

Lecture No 3

PESTS OF SORGHUM, PEARL MILLET AND FINGER MILLET

I. PESTS OF SORGHUM

More than 150 species of insects have been reported to damage sorghum. However over a dozen species are very serious and constitute a major constraint in sorghum production. Shoot fly, stem borers, shoot and ear head bug and aphids are serious pests that bring reduction in the yield.

Major pests				
1.	Sorghum Shootfly	<i>Atherigona soccata</i>	Muscidae	Diptera
2.	Stem borer	<i>Chilo partellus</i>	Crambidae	Lepidoptera
3.	Pink stem borer	<i>Sesamia inferens</i>	Noctuidae	Lepidoptera
4.	Shoot bug	<i>Peregrinus maidis</i>	Delphacidae	Hemiptera
5.	Earhead bug	<i>Calocoris angustatus</i>	Miridae	Hemiptera
6.	Sorghum midge	<i>Contarinia sorghicola</i>	Cecidomyiidae	Diptera
7.	Plant lice (Aphids)	<i>Rhopalosiphum maidis</i> , <i>Melanaphis sacchari</i>	Aphididae	Hemiptera
Minor Pests				
8.	Earhead web worm	<i>Cryptoblabes gnidiella</i>	Pyraustidae	Lepidoptera
9.	Gram caterpillar	<i>Helicoverpa armigera</i>	Noctuidae	Lepidoptera
10.	Plant bug	<i>Dolycoris indicus</i>	Pentatomidae	Hemiptera
11.	Stink bug	<i>Nezara viridula</i>	Pentatomidae	Hemiptera
12.	Mirid bug	<i>Creontiades pallidifer</i>	Miridae	Hemiptera
13.	Slug caterpillar	<i>Thosea apierens</i>	Cochlididae	Lepidoptera
14.	Leaf roller	<i>Marasmia trapezalis</i>	Pyralidae	Lepidoptera
15.	Flea beetle	<i>Cryptocephalus schestedii</i> , <i>Monolepta signata</i>	Chrysomelidae	Coleoptera
16.	Red hairy caterpillar	<i>Amsacta albistriga</i> , <i>A. moorei</i>	Arctiidae	Lepidoptera
17.	Semilooper	<i>Eublemma silicula</i>	Noctuidae	Lepidoptera
18.	Weevils	<i>Mylocerus maculosus</i> <i>M. discolor</i> , <i>M. subfaciatus</i>	Curculionidae	Coleoptera
19.	Wingless grasshopper	<i>Colemania sphenaroides</i>	Acrididae	Orthoptera

MAJOR PESTS

1.Sorghum Shootfly: *Atherigona soccata* (Muscidae: Diptera)

Distribution and status

Maharashtra, Andhra Pradesh, Tamil Nadu and Karnataka

Host range: Maize, ragi, bajra, rice, wheat and grasses

Damage symptoms

The maggot on hatching migrates to the upper surface of leaf and enters between the leaf sheath and stem. After reaching the soil level, the maggot bores inside the stem and cuts the growing point resulting in “dead heart” symptom. The infested plant produces side tillers. The attack is more severe during summer than kharif season



Bionomics



Adult, a whitish grey female fly lays white, cigar-shaped eggs on the lower surface of leaf blades mostly during morning hours. The egg is white, cylindrical, distal end somewhat flattened. The incubation period varies from 2-3 days. Maggot is dirty white and apodous. Mature larvae are yellow and about 6 mm long. The larval period is 8-10 days and has four larval instars. It pupates at the base of the stem or in soil for 8-10 days. The life cycle is completed in 17-21 days.

ETL: 10% dead hearts or 1 egg / plant

Management

1. Use resistant varieties like Co-1, CSH 15R, Maldandi and Hagari, M35-1, Swati, SPV 491, IS - 18551, 5566, 5285, 5613, ICSV 700, ICSV 705, Phule Yashoda, CSH 7, CSH 8
2. Sow sorghum immediately at the onset of monsoon rains to minimise shootfly damage.
3. Use higher seed rate (12.5 kg/ha) and remove the shoot fly damaged seedlings at the time of thinning or raise nursery and transplant only healthy seedlings.
4. Pull out and destroy plants showing dead hearts at the time of thinning.
5. Set up hanging type of plastic fishmeal trap @ 12/ha till the crop is 30 days old.
6. Treat 100 kg seeds with chlorpyrifos 20 EC 400 ml or quinalphos 25 EC 400 ml or imidacloprid 48 FS 1.2 L or imidacloprid 70 WS 1.0 kg or thiomethoxam 30 FS 1.0 L
7. Granular application of phorate 10 G or carbofuran 3 G to the furrow at the time of sowing at 2.5 kg a.i./ha.
8. Spray endosulfan 35 EC @18 ml, dimethoate 30 EC @ 12 ml and methyl demeton 25 EC @12 ml for an area of 120 m² nursery.
9. Spray any one of the following insecticides in the mainfield - endosulfan 35 EC 500 ml, dimethoate 30 EC 500 ml (250 L of spray fluid/ha).

2. Stem borer: *Chilo partellus* (Crambidae: Lepidoptera)

Distribution and status

India, Pakistan, SriLanka, Indonesia, Iraq, Japan, Uganda, Taiwan, Sudan, Nepal, Bangladesh and Thailand.

Host range

Maize, sorghum, sugarcane, bajra, rice, *Sorghum halepense*, finger millet, etc.

Damage symptoms

It infests the crop a month after sowing and the damage persists upto

emergence of ear heads. Central shoot withering leading to “**dead heart**” is the typical damage symptom. Bore holes are visible on the stem near the nodes. Young larva crawls and feeds on tender folded leaves causing typical “**shot hole**” symptom. Affected parts of stem may show internally tunneling caterpillars.

Bore holes and tunneling by caterpillars



Shot hole symptom

Broken stem



ETL: 10% dead heart

Bionomics

The adult moth is medium in size and straw coloured. It lays about 300 scale-like flat oval eggs in batches on the under surface of leaf near the midrib. The incubation period is 2-5 days. The larva is yellowish brown with a brown head and the prothoracic shield measures about 25 mm long. The larval period is 28 - 50 days with seven instars. It pupates inside the stem and emerges in 7-10 days through the larvae's entry holes as adult. The total life cycle is completed in 30 to 40 days



Management

1. The stubbles should be ploughed up during winter and burnt to destroy the hibernating larvae.
2. Grow resistant cultivars like E 302, E 303, IS 2205, ICSV 700
3. Dead hearts should be pulled out and used as fodder or buried in manure pits.
4. Sow lab lab or Dolichos as an intercrop in the ratio of 4:1 to minimise the stem borer damage.
5. Set up light trap till midnight to attract and kill the stem borer moths.
6. Bio-control agents viz., *Trichogramma chilonis* (egg parasitoids) *minutum*, *Bracon chinensis* and *Apanteles flavipes*, (larval parasitoids) should be encouraged.
7. Mix any one of the following insecticides with sand to make up the total quantity of 50 kg and apply in the leaf whorls. Phorate - 10 G 8 kg, carbofuran 3 G 17 kg, endosulfan 4D 25 kg or spray endosulfan 35 EC 750 ml (or) carbaryl 50 WP 1 kg (500 L spray fluid/ha).

3. Pink stem borer: *Sesamia inferens* (Noctuidae: Lepidoptera)

Distribution and status

India, Pakistan, Malaysia, Taiwan, Burma, Bangladesh, Sri Lanka, South East Asia, China, Korea, Japan and Indonesia.

Host range: Sorghum, maize, rice, wheat, sugarcane, bajra and ragi, barley, guinea grasses.

Damage symptoms

The pink larva bores into the stem and damages the central shoot resulting in dead heart.



Bionomics

The adult moth is fawn-colored, with dark brown streaks on the fore wings and white hind wings. The female lays about 150 creamy-white and hemispherical eggs that are arranged in two or three rows between the leaf sheath and the stem of the host plant. Egg period 7 days. The fully grown larvae measures about 25 mm and is pale yellow with a purple pink tinge and a reddish-brown head. The larval period 25 days but in cold months it may be extended to 75 days. Pupation occurs in the larval tunnel in the stem and the adult emerges in 12 days. One generation may take 6-7 weeks. The life cycle is completed in 45-75 days. There are 4-6 generations per year.



Management

1. Release egg parasitoids: *Telenomus* sp., *Trichogramma chilonis*; Larval parasitoids: *Apanteles flavipes*, *Bracon hebetor*; Pupal parasitoid: *Tetrastichus ayyari*
2. Spray endosulfan 35 EC @ 1 L/ha or chlorpyrifos 20 EC 1.0 L / ha or apply carbofuran 3 G @ 25 kg/ ha or cartap hydrochloride 4 G @18.75 kg/ha at every 20 days interval after germination of the crop.

4. Shoot bug: *Peregrinus maidis* (Delphacidae, Hemiptera)

Distribution and status: Karnataka, Tamil Nadu Andhra Pradesh and Madhya Pradesh

Host range: Sorghum, maize, rice, millets

Damage symptoms

Adults and nymphs suck sap from plants. The attacked plants become unhealthy stunted and yellow. The leaves wither from top downwards. Panicle formation is inhibited and the plants die if attack is severe. Honeydew secreted by the bug causes growth of sooty mould on leaves. The midribs of the leaves turn red due to egg-laying and may dry up subsequently.



Bionomics

The adult is yellowish brown to dark brown with translucent wings. The brachypterous female is yellowish while macropterous female is yellowish brown and male dark brown. It lays eggs in groups of 1-4 inside the leaf tissue and covered with a white waxy substance. The fecundity of the bug is 97 eggs / female. The egg period lasts for seven days. The nymphal stage undergoes five instars in 16 days. The total life cycle is completed in 18-31 days.



Management

1. Conserve egg parasitoids viz., *Paranagrus optabilis*, *Octetrastichus indicus* and Predators - *Coccinella septumpunctatum*, *Menochilus sexmaculatus*,

Geocoris tricolor

2. Spray dimethoate or methyl demeton 500 ml in 500 L of water

5. Earhead bug: *Calocoris angustatus* (Miridae: Hemiptera)

Distribution and status: South India

Host range: Pearl Millet, maize, tenai, sugarcane and grasses

Damage symptoms

The adults and nymphs damage the earheads by feeding on them. They suck the juice from the grains when they are in the milky stage. The sucked out grains, shrink and turn black in colour and become ill filled (or) chaffy. Older grain shows distinct feeding punctures that reduce grain quality.



Bionomics

Adult male is green in colour and female is green with a brown margin. Blue cigar shaped eggs are laid under the glumes or into the middle of the florets. Each insect lays between 150 and 200 eggs. The egg period is seven days. Nymphs are slender, green in colour. First instar is orange in colour. The nymphal period is 10 - 14 days. The life cycle from egg to adult occupies less than 3 weeks. At least 2 generations of the bug can feed on the same crop when the panicles do not ripen at the same time.



ETL: 10 Nos/ear head

Management

- Dust with carbaryl 10% at 12 kg/ha (or) quinalphos 1.5% 12 kg/ha synchronising during milky stage
- Grow resistant cultivars like IS1760, IS 17645, CSM 388, Chencholam, BBR - 1(ICS V239)

6. Sorghum midge: *Contarinia sorghicola* (Cecidomyiidae: Diptera)

Distribution and status

India, Pakistan, Bangladesh, West Iran, Sri Lanka, Sudan, Java, Africa, South East Asia, South China, South America, West Indies, USA and Italy.

Hosts: Sorghum cultivated and wild species.

Damage symptoms

A maggot feeds on the developing grains and pupates there. White pupal cases protruding out from the grains and chaffy grains with holes are the damage symptoms.



Bionomics



The adult fly is small, fragile with a bright orange abdomen and a pair of transparent wings. It lays eggs singly in developing florets resulting in pollen shedding. A female lays about 30-35 eggs at the rate of 6-10 in each floret. The incubation period is 3-4 days. The maggot has four instars with duration of 8-10 days. Larvae are colorless, but, when fully grown, they are dark orange. Larval period 9 - 11 days. The larval stage undergoes diapause in a cocoon during December - January within a spikelet. Pupates beneath the glume. The pupal period

3 days. When the adult emerges the white pupal skin remains at the tip of the spikelet. A generation is completed in 14-16 days. The insect's rapid developmental cycle permits 9-12 generations.

Management

1. Grow resistant cultivars like DJ 6541, AF 28, ICSV 197, ICSV 745, ICSV 88032
2. Conserve larval parasitoids - *Apanteles* sp., *Eupelones popa*; Larval and pupal parasitoid - *Tetrastichus* spp.; Predators – *Orius albidipennis*; *Tapinoma indicum*
3. Give first application at nearly 90% earhead emergence and repeat after 4 or 5 days. The insecticides recommended are spray endosulfan 35 EC 1.0 L (or) malathion 50 EC 1.0 L (or) carbaryl 50 WP 2 kg/ha or endosulfan 4 D or malathion 5 D or carbaryl 10 D or quinalphos 1.5 D at 25 kg/ha .

7. Plant lice (Aphids): *Rhopalosiphum maidis*, *Melanaphis sacchari* (Aphididae: Hemiptera)

Distribution and status: All sorghum-growing areas of the world.

Host range: Sorghum, maize, ragi

Damage symptoms

Colonies of aphids are seen in central leaf whorl, stems, or in panicles. The young and adults suck the plant juice. This frequently causes yellowish mottling of the leaves and marginal leaf necrosis. The aphid produces an abundance of honeydew on which molds grow. In panicles, honeydew may hinder harvesting. The aphid also transmits maize dwarf mosaic virus.



Bionomics

Rhopalosiphum maidis

The aphid is dark bluish-green and somewhat ovate. It is 2 mm long, with black legs, cornicles, and antennae. Winged and wingless forms occur. Females give birth to living young without mating and a generation requires only a week or so. The adult is yellow coloured with dark green legs.

Melanaphis sacchari

The sugarcane aphid is yellow to buff. Numbers increase rapidly during dry spells or at the end of the rainy season. The female of the wingless form deposits 60-100 nymphs within its reproductive period of 13-20 days. The winged form produces slightly fewer nymphs. The life cycle is completed in 5.5-7.0 days during the dry season.

Rhopalosiphum maidis



Melanaphis sacchari



Management

Spray the base of attacked plants with a contact (or) systemic insecticide like dimethoate 30 EC or methyl demeton 25 EC 500 ml in 500 L of water

MINOR PESTS

8. Ear head web worm: *Cryptoblabes gnidiella* (Pyraustidae: Lepidoptera)

Host: Sorghum, Maize

Damage symptoms

The larvae destroy the grain in the head. They produce webs of silken thread that remain on and inside the head. Heavily infested heads may be covered with webbing.



Bionomics

The adult moth is small with brown fore wings and light brown hind wings. Creamy white, round or conical eggs are laid singly on the spikelets and on grains of the panicle. The egg period is 3-4 days. The larva is light brown with dark head and has dark lateral lines on the body. The larval duration is 9-10 days. It constructs silken cocoon and pupates within the silken webs. Pupal period 7 days. The life cycle is completed in 23-24 days.



9. Gram caterpillar: *Helicoverpa armigera* (Noctuidae: Lepidoptera)

Distribution and status: World wide. It is major on cotton, lablab, chillies, tomato, pulses, maize and minor on sorghum.

Host range: Cotton, sorghum, lab lab, soybean, pea, safflower, chillies, tomato, groundnut, tobacco, gram, okra, maize etc.

Damage symptoms

Larvae hide within the ear heads and feeds on the grains. Earheads are partially eaten and appear chalky. Feecal pellets are visible within the ear head.



Bionomics

Adult is brown coloured moth with a 'V' shaped speck on forewings and dull black border on the hind wing. Larva is green with dark broken grey lines and dark pale bands. It shows colour variation of greenish to brown.



Management

Spraying of insecticides as given under cotton

10. Plant bug: *Dolycoris indicus* (Pentatomidae: Hemiptera)

Damage symptoms: Grains become chaffy or spotted black and get shriveled.

Bionomics: Brown coloured bug with a white patch on the scutellum.



11. Stink bug: *Nezara viridula* (Pentatomidae: Hemiptera)

Damage symptoms

Grains become chaffy or spotted black and get shriveled. A stinking smell emanates from the bug.

Bionomics

Adult is green in colour. Nymph is brownish red with multi colour spots.



12. Mirid bug: *Creontiades pallidifer* (Miridae: Hemiptera)

No external symptom will be visible. The earhead should be tapped either on the palm (or) a piece of cardboard. A number of brownish (or) greenish nymphs and adults can be seen. On the developing grains small brownish spots will be visible. In severe infestation, the grains get shriveled without maturing and the earheads appear uneven.

13. Slug caterpillar: *Thosea apierens* (Cochlididae: Lepidoptera)

Damage symptoms

Irregular feeding and defoliation are the symptoms of attack.

Bionomics

It is a brown stout moth with a pair of white bands on forewings. Larva is green with stinging hairs.

14. Leaf roller: *Marasmia trapezalis* (Pyralidae: Lepidoptera)

Damage symptoms

Leaves are folded longitudinally especially near the tips and leaves dry from the tip.



Bionomics

Adult moth possess greyish wings with three dark transverse stripes and a dark wide sub terminal band. Larva is pale greenish yellow with conspicuous setae. Head and thoracic shield are reddish brown in colour.

Management

Hand pick rolled leaves and spray carbaryl 50 WP at 1 kg/ha.

15. Flea beetle: *Cryptocephalus schestedii*, *Monolepta signata* (Chrysomelidae: Coleoptera)

Damage symptoms

It makes small holes on the leaves.

Bionomics

Black beetle with long antennae and four pale yellow spots on elytra.



Management

Spray endosulfan 35 EC 1.0 L in 750 L of water

16. Red hairy caterpillar: *Amsacta albistriga*, *A. moorei* (Arctiidae: Lepidoptera)

Distribution and status

Oriental in distribution including India. It is a serious pest on pulses in Rajasthan and groundnut in southern part of India. *Amsacata albistriga* is predominant in South India while *A. moorie* dominates northern parts of the country.

Host range

Maize, sorghum, green gram, sesame, pearl millet, finger millet, groundnut, sunhemp, castor, cotton.

Damage symptoms

The larvae feed on the leaves gregariously by scrapping the under surface of tender leaflets leaving the upper epidermal layer intact in early stages. Later, they feed voraciously on the leaves and main stem of plants. They march from field to field gregariously. Severely affected field looks as if grazed by cattle.



Bionomics

Adults are medium sized moths. In *A. albistriga*, forewings are white with brownish streaks all over and yellowish streaks along the anterior margin and hindwings are white with black markings. A yellow spot is found on the head. In *A. moorei*, all markings are red in white wings. On receipt of heavy rains, in kharif season, moths emerge out from soil in the evening hours. It lays eggs on the under surface of the leaves. The eggs are cream coloured or bright yellow and laid in groups. A female moth may lay about 600-700 eggs. Egg period is 2-3 days. Tiny greenish caterpillar feeds on the leaves gregariously. A full-grown larva measures about 5 cm in length with reddish brown hairs all over the body arising on warts. The larval period is 40-50 days. The grown up larva pupate in earthen cells at a depth of 10-20 cm. They pupate mostly along the field bunds and in moist shady areas under the trees in the field and undergo pupal diapause till the next year.



ETL - 8 egg masses / 100 meter

Management

- Use light trap
- Dig trenches around the infested field and dust any of the insecticide viz., endosulfan 6% D or methyl parathion 2% D or fenvalarate 2% D.
- Spray endosulfan 35 EC 750 ml/ha quinalphos 25 EC 750 ml/ha (or) dichlorvas 76 WSC 625 ml/ha (or) chlorpyriphos 20 EC 1250 ml/ha in 375 litres of water.

17. Semilooper: *Eublemma silicula* (Noctuidae: Lepidoptera)

Damage symptoms

Extensive webbing of grains and presence of broken grains can be seen on the ear head.

Bionomics

The adult moth is small with reddish buff coloured wings having wavy lines. Eggs are laid on spikelet and grain. The egg period is four days. Larva is pale yellow. Larval period lasts for 12-13 days. It pupates within the gallery for about 12 days.

ETL: Caterpillar 2 nos. / earhead

Management

Spray two to three rounds of phosalone 750mi in 500 L of water at fortnightly interval.

18. Ash weevils: *Myloccerus maculosus* , *M.viridanus*, *M.subfasciatus* & *M. discolor* (Curculionidae: Coleoptera)

Distribution and status: Throughout India

Host range: Bajra, maize, sorghum, pulses, groundnut, cotton, guava

Damage symptoms

Leaf margins are notched resulting in wilting of plants in patches. Plants come off easily when pulled. Roots are eaten away by grubs. Adult feed on leaves.

Bionomics

***M.viridanus*:** Adult weevil with greenish white elytra

***M. maculosus*:** Adult weevil with greenish white elytra having dark lines.

***M. discolor*:** Adult weevil is brown with white spot on elytra. Grub is small, white apodous and found feeding on roots. Weevil appear during summer and lay ovoid, light yellow eggs in the soil. Female lays on an average 360 eggs over a period of 24 days. Eggs hatch in 3-5 days. Grub period 1-2 months, pupate in soil inside earthen cells and pupal period is 7-10 days. Life cycle is completed in 6-8 weeks. There are 3-4 generations in a year. Adults live fairly long for 4-5 months in the winter.

***M. subfasciatus*:** The adult weevil light grayish to white with four black spots on the wing covers. The eggs are light yellow and laid deep in the soil. The grubs are fleshy, yellow-colored. Pupation occurs in earthen cells in the soil. Egg, larval, and pupal periods last for 3 - 11, 3-42, and 5- 7 days respectively.

M. viridanus



M. subfasciatus



M. discolor



Management

1. Pest can be suppressed by disturbing the soil upto a depth of 7.5 cm and destroying the immature stages
2. Spray 2.5 kg carbaryl 50 WP in 500 L of water/ha

19. Wingless grasshopper: *Colemania sphenaroides* (Acrididae: Orthoptera)

Damage symptoms

Nymphs feed on growing plants and adult feeds on florets, ears and defoliate.

Bionomics

The adult grasshopper is wingless, greenish yellow with blue-black antennae with purple band behind the eye and laterally on thorax. It lays eggs in batches in the soil at a depth of 6 cm during October and November. The eggs hatch in the following June and July during monsoon rain.

Integrated Pest Management in Sorghum

A. Cultural methods

1. Complete the sowing of sorghum in a short time to avoid continuous flowering, which favours grain midge and earhead bug multiplication.
2. Sow Sorghum: lablab/cowpea (4:1) as an intercrop to minimize stem borer damage.
3. Take up early sowing of sorghum immediately after the receipt of South West or North East Monsoon to minimize the shoot fly incidence.
4. Use increased seed rate upto 12.5 kg per hectare and remove the shoot fly damaged seedlings at the time of thinning in case of direct sowing or raise nursery and transplant only healthy seedlings.
5. Plough soon after the harvest, remove and destroy the stubbles.

B. Mechanical method

1. Set up light traps till mid night to monitor, attract and kill adults of stemborer, grain midge and earhead caterpillars.
2. Set up sex pheromone trap at 12/ha to attract male moths *Helicoverpa* sp. from flowering to grain hardening.
3. Set up the TNAU low cost fishmeal traps @ 12/ha till the crop is 30 days old.

C. Biological methods

1. Take up two applications of NPV at 10 days interval at 250 LE/ha along with crude sugar 2.5 kg + cotton seed kernel powder 250 g on the ear heads to reduce the larval population of *Helicoverpa* sp.

D. Chemical methods

1. Use seeds pelleted with insecticides.
2. Arpocarb fishmeal formulation is more effective in attracting the shoot fly adults especially the females.

Preparation of Arpocarb fishmeal: Fishmeal powder is to be sprayed first with 2% starch dissolved in hot water as a sticking agent. The insecticide Arpocarb should then be sprayed at 50 ml/kg of fishmeal powder. The resultant mixture is shade dried and can be used at 50 g/trap. The formulated product should be moistened well before placing in the trap. The formulation can be changed once in 10-14 days depending upon the smell.

II. PESTS OF PEARL MILLET

Major pests				
1.	Shoot fly	<i>Atherigona approximata</i>	Muscidae	Diptera
2.	Stem borer	<i>Chilo partellus</i>	Crambidae	Lepidoptera
3.	Pink stemborer	<i>Sesamia inferens</i>	Noctuidae	Lepidoptera
4.	Grain midge	<i>Geromyia penniseti</i>	Cecidomyiidae	Diptera
5.	Stink bug	<i>Nezara viridula</i>	Pentatomidae	Hemiptera
Minor pests				
6.	Leaf beetle	<i>Lema downsei</i>	Galerucidae	Coleoptera
7.	Black hairy caterpillar	<i>Estigmene lactinea</i>	Arctiidae	Lepidoptera
8.	Wingless grasshopper	<i>Neorthacris simulans</i>	Acrididae	Orthoptera
9.	Semilooper	<i>Antoba (=Eublemma) silicula</i>	Noctuidae	Lepidoptera

MAJOR PESTS

1. Shoot fly: *Atherigona approximata*, Muscidae: Diptera

Damage symptoms

A serious pest on pearl millet all over India in Tamil Nadu during cold weather season; it attacks the crop both in seedlings and boot leaf stage. It causes dead hearts in young plants and chaffy grains in the mature crop.

Bionomics

Adult is greyish white fly. The egg-stage of the fly lasts 37-48 hours, larval stage 7-9 days and pupal stage 6 days.

Management

As given under Sorghum

2. Stem borer: *Chilo partellus* (Crambidae: Lepidoptera)

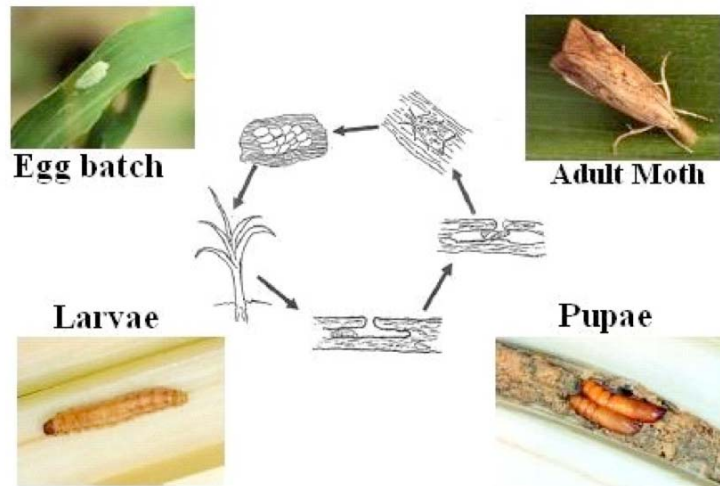
Damage symptoms

It infests the crop a month after sowing and upto emergence of earhead. Central shoot withering leading to “dead heart” is the typical damage symptom. Bore holes visible on the stem near the nodes. Young larva crawls and feeds on tender

folded leaves causing typical “shot hole” symptom. Parts of stem may show internally tunneling caterpillars.

Bionomics

Life cycle of *Chilo partellus*



Management

As given under sorghum

3. Pink stemborer: *Sesamia inferens* (Noctuidae: Lepidoptera)

Distribution and status

India, Pakistan, Malaysia, Taiwan, Burma, Bangladesh, Sri Lanka, South East Asia, China, Korea, Japan and Indonesia.

Host range: Sorghum, maize, rice, wheat, sugarcane, bajra and ragi, barley, guinea grasses

Damage symptoms

Pink larva enters into the stem causing dead heart symptom.

Bionomics

The adult moth is a straw coloured moth with white wings. The larva is pinkish brown with dark head. The life cycle is completed in 45-75 days. There are 4-6 generations per year.



4. Grain midge: *Geromyia penniseti* (Cecidomyiidae: Diptera)

Damage symptoms

Maggot feeds on developing grains causing grainless glumes with white pupal case attached to the tip of the spikelet.

Bionomics: Adult is a light pink fragile fly.

Management

Dust any one of the insecticides – malathion 5D 25 kg, carbaryl 10 D 25 kg, endosulfan 4 D 10 kg/ha.

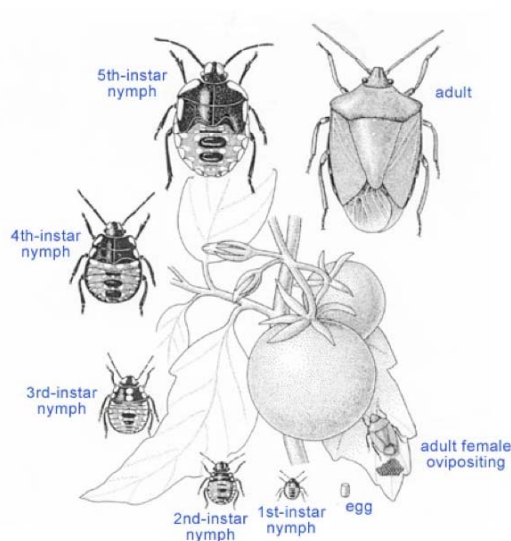
5. Stink bug: *Nezara viridula* (Pentatomidae: Hemiptera)

Damage symptoms

Grains become chaffy or spotted black and get shrivelled. A stinking smell emanates from the bug.

Bionomics

Adult is green in colour. Nymph is brownish red with multi colour spots.



Management of ear head pests

Apply any one of the insecticides at 25 kg/ha - carbaryl 10 D, malathion 5 D, or spray carbaryl 50 WP 750 g (or) endosulfan 35 EC 750 ml/ha at 50% flowering stage.

MINOR PESTS

6. Leaf beetle: *Lema downsei* (Galerucidae: Coleoptera)

Damage symptoms

Grubs and adults scrape the chlorophyll. It results in withering and drying of

leaves leading to burnt up appearance.

Bionomics

Grub is whitish with a small black head and a swollen humped body and has the habit of carrying its fecal matter dorsally. Adult is a straw coloured beetle.

7. Black hairy caterpillar: *Estigmene lactinea* (Arctiidae: Lepidoptera)

Damage symptoms

Larva feeds on leaves voraciously and causes severe defoliation.

Bionomics

Adult is a large white moth with crimson markings on head, body and wings. Larva is thick with black head and hairs.



8. Wingless grasshopper: *Neorthacris simulans* (Acrididae: Orthoptera)

Damage symptoms

Both nymphs and adults feed on leaves and cause defoliation.

Bionomics

Greenish brown in colour with red stripe on the sides without wings.

9. Semilooper: *Antoba* (=Eublemma) *silicula* (Noctuidae: Lepidoptera)

Distribution: India

Hosts: Sorghum, pearl millet, finger millet

Damage symptoms

Extensive webbing of grains and presence of broken grains on the ear head.

Bionomics

The adult moth is small with reddish buff coloured wings having wavy lines. Eggs are laid on spikelet and grain. The egg period is 4 days. Larva is a pale yellow semilooper. Larval period lasts for 12-13 days. It pupates within the gallery for about 12 days.

ETL: caterpillars 2 Nos./ear head

III. PESTS OF FINGER MILLET

Major pests				
1.	Pink stem borer	<i>Sesamia inferens</i>	Noctuidae	Lepidoptera
2.	White borer	<i>Saluria inficita</i>	Phycitidae	Lepidoptera
3.	Root aphid	<i>Tetraneura nigriabdominalisi</i>	Aphididae	Hemiptera
4.	Cut worm	<i>Spodoptera exigua</i>	Noctuidae	Lepidoptera
5.		<i>Holotrichia consanguinea</i>	Melolonthidae	Coleoptera
Minor pests				
6.	Flea beetle	<i>Chaetocnema pusaensis</i>	Alticidae	Coleoptera
7.	Earhead caterpillars	<i>Sitotroga cerealella</i>	Gelechiidae	Lepidoptera

MAJOR PESTS

1. Pink stem borer: *Sesamia inferens* (Noctuidae: Lepidoptera)

Damage symptoms

Pink larva enters into the stem and causes dead heart symptom.

Bionomics

The adult is a straw coloured moth with white wings. The larva is pinkish brown with dark head. The life cycle is completed in 45-75 days. There are 4-6 generations per year.

Management

Spray cartap hydrochloride 4G @ 25kg/ha, fipronil 0.3G 15kg chlorpyrifos 10G 10kg, in whorls .

2. White borer: *Saluria inficita* (Phycitidae: Lepidoptera)

Damage symptoms

A potential pest on finger millet in South India. Larva bores into the stem at the base of the tiller close to the soil level and causes dead heart.

Bionomics

Adult is a small moth with dark brown forewings with a white band along the anterior margin and white hind wings. Larva is creamy white with yellow head.

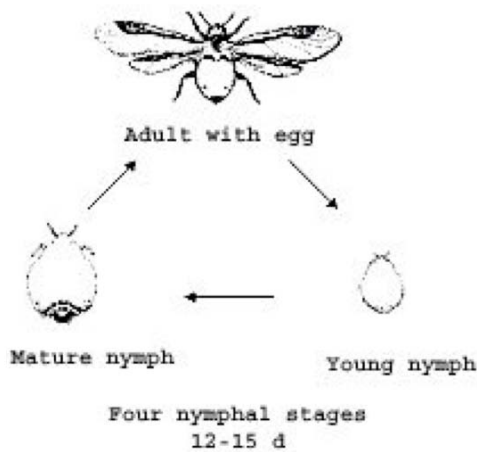
3. Root aphid: *Tetraneura nigriabdominalisi* (Aphididae: Hemiptera)

Damage symptoms

Aphid remains at the base of the plant and suck the sap. The infested plants turn pale yellow and become stunted. Wilting and drying of plants in patches is the typical symptom. Black ants attend them for honeydew and their presence confirm the root aphid attack. It occurs on many grasses too.



Bionomics



The aphids are pinkish and globular. It reproduces viviparously. They have 4 nymphal instars with a total nymphal duration of 7-9 days. Adult lives for 5-11 days and produces 10-35 off springs.

Management

Spraying the base of attacked plants with a contact or systemic insecticides controls the aphid.

4. Cut worm: *Spodoptera exigua* (Noctuidae: Lepidoptera)

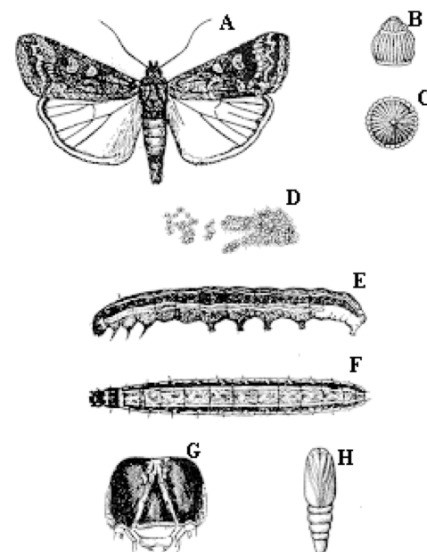


Damage symptoms: Defoliation.

Host range: onion, brinjal, cotton, cowpea, chillies, daincha.

Bionomics

Moth is brown coloured with white hind wings. It lays eggs in groups. Larva is



Beet Armyworm. A, Adult. B-C, Eggs (enlarged). D, Egg mass. E-F, Larvae. G, Larval head. H, Pupa.

nocturnal in habit. It is brownish green with wavy lines on the dorsal surface and yellow stripes laterally. The larval period is 10-16 days. It pupates in earthen cocoons in soil for 7-11 days.

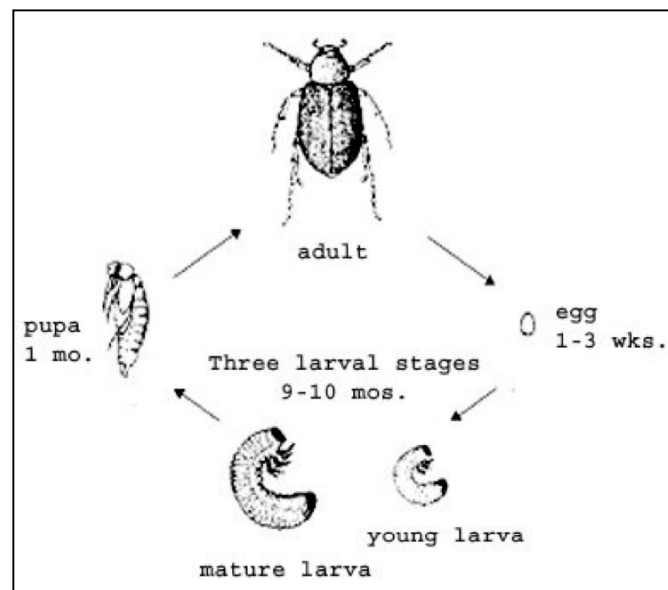
5. *Holotrichia consanguinea* (Melolonthidae: Coleoptera)

Damage symptoms

Grubs feed on roots and results in the death of the grown up plants.

Bionomics

Grub is fleshy, 'C' shaped, whitish yellow in colour found close to the base of the clump. Adult is dark brown.



MINOR PESTS

6. Flea beetle: *Chaetocnema pusaensis* (Alticidae: Coleoptera)

Damage symptoms

Adult beetles cause small holes in the leaves of young plants.

Bionomics

Adult is a dark blue beetle with enlarged hind femur.

7. Earhead caterpillars: *Sitotroga cerealella* (Gelechiidae: Lepidoptera)

It is a major stored product pest. Under field conditions larvae feed on the developing grains.

Management of finger millet pests

1. Spray any one of the following insecticides mixed in 10 lit. of water using a high volume of sprayer if dusting is not done to protect the seedling in the nursery - methyl demeton 25 EC 20 ml and dimethoate 30 EC 20 ml.
2. Spray any of the following insecticides per ha for the control of stemborer, leaf feeder - endosulfan 35 EC 1000 ml and carbaryl 50 WP 1 kg.
3. Spray carbaryl 50 WP 1 kg/ha at milky stage to check ear head bug and ear head caterpillars.
4. Mix dimethoate 30EC 3 ml in one litre of water and drench the rhizosphere of the infested and surrounding plants with solution to check the root aphid.

QUESTIONS - Sorghum, Pearl millet and Finger millet

1.	To minimize sorghum stem borer damage cowpea or lab lab is sown as intercrop in the ratio _____	
	a. 4:1	b. 2:1
	c. 3:2	d. 1:2
2.	Which is the following pest attack is a month old sorghum crop after sowing and upto emergency of ear head	
	a. Shoot fly	b. Stem borer
	c. Pink stem borer	d. White stem borer
3.	The affected sorghum plant producing more side tillers is due to attacking of _____	
	a. Shoot fly	b. Stem borer
	c. Pink stem borer	d. White stem borer
4.	----- diapause occurs in Red hairy caterpillar	
	a. Egg	b. Larval
	c. Pupal	d. Adult
5.	.----- type of diapause is occurred in sorghum grain midge	
	a. Egg	b. Larval
	c. Pupal	d. Adult
6.	.----- acts as an vector for transmitting chlorosis diseases on sorghum	
	a. Shoot bug	b. Earhead bug

	c. Mirid bug	d. Plant bug
7.	_____ transmits freckled yellow disease in sorghum	
	a. Shoot bug	b. Earhead bug
	c. Mirid bug	d. Plant bug
8.	<i>Thosea apierens</i> belongs to the following family	
	a. Muscidae	b. Cochlidae
	c. Crambidae	d. Miridae
9.	----- among the following one is a serious pest of cumbu	
	<i>Atherigona approximata</i>	a. <i>Chilo partellus</i>
	<i>Atherigona orientalis</i>	d. <i>Sesamia inferens</i>
10.	Chaffy shriveled millet grains with black spots is the typical symptom of	
	a. Stink bug	b. Grain midge
	c. Ear head bug	d. Soot bug
11.	_____ is the scientific name of shootfly of pearl millet	
	a. <i>Atherigona approximata</i>	b. <i>Atherigona orientalis</i>
	c. <i>Atherigona soccata</i>	d. <i>Atherigona oryzae</i>
12.	Withering and drying of leaves leading to burnt appearance is the damage symptom	
	a. Leaf beetle	b. Ash weevil
	c. Flea beetle	d. Black hairy caterpillar
13.	Shot holes in millets is caused by -----	
	a. Leaf beetle	b. Stem borer
	c. Pink stem borer	d. Gall midge
14.	.----- is a pest of pearl millet at seedling and boot leaf stage	
	a. Shoot fly	b. Stem borer
	c. Pink stem borer	d. Gall midge
15.	----- is site of pupation for sorghum shootfly	
	a. Stem	b. Soil
	c. Both a & b	d. Leaf

16.	White pupal case protruding out from the chaffy sorghum grains with holes are the damage symptoms of -----	
	a. Grain midge	b. Earhead bug
	c. Mirid bug	d. Shoot bug
17.	Alternate host of sorghum shoot fly is _____	
	a. Maize	b. Ragi
	c. wheat	d. all the above
18.	Alternate host of <i>Chilo partellus</i> is _____	
	a. Blackgram	b. Sesame
	c. Maize	d. all the above
19.	Alternate host of <i>Sesamia inferens</i> is _____	
	a. sugarcane	b. wheat
	c. rice	d. all the above
20.	Alternate host of red hairy caterpillar	
	a. Green gram	b. castor
	c. cotton	d. all the above
21.	Alternate host of <i>Peregrinus maidis</i> is _____	
	a. sugarcane	b. groundnut
	c. rice	d. all the above
22.	Alternate host of <i>Rhopalosiphum maidis</i> is _____	
	a. maize	b. sorghum
	c. ragi	d. all the above
23.	Alternate host of <i>Helicoverpa armigera</i>	
	a. cotton	b. tomato
	c. groundnut	d. all the above
24.	Arpocarb fishmeal is used to attract _____	
	a. gram caterpillar	b. shoot fly
	c. pink stem borer	d. red hairy caterpillar
25.	Arpocarb fishmeal formulation is more effective in attracting the shoot fly female/male	
26.	Grainless glumes with white pupal case is the symptom of _____ in bajra	

	Grain midge
27.	Potential pest of finger millet under South Indian conditions is _____ Pink stem borer
28.	Site of pupation of cut worms in is ----- Earthern cocoon in soil
29.	Presence of ants for honey dew secretion in Finger millet is an the indication of ----- Root aphid
30.	Dead hearts in young plants and chaffy grains in developed grains are the symptoms of _____ in pearlmillet. stem borer
31.	Webbing of grains and presence of broken grains are the symptoms of _____ in bajra semilooper, Antoba silicula
32.	Chaffy or spotted black and shrivelled grain is the symptom of _____ in bajra stink bug , Nezara virudula