RAMA UNIVERSITY

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FACULTY OF AGRICULTURAL SCIENCES & ALLIED INDUSTRIES

Lecture No.3

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.

Major pests				
1.	Yellow stem borer	*Scirpophaga incertulas*	Pyraustidae	Lepidoptera
2.	Gall midge	*Orseolia oryzae*	Cecidomyiidae	Diptera
3.	Swarming caterpillar	*Spodoptera mauritia*	Noctuidae	Lepidoptera
4.	Leaf folder	*Cnaphalocrocis medinalis*	Pyralidae	Lepidoptera
5.	Rice case worm	*Nymphula depunctalis*	Pyraustidae	Lepidopera
6.	Rice skipper	*Pelopidas mathias*	Hesperiidae	Lepidoptera
7.	Spiny beetle / Rice hispa	*Dicladispa armigera*	Chrysomelidae	Coleoptera
8.	Whorl maggot	*Hydrellia sasakii*	Ephydridae	Diptera
9.	Rice horned caterpillar	*Melanitis ismene*	Satyridae	Lepidoptera
10.	Yellow hairy caterpillar	*Psalis pennatula*	Lymantriidae	Lepidoptera

Minor pests				
11.	Grasshopper	*Hieroglyphus banian*	Acrididae	Orthoptera
12.	Short horned grasshopper	*Oxya nitidula*	Acrididae	Orthoptera
13.	Blue beetle	*Halticia cyanea*	Chrysomelidae	Coleoptera
14.	Rice root weevil	*Echinocnemus oryzae*	Curculionidae	Coleoptera
15.	Rice root weevil	*Hydronomidus molitar*	Curculionidae	Coleoptera
16.	Rice root grub	*Arthrodeis* 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%.

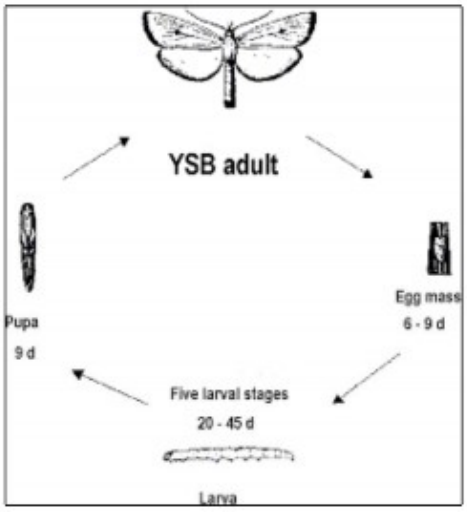
Whitehead or dead panicles at reproductive stage

ETL:
2 egg masses/ m2

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 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 ethofenoprox 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 *Eleucine indica*.

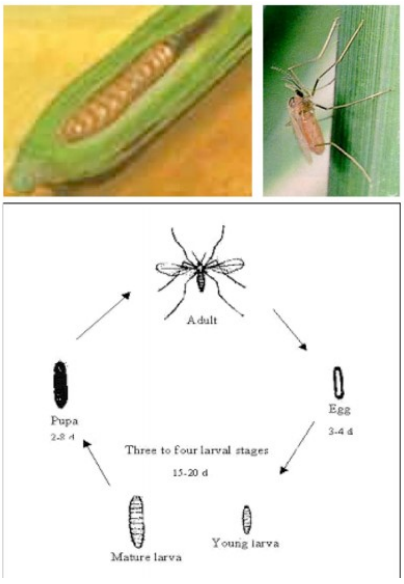
Damage symptoms:

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.

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 m2 in the main field at 10 days after transplanting (DAT).

8. The is an effectivhe 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. 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 earthern cocoon in soil for 10-15 days.

Management:

1. Conserve larval parasitoids viz., *Apanteles ruficrus*, *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 chlorpyriphos 20 EC 80 ml (or) endosulfan 35 EC 80 ml during late evening.

4. Leaf folder (or) leaf roller:

Cnaphalocrocis medinalis (Pyralidae: 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 • Chlorpyriphos 20 EC 1.25 L • Acephate 75 SP 666-1000 g • Ethofenoprox 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