobius* sp., *Apsilops* sp., *Eupteromalus parnarae*
3. Drain water from the field
4. Dislodge the cases by running a rope over the young crop
5. Spray endosulfan 35 EC or monocrotophos 36 SL 1.0 L or phenthoate 50 EC 1.0 L in 500 L water/ha.

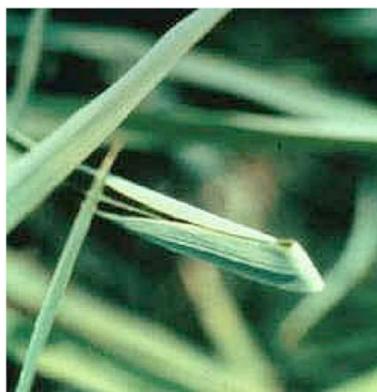
### 6. Rice skipper: *Pelopidas mathias* (Hesperiidae: Lepidoptera)

**Distribution and status:** India, South East Asia, China, Africa

**Host range:** Rice, Sugarcane

#### Damage symptoms

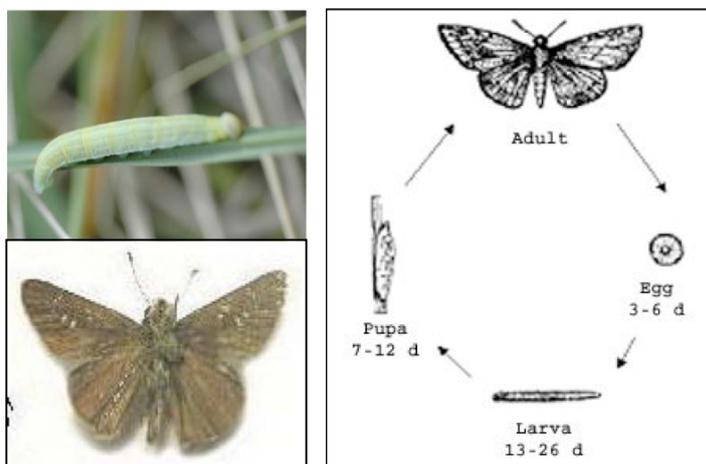
Edges of the leaves are fastened with webbing. Backward rolling of leaves, feeding from margin inwards are symptoms of damage.



**Folded Leaves (IRRI)**

## Bionomics

Adult butterfly has brown coloured wings and curved antennae. Eggs are laid singly on the leaf blades. Larva is pale green with constricted neck.



## 7. Spiny beetle / Rice hispa: *Dicladispa armigera* (Chrysomelidae: Coleoptera)

### Distribution and status

Bangladesh, Burma, Southern China, India, West Malaysia, Nepal, Pakistan, Sumatra, Thailand, West Iran.

**Host range:** Rice

### Damage symptoms

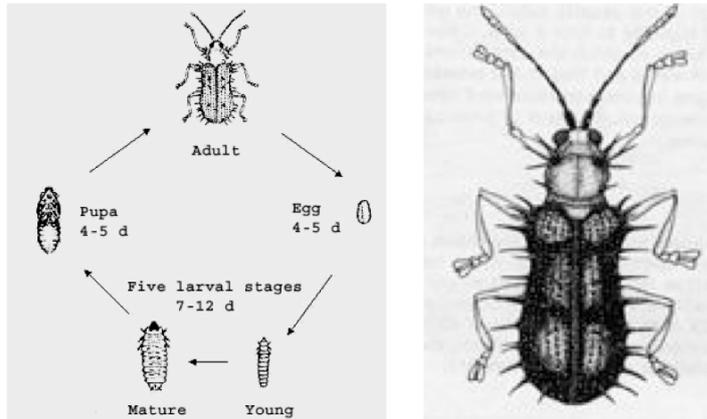
Adults feed on chlorophyll by scraping and cause white parallel streaks (or) white patches along the long axis of leaf. Grubs mine into the leaves and make blister near leaf tips.

### Damage on leaf (IRRI)



## Bionomics

Adult is blue - black shiny beetle with spines on the thorax and elytra. It lays eggs singly on the leaf tip. Grub is minute, flat and yellow. It mines between the epidermal layers of leaf and pupates in leaf mines. Egg period: 4-5 days; Larval period: 7-12 days; Pupal period: 3-5 days. There are six generations / year.



### Management

1. The leaf tips containing blotch mines should be plucked and destroyed.
2. Manual collection and killing of beetles with hand nets may help in reducing the population of the pest.
3. Dust the crop with 10% BHC dust @ 30 kg/ha at least two times at an interval of 40 days.
4. Spray endosulfan 1.0 L or lambda-cyhalothrin 2.5 EC 500 ml / EC 250 ml in 500 L water/ha.

### 8. Whorl maggot: *Hydrellia sasakii* (Ephydriidae: Diptera)

**Distribution and status:** Philippines

**Host range:** Rice, *Cyanodon dactylon* and *Echinochloa crusgalli*

#### Damage symptoms

Yellowish white longitudinal marginal blotching with hole in a few places on the emerging leaves. Leaves become shriveled. Plant gets stunted and maturity is delayed. Maximum damage is observed on 30 DAT.

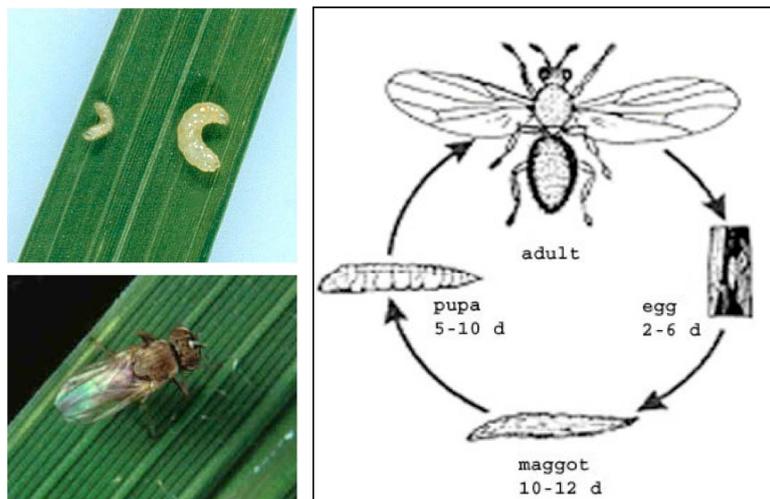


**Pinholes and patches (IRRI)**

ETL - 25% damaged leaves

## Bionomics

The adult is a small dull grey fly. Maggot is 2 mm in length and feeds on the tender tissue inside the whorl. It is yellowish white in colour.



### Rice whorl maggot (IRRI)

#### Management

1. Apply carbofuran 3G 10 kg or cartap hydrochloride 4 G 18.75-25.0 kg or fipronil 0.3 G 16.70 - 25.0 kg shortly after transplanting.
2. Spray endosulfan 35 EC 1.0 L or quinalphos 25 EC 1.0 L or ethofenoprox 10 EC 500-750 ml or fipronil 5 SC 1.0 -1.5 L or in 500 L water/ha.

## 9. Rice horned caterpillar: *Melanitis ismene* (Satyridae, Lepidoptera)

**Distribution and status:** Throughout India

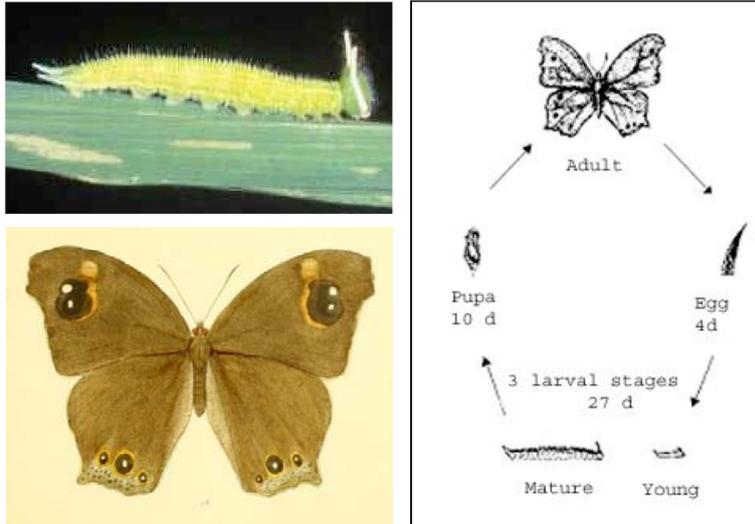
**Host range:** Rice, Millets

#### Damage symptoms

The larva of this butterfly feeds on leaf blades of rice. Leaves are defoliated from the margin or tip irregularly.

#### Bionomics

The butterfly lays round white eggs singly on the leaves. The caterpillar is green, slightly flattened with two red horn processes on the head and two yellow processes in the anal end. It pupates in a greenish chrysalis, which suspends from the leaf. The butterfly is dark brown with large wings having a black and yellow eye like spot one on each of the fore wings.



### 10. Yellow hairy caterpillar: *Psalis pennatula* (Lymantriidae: Lepidoptera)

**Distribution and status:** Assam, Andhra Pradesh, Punjab and South India.

**Host range:** Rice, grasses, wheat

**Damage symptoms:** Caterpillar causes defoliation

#### Bionomics

The caterpillar is yellowish brown with red stripes and has an orange head. Tufts of hairs are present all over the body of which two in the anterior and one in the posterior region are prominent. It pupates in a pale white cocoon of silk and frass attached to the leaf and the adult moth is stout with straw coloured forewings. It lays eggs in masses of upto 57 eggs on leaves. The egg period is 10-11 days. The larval period lasts for 25-35 days.

### MINOR PESTS

### 11. Grasshopper: *Hieroglyphus banian* (Acrididae: Orthoptera)

#### Damage symptoms

The nymphs and adults cause enormous loss to the crop by chewing and cutting various plant portion viz., leaves, flowers and grains. They completely defoliate the plants leaving only the mid ribs and the plant growth is affected.

#### Bionomics

Adults are green, larger with transverse black lines on pronotum. It lays eggs in soil at a depth of 5 cm.

Nymphal period is from 2.5 - 3.5 months



## Management

1. Expose the eggs to be picked up by birds after ploughing and trimming the bunds
2. Egg parasitoids *Cacallus* spp., *Barycomus* spp. and *Seelio* spp., should be encouraged.
3. Dust the crop with 5-10% BHC (or) methyl parathion 2% or lindane 2 D 25-30 kg/ha (or) malathion 5 D 20 kg/ha
4. Spray dichlorvos 76 EC 500 ml/ha (or) malathion 50 EC 2.5 lit/ha.

## 12. Short horned grasshopper: *Oxya nitidula* (Acrididae: Orthoptera)

### Damage symptoms

Nymphs and adults feed on leaves leaving the stalks and midribs. Irregular feeding on seedlings and cutting of stem at panicle stage are the symptoms of damage.

### Bionomics

Grasshopper is green, smaller with brown band on sides. Eggs are laid in soil which hatch out in June - July and mature in August - September.

### Management

Expose the eggs during summer ploughing so that they are picked up by birds.

## 13. Blue beetle: *Halticia cyanea* (Chrysomelidae: Coleoptera)

A medium sized steel blue beetle often found in large numbers on rice but is harmless as it breeds on the common weed, *Ammania* sp., found in wetlands.

## 14. Rice root weevil: *Echinocnemus oryzae* (Curculionidae: Coleoptera)

### Damage symptoms

Grubs feed on the roots of rice plants resulting in stunting and non formation of tillers. Presence of dead plants in large patches is a typical symptom.

### Bionomics

The adult weevil is shiny black with oblong body covered with greyish scales. The female lays eggs in soil near the roots of grasses. The incubation period is 3-4 days. The grub is creamy white, aquatic and feeds on root hairs. The larval period lasts for 11 months. The grub over-winters in soil at a depth of 25-30 cm, after September. It pupates during May. The pupal period is 10-12 days.



## 15. Rice root weevil: *Hydronomidus molitor* (Curculionidae: Coleoptera)

### Damage symptoms

Yellowing of newly transplanted seedlings and presence of dead plants in large patches.

### Bionomics

Adult is shiny black weevils with oblong body covered with greyish scales. Grub is creamy white and aquatic.

## 16. Rice root grub: *Arthrodeis* sp., (Tenebrionidae: Coleoptera)

### Damage symptoms

They feed on roots and cause yellowing and gradual wilting of entire plants.

### Bionomics

Black coloured shiny beetle.

## Integrated Pest Management in Rice

### A. Cultural method

1. Remove / destroy stubbles after harvest and keep the field free from weeds.
2. Trim and plaster the bunds of rice field to expose the eggs of grasshoppers and to eliminate the bug breeding in grasses.
3. Form the bunds narrow and short to reduce the damage by rodents.
4. Use resistant varieties wherever available.
5. Provide effective drainage wherever there is problem of BPH.
6. Clip the tip of seedlings before transplanting to prevent the carry over of egg masses of rice yellow stem borer from nursery to mainfield.
7. Organise synchronized planting wherever possible.
8. Leave 30 cm rogue space at every 2.5 m to reduce damage by BPH and rodents.
9. Avoid use of excessive nitrogenous fertilizers.
10. Use irrigation water judiciously (Alternative wetting and drying reduce BPH and case worm).
11. Remove the egg masses of stem borer in the main field.

### B. Mechanical methods

1. Dig out the rat burrows and destroy the rats and young ones at the beginning of the season.
2. Set up light traps to monitor and control pests.
3. Set up-bow traps to kill rodents.

### C. Biological methods

1. Release *Trichogramma japonicum* twice on 30 and 37 DAT @ 5 cc/ha/release against stem borer.
2. Release *Trichogramma chilonis* on 37, 44 and 51 DAT (thrice) @ 5 cc/ha/release against leaf folder.
3. Release of *Platygaster oryzae* parasitized galls @ 1 per 10 m<sup>2</sup> in the mainfield on 10 DAT against gall midge.
4. Set up owl perches to reduce rat damage.

### D. Plant products

1. Spray neem seed kernel extract 5% (25 kg/ha), neem oil 3% (15 lit/ha) to control brown planthopper.
2. Spray botanicals viz., NSKE, *Vitex negundo* (Notchi), *Prosopis juliflora* and *Ipomoea carnea* leaf extract 5% to control earhead bug and black bug.

### E. Chemical methods

1. In BPH prone area / season avoid use of synthetic pyrethroids, methyl parathion and quinalphos and use recommended chemical at recommended doses.
2. Use insecticides based on ETL.

## QUESTIONS

1.	Paddy stem borer belongs to _____ family	
	a. Pyralidae	b. Hesperidae
	c. Cecidomyiidae	d. <b>Pyraustidae</b>
2.	'White ear' in rice is due to _____ attack	
	a. <b>Stem borer</b>	b. Leaf folder
	c. Swarming caterpillar	d. case worm
3.	Gall midge belongs to _____ family	
	a. Pyralidae	b. Hesperidae
	c. <b>Cecidomyiidae</b>	d. Pyraustidae
4.	'Silver shoot' in rice is due to _____ attack	
	a. Stem borer	b. Leaf folder
	c. <b>Gall midge</b>	d. case worm
5.	Flating of tubular cases in rice field is due to _____ pest	
	a. <i>Orseolia oryzae</i>	b. <b><i>Nymphula depunctalis</i></b>
	c. <i>Spodoptera mauritia</i>	d. <i>Scirpophaga incertulas</i>
6.	Alternate host of rice skipper ( <i>Pelopidas mathias</i> ) is _____	
	a. Potato	b. <b>Sugarcane</b>
	c. Maize	d. Wheat
7.	Backward rolling of leaves is the typical symptom of _____	
	a. <i>Orseolia oryzae</i>	b. <i>Scirpophaga incertulas</i>
	c. <b><i>Pelopidas mathias</i></b>	d. <i>Nymphula depunctalis</i>
8.	Alternate host of <i>Cnaphalocrocis medinalis</i> (leaf folder) is _____	
	a. pulses	b. <b>grasses</b>
	c. maize	d. wheat

9.	Alternat host of <i>Melanitis ismene</i> is _____	
	<b>a. millets</b>	b. pulses
	c. sugarcane	d. castor
10.	Scorching symptom of the entire rice field is due to _____	
	<b>a. <i>Cnaphalocrocis medinalis</i></b>	b. <i>Scirpophaga incertulas</i>
	c. <i>Pelopidas mathias</i>	d. <i>Nymphula depunctalis</i>
11.	Alternate host of Yellow hairy caterpillar is _____	
	a. millets	b. pulses
	c. sugarcane	<b>d. wheat</b>
12.	Which of the following pest causes onion needle or silver shoot symptoms in rice	
	a. <i>Nephotettix nigropictus</i>	b. <i>Cofana spectra</i>
	c. <b><i>Orseolia oryzae</i></b>	d. <i>Hydrellia philipiana</i>
13.	Irregular feeding of rice foliage is caused by -----	
	a. Army worm	b. Green beetle
	c. Spiny beetle	<b>d. Grass hopper</b>
14.	Presence of dead plants in patches is the symptom of -----	
	a. <i>Altica cyanea</i>	b. <i>Leptisma pygmaea</i>
	c. <i>Echinochermus oryzae</i>	<b>d. <i>Hydronomidus molitar</i></b>
15.	Cutting of seedling tip before transplanting is a good management technique for controlling	
	<b>a. Stem borer</b>	b. Leaf folder
	c. Mealy bug	d. Grasshopper
16.	Passing of rope over the crop is done to dislodge the following pest	
	a. Leaf folder	<b>b. Caseworm</b>
	c. Mealy bug	d. Grasshopper
17.	Judicious application of fertilizer is done to minimize ----- damage in rice	
	<b>a. Leaf folder</b>	b. GLH

	c. Caseworm	d. BPH
18.	'White ear' in rice is due to _____ attack	
	a. <b>Stem borer</b>	b. Leaf folder
	c. Swarming caterpillar	d. case worm
19	Floating of tubular cases in rice field is due to _____ pest	
	a. <i>Orseolia oryzae</i>	b. <b><i>Nymphula depunctalis</i></b>
	c. <i>Spodoptera mauritia</i>	d. <i>Scirpophaga incertulas</i>
20.	Alternate host of rice skipper ( <i>Pelopidas mathias</i> ) is _____	
	a. Potato	b. <b>Sugarcane</b>
	c. Maize	d. Wheat
21.	Backward rolling of leaves is the typical symptom of _____	
	a. <i>Orseolia oryzae</i>	b. <i>Scirpophaga incertulas</i>
	c. <b><i>Pelopidas mathias</i></b>	d. <i>Nymphula depunctalis</i>
22.	Alternate host of <i>Melanitis ismene</i> is _____	
	a. <b>millet</b>	b. pulses
	c. sugarcane	d. castor
23.	Alternate host of Yellow hairy caterpillar is _____	
	a. millets	b. pulses
	c. sugarcane	d. <b>wheat</b>
24.	----- ia a chemical responsible for gall formation in rice <b>Cecidogen</b>	
25.	Gall formation is nothing but modification of ----- <b>Leaf sheath</b>	
26.	Write the scientific name of green horned caterpillar is----- <b><i>Melanitis leda ismene</i></b>	
27.	----- egg parasitoid can be released against rice stem borer <b><i>Trichogramma japonicum</i></b>	
28.	----- egg parasitoid can be released against rice stem borer <b><i>Trichogramma chilonis</i></b>	

29.	Write the scientific name of rice crab <b><i>Paratelphusa hydrodromus</i></b>
30.	Write the scientific name of rice mite <b><i>Oligonychous oryzae</i></b>
31.	Trimming of bunds is recommended for the control of _____ grasshopper