

Identification: The adult is a wedge shaped insect, having straw color with white back. Its nymph is grayish white which turns to dark grey when it is nears to maturity. The adults and nymphs of this insect are very active and they can easily jump from one leaf to another on a slight disturbance.

Life cycle: The adult female generally lays 100-150 eggs on the leaf sheath. After hatching, the nymphs feed on leaves and transformed into adults. The life cycle is completed in 3 weeks. The plant hopper females live for about 2 weeks. There are several generations in a year.

Damage: The adults and nymphs suck cell sap from the leaf surface and tend to congregate on the leaf sheath at the base of the plant. The leaves of attacked plants turn yellow and later on rust red. These symptoms start from the leaf tips and spread to the rest of the plant. Various brownish spots also appear on the feeding sites. Damaged plants finally dry up without producing ears. This insect also secretes honeydew on which a sooty mould appears, imparting a smoky hue to the rice fields.

Control:

- A spacing of 20 × 15 cm should be followed to avoid the rapid development of hopper population.
- Alternate drying and wetting the field during peak infestation and draining out the standing water from the field 2-3 times checks the population of the hopper to a large extent.
- Grow resistant varieties.
- Spray carbaryl D 5 kg/acre or imidacloprid SL 250 ml/acre

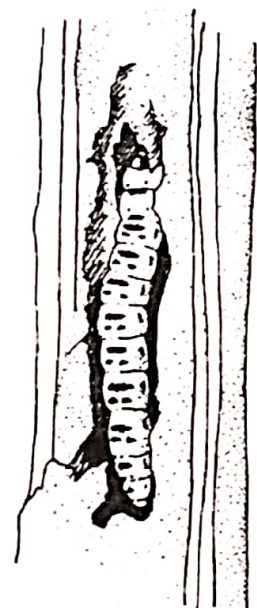
4.4 INSECT PEST OF MAIZE & SORGHUM

4.4.1 MAIZE BORER

T.N: *Chilo partellus*

(Pyralidae; Lepidoptera)

Identification: The adults are yellowish-grey in color while the larvae are dirty grayish white with black head and four brownish longitudinal stripes on the back.



Life cycle: The female lays oval and yellowish clusters of eggs on the underside of the leaves. When the larva is full grown within 4 weeks it pupates inside the stem after making a hole. The life cycle is completed in about 3 weeks. There are 5 generations in a year.

Damage: The young larvae firstly feed on the leaves, making a few holes and then bore their way downwards through the central whorl and the plant also shows “Dead hearts”. Young seedlings are more often destroyed by the attack of this pest.

Control:

- Destroy the weeds, stubbles and other alternate hosts of this pest by ploughing the field after harvest.
- Removal and destruction of infested plants, dead hearts and the crop residues.
- Trapping the moths by light traps.
- *Trichogramma spp.* is the egg parasitoid while *Apanteles spp.* is the larval parasitoid of maize borer.
- Use of carbofuran G 8-10 kg/acre.

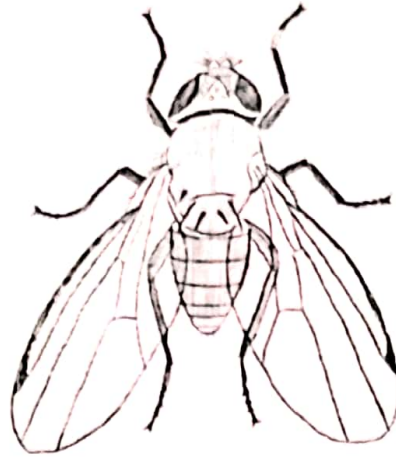
4.4.2 SORGHUM SHOOT FLY

T.N: *Atherigona soccata*

(Muscidae; Diptera)

Identification: The sorghum shoot fly is also known as the sorghum stem fly. Eggs are white in colour. Larvae are yellowish brown while adults are pale grey with yellowish abdomen.

Life cycle: The female lays flattened, elongate and somewhat boat shaped eggs singly on the underside of the leaves. After hatching the tiny maggots bore into the stem and feed inside the main shoot. They may either pupate in the stem or in the soil.



Damage: It attacks on the young seedlings, producing deformed, twisted and dead hearted plants. The maggots bore into the stem and cut the main shoot and by the time they pupate, the plant is almost dead. Hence crop yield is reduced.

Control:

- Grow resistant varieties.
- Destruction of attacked plants or plant parts.
- Sowing of crop from early June to the 2nd week of July normally escapes the shoot fly attack.
- Coating of seeds with imidacloprid WS 5-7 g/kg seed protects the shoot fly attack up to 2 weeks.
- Spray carbosulfan EC 250 ml/acre or carbofuron G 10 kg/acre.

4.5 INSECT PESTS OF GRAM

4.5.1 GRAM CUTWORM

T.N: *Agrotis flammatra*

(Noctuidae; Lepidoptera)



Identification: Eggs are yellowish white. Larvae dark grey in colour. The adult is a heavy-bodied grayish-brown or wheat colored insect.

Life cycle: This pest is active from October to April. The moths appear in October and lay up to 900 eggs on the under surface of leaves, shoots, stems or in soil. The eggs hatch in one week during summer and in 2 weeks during winter. Larvae are full-grown in 4-7 weeks and then pupate for 2 weeks in earthen cells in the soil. The life cycle is completed in 7-11 weeks and there are generally 2 generations in a year.

Damage: The caterpillars come out from their breeding places at night and become active, cutting down the young plants of gram, vegetable seedlings etc. just above or slightly below the surface of soil. The cutaway gram seedlings in the field are indication of its attack.

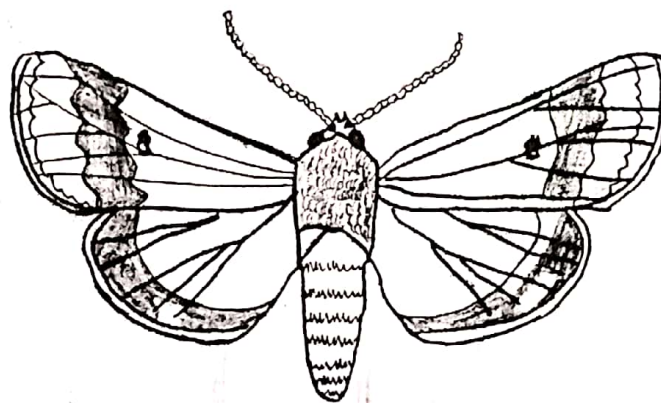
Control:

- Hand picking/hand hoeing will be effective.
- It is also controlled by using poisoned bran mash. The bait is placed in small heap in the infested field in the evening.
- Trapping the moths by light traps.
- Clean cultivation should be done.
- The pest is kept under check by enticing birds and insect predators.
- Spray cypermethrin + monocrotophos EC 500 ml/acre.

4.5.2 GRAM POD CATERPILLAR

T.N: *Helicoverpa armigera*

(Noctuidae; Lepidoptera)



Identification: The gram pod-caterpillar or gram pod-borer is a serious pest of gram and red gram. The moth is stoutly built and is yellowish brown. Caterpillars are greenish with dark broken grey lines along the sides of the body.

Life cycle: The females lay about 500 – 750 eggs on tender parts of the plants. The eggs hatch in one week. Larvae come out and move from pod to pod and are full fed in 3 weeks. The full grown larvae come out of the pods and pupate in soil for 2 weeks which prolongs in winter. There may be 8 generations in a year.

Damage: Larvae feed on the foliage when young and on the seed in later stages. A single larva may destroy 30-40 pods before it reaches maturity.

Control:

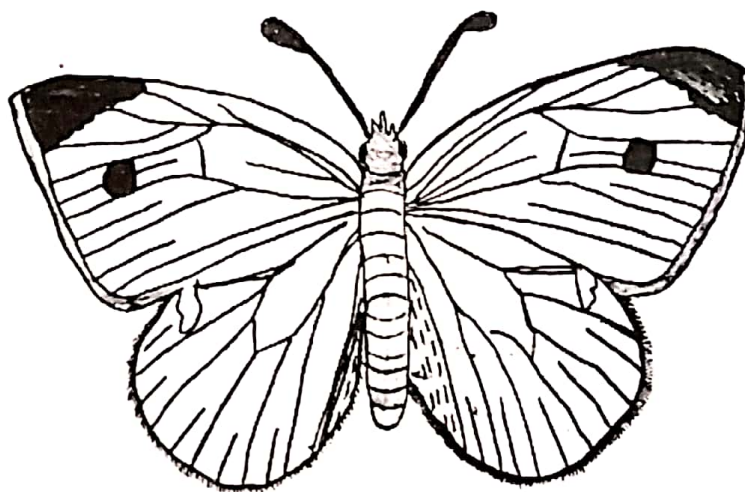
- The pest can be suppressed by hand picking the caterpillars in the early stages of the attack.
- Ichneumonid wasp, larval parasitoid of gram pod-borer should be promoted in the field.
- Spray profenofos EC 800 ml/acre or lambda cyhalothrin EC 250 ml/acre.

4.6 INSECT PESTS OF VEGETABLES

4.6.1 CABBAGE BUTTERFLY

T.N: *Pieris brassicae*

(Pieridae; Lepidoptera)



Identification: Large, body blackish, wings yellowish white with a black patch on apical angle of each forewing. Female bears two black spots on the upper side of each forewing. Larvae are pale yellow or greenish yellow.