INTEGRATED PEST MANAGEMENT IN PADDY

SMS (Entomology)
Krishi Vigyan Kendra, Dhemaji
Assam Agricultural University
Silapathar
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Among the food grains paddy occupies fore most status in human food requirements. Paddy is grown under different agro-climatic conditions and the crop is damaged by more then 100 species of insect pests and infested by varied diseases. These insect pests’ cause enormous grain yield losses, which may vary from 20-50% if not managed in time, India losses 30% yield in rice every year. It is most important staple food of about 65% of Indian population; in Assam, it is more then 90%.

IPM (Integrated Pest Management)

IPM is an eco- friendly approach for managing pest and disease nproblems utilizing all possible available methods and techniques of pest control such as Cultural, Mechanical, Biological and Chemical methods in as compatible and scientific manner as possible to suppress the pest population below economic injury level.

WHY IPM?

In order to minimize the indiscriminate and judicious use of chemical Pesticides, IPM has been formulated as principle of plant protection in over all crop protection programmes under the National Agriculture policy of the Govt.of India for sustainable crop production with out affecting environment.

IPM Strategy for paddy.

Cultural Practices.

- Selection of healthy seeds or resistance /tolerance variety.
- Raising of healthy Nursery
- Early and timely sowing/planting.
- Seedling root dip/Nursery treatment in stem borer endemic area.
- Destruction of left over nursery.
- Normal spacing
- Balance use of fertilizer
- Proper water management (Alternate wetting and drying to avoid water stagnation in plant hopper endemic area)
- Harvest close to ground.

Mechanical practices:

- Clipping off rice seedling tips before transplanting.
- Removal and destruction of disease/pest infested plant parts.
- Use of rope in rice crop for dislodging case worm and leaf folder larvae etc.
• Collection and destruction of egg mass and larvae.

**Biological Control Practices:**

**Conservation**

• Biological agent such as Spider, Water bug, Frog, Mirid bug, Damsel fly, Dragon fly, Grasshopper, Coccinellids, Bracon, wasp, Trichogramma, Telenomus etc should be conserved
• Root dip treatment of rice seedling with Chlorpyriphos is safe for natural enemies.

**Augmentation**

_ Release of *Trichogramma japonicum* or *Trichogramma chilonis*
@50,000-1,00,000 adult/ha 5 times starting from 30 days after transplanting for control of stem borers and leaf folders

**Chemical control measures**

Chemical pesticides are to be applied on need base and judiciously. Recommended chemicals are to be applied at right time at recommended dose.

**Weed management practice**

_ Seed bed should be prepare thoroughly.
_ Ensure through land preparation of field. Proper puddling and harrowing to be give to ensure uniform water stagnation.
_ Timely sowing of crop.
_ Sowing at proper spacing.
_ Mechanical weeding should be practiced after 2-3 weeks and so on if necessary.
_ Bunds and irrigation channel should be kept weed free.

**Rodent management**

_ Bund trimming and weed free cultivation minimise rodent harborage.
_ Employment of indigenous trap etc
_ Application of rodenticies such as Bromodioline, Zinc phospide, Alluminium phospide as and when required.
Major Pest of Paddy and its Management.
Paddy Stem borers

Yellow stem borer, Dark hade stripborer, White Stem borer etc

Damage: Egg are laid on leaf, freshly hatched larvae move down to leaf sheath and feed on inner tissue. With the advancement of growth and development larvae bore into stem bore into stem and feed on inner surface. Due to such feeding at vegetative stage the central leaf whorl unfold, turns brown and dries up which is termed as Dead Hearth. Infestation after the panicle initiation result in drying of panicle which may not emerges at all and those that have already emerges do not produce grain and appears as white head.

Management:
Destruction of stubbles after the harvest decreases the carry over to next crop. Harvesting the plant close to the ground.
Clipping off tip of seedling before transplanting reduced carry over of egg from nursery to main field. As the egg of stem borers are laid near the tip of leave.
Release Trichogramma japonicum, T. chilonis an egg parasitoid @ 50,000–1,00,000 adult/ ha.
Avoid high dose fertilizer.
Field sowing more then 5 % dead heart should be spread with 0.07% Phospomidon 30 EC (2.3 ml/liter water) or 0.1 % Monocrotophos 36 EC (2.7 ml/liter water) or 0.15% Chlorpyriphos 20 EC (7.5 ml/liter water) or 7.5 kg Phorate 10G/ ha.

Rice Plant Hopper:
Nymph and adult caused damage by sucking cell sap from the leaf which turn yellow. If insect attack during early stage
Of growth, the entire plant may dry up. Under favorable condition of high humidity, optimum temperature, high nitrogen application and no wind, the population increases very rapidly and a hopper burn is observed localities giving brownish plot in the field.
Management:
1. Close planting creates favorable micro climate for rapid development of hopper population. Hence spacing of 20 x 30 cm should be followed.
2. Alternate drying and wetting of field during peak infestation and drain standing water from the field checks hopper population.
3. Avoid high dose of nitrogen fertilizer application.
4. Mirid bug are predator of egg and nymph of hopper.
5. Spray 0.2% Quinalphos 25 EC (8 ml/ liter water) or 0.1% Monocrotophos 36 EC (2.7 ml/ liter water) or 0.2% Endosulfan 35 EC (5.7 ml/ liter water).

Traditional Method
Pour kerosene on a flooded field and drag a rope across the foliage bending it into kerosene film on the water. The insects dislodge into the oil and get killed. And the field are drained off after 6 (six) hours to prevent phytotoxicity. In this method beneficial insect also get killed.

Ghandi Bug:
The nymph and adult suck juice from the developing grain during milky stage, causing incomplete/ partially filled or chaffy grains. Black or brown spot appears around the hole made by bug on which sooty mould develop.
Management:
Dust 5 % Malathion or 5% Carbaryl @ 25 kg/ ha 15 days after penicle emerge.

Traditional method:
Placing a rotten frog/ dry fish in the filed during milky stage, the foul smell of these attract bugs and keep busy on feeding carcass.

Leaf folder:
Young larvae feed on tender leaf by scrapping green matter. Old larvaeefasten longitudinal margin of leaf together with its sticky substance and the feed inside the fold by scrapping green matter. The scrapped leaf becomes membranous, turn white and than finally wither. Heavily infested crop sows streaks on the leaf and appear whitish from distance.

Management:
Remove grass weeds from bounds around paddy field.
Light trapping of adult help to reduce pest population.
Release trichogramma Japonicum or T chilonis @ 50,000 to 1,00,000 adult.
Spray insecticide at economic threshold level of 10 % damage.
0.12 % Fenetrothion 50 EC (2.4 ml/ liter water), 0.2 % Carbaryl 50
wp (4 ml/liter water) or 0.1 % Monocrotophos 36 EC (2.7 ml/liter water) or 0.15% Chlorpyriphos 20 Ec (7.5 ml/liter water)

**Rice Hispa:**
Both beetle and grub feed on green portion of leaf causing characteristic linear patches along the veins, grub also mine into leafs showing blister spot. Damage starts in nursery and spread to main field.

**Management:**
1. Clipping of leaf tip before transplantation.
2. Nursery bed are flooded, the beetle float and can be collected at a corner of nursery and destroyed.
3. Application of Phorate 10 G in nursery minimises infestation.
4. In the main field spray 0.1 % Monocrotophos 36 EC (2.7 ml/liter water) or 0.15% Chlorpyriphos 20 EC (7.5 ml/liter water) 0.2% quinalphos 25 EC (8 ml/liter water).

**Termite:**
Termites are generally polyphagous insect which infest a wide range of plant. Generally termite infest upland paddy but it also attack in lowland where there is no assured irrigation/ water stagnation. Termite colony attacks on germinating seed or growing root causing complete drying of crop. The damaged plant can easily be pulled out by hand.

**Management:**
1. Locate the termintorium and destroy by pouring Chlorpyriphos solution into termintorium.
2. Seed treatment with Chlorpyriphos 0.5- 1 kg/ 100 kg seed.
3. Seedling dip with Chlorpyriphos.
4. Flooding/water stagnation avoids termite infestation.
5. Application of Chlorpyriphos 10 G granules @ 7.5 kg/ ha.

**Mole Cricket:**
Generally mole cricket infests dried paddy filed or rain-fed field. Both nymph and adult feed on root and shoot near at ground.

**Management:**
1. Soil application of Carbofuran 3 G @ 10 kg/ ha checks pest infestation.
2. Flooding avoids cricket infestation.

Rodent.

Rodent attack starts from nursery till harvest and storage. In nursery rodent uproot crop and eat the seed, later on they cut down the plant. In vegetative phase damage starts when the plant form 3- 4 nodes and the damage continues in the reproductive phase till harvest.

Management:

1. Bund trimming and weed free cultivation minimise rodent harborage.
2. Employment of indigenous trap etc
3. Application of rodenticies such as 0.005 % Bromodioline bait (20g bromodioline + 20 g m. oil + 20 g sugar in 1 kg cereal) or 2 % Zinc phospide bait.