



Centurion
UNIVERSITY

PESTS OF SORGHUM & OTHER MILLETS

SORGHUM SHOOTFLY *Atherigona soccata*

Muscidae: Diptera

DISTRIBUTION:

The pest is found distributed in India and West Africa infesting sorghum, maize, ragi, bajra etc. Its severe incidence necessitates resowing.

APPEARANCE:

- Fly is a small 3 mm long, dark grey housefly like with its abdominal segments marked with two rows of six dark spots in female and four dark spots in male.
- Full grown maggot is pale yellowish measuring 10 mm in length



LIFE CYCLE:

- Single female fly lays 40 eggs.
- Eggs are laid singly on the ventral surface of mostly the third and fourth leaves of seedlings.
- Egg is whitish cigar shaped or flattened boat shaped with wing like lateral projection.
- The egg hatches in 2-3 days.
- Larval duration is 6-10 days.
- Pupation takes place inside the stem at the base with a pupal duration of 7-10 days.
- Population reaches the minimum in December-June.

SYMPTOMS OF DAMAGE:

- Maggot moves to the dorsal surface of leaf, wriggles down the leaf, reaches base of the seedling and bores into axis destroying growing point.
- The central succulent core begins to decay, and the maggot feeds on the rotting matter.
- The damage results in the following symptoms.
 - Dead heart which can easily be pulled out giving offensive smell at cut end
 - Production of side/secondary tillers which are in turn attacked



Egg laid and Deadheart



Damage in Sorghum

MANAGEMENT:

- **Use of a higher seed rate** of 12 kg/ha instead of normal rate of 10 kg/ha and removal of affected and extra plants at the time of thinning four weeks after sowing since shootfly affects only young plants of 4-5 weeks age
- **Timely sowing of kharif sorghum** before July 15th, however for highly susceptible variety CSH-1, the above measures prove ineffective.
- Some varieties found resistant to shootfly : **IS 1054, IS 1071, IS 2394, IS 5484, SPV 86, SPV 462**
- Application of carbofuran 3 G granules @ 2 g/one metre row length in furrows at sowing time



SORGHUM STEM BORER *Chilo partellus*

Pyralidae: Lepidoptera

DISTRIBUTION:

Its infestation starts one month after sowing till harvest. This is ranked as the most important among the pests of sorghum and maize in India and is distributed all over the country. It also infests sugarcane, rice and Johnson grass.

APPEARANCE:

- Moth is medium sized, straw coloured with black specks along caudal margin of forewings.
- The larva is cylindrical, yellowish brown with a **brown head and a prothoracic shield** and dark spots on the body.

LIFE CYCLE:

- A single female lays nearly 300 eggs **on undersurface of leaves.**
- Eggs are scale like, flattish, overlapping and laid in batches. Eggs hatch in about seven days.
- Larval duration is 28-35 days.
- Larvae hibernate in winter.
- Full grown caterpillar prepares an exit hole before pupation inside the stem.
- Pupa within the stem is obtect, reddish brown with 6 spines at caudal end.**
- Pupal stage lasts 7-10 days

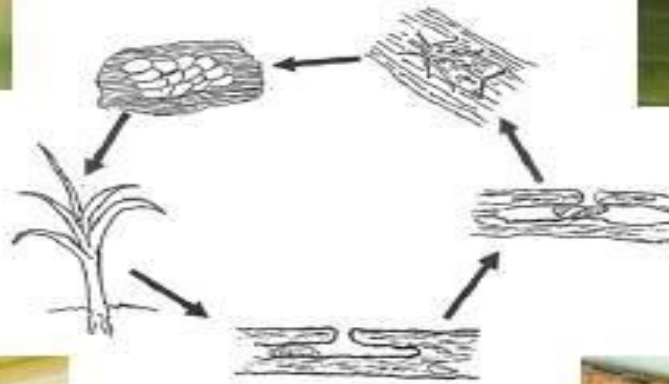
Life cycle of *Chilo partellus*



Egg batch



Adult Moth



Larvae



Pupae

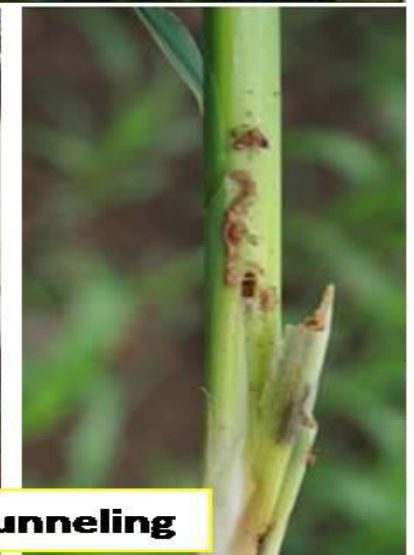


SYMPTOMS OF DAMAGE:

•Larvae bite their way into the stem feeding on the internal tissue and killing the central shoot in young plants. The damage results in

- ❖ 1. Shot holes due to biting across leaf spindle
- ❖ 2. Dead heart with no offensive smell at cut end when pulled out
- ❖ 3. Chaffy ear heads in later stages







MANAGEMENT:

- Uprooting and burning affected stubbles after harvest to destroy hibernating larvae
- Adoption of higher seed rate, pulling and destroying affected plants in the early stages
- Selection of sorghum varieties resistant to stem borer CSH 7,8; SPV 17, 19, 29,58; ICSV 197, 745, 88013
- Maize varieties / hybrids Ganga 5, DHM 101, 103, 105 have been found resistant to *C.partellus*

- Preservation of natural enemies

Egg parasitoid : *Trichogramma chilonis*

Larval parasitoids : *Cotesia flavipes*, *Bracon chinensis*

Pupal parasitoids: *Xanthopimpla punctata*, *Tetrastichus ayyari*

- Placement of carbofuran 3 G granules @ 4 kg/ac at 35-40 DAS in leaf whorls since first instar caterpillars congregate in leaf whorls.

RAGI PINK BORER *Sesamia inferens*

Noctuidae: Lepidoptera

DISTRIBUTION:

- This is a serious pest of ragi in South India. It also infests sorghum, maize, bajra, rice, wheat, sugarcane, wheat, grasses etc.

APPEARANCE:

- Moth is medium sized, straw coloured with **forewings having marginal black streaks. Hind wings and thorax are white.**
- The full grown larva measures 20-26 mm and is pale yellow with a purple pink tinge and reddish brown head.

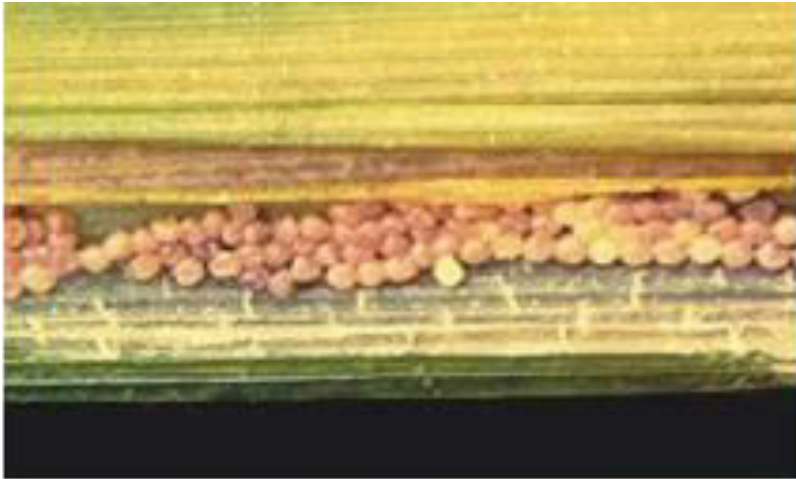
Ragi pink stem borer : *Sesamia inferens*
(Noctuidae : Lepidoptera)



- Moth is medium sized stoutly built having straw coloured forewings with dark brown longitudinal streak in the middle of the wing
- Hind wings are white in colour

LIFE CYCLE:

- The female lays about 100 yellowish pearl like eggs between the stem and the leaf sheath in 1-3 rows.
- The incubation period is 7-12 days.
- The larval period lasts for 25-54 days.
- Pupation is inside the stem and the adult emerges in 8-12 days.



SYMPTOMS OF DAMAGE:

- Caterpillars bore into the stem and kill the central shoot causing **Dead hearts and Chaffy earheads later**
- There may be up to five larvae inside a stem. A single caterpillar can damage number of plants.
- Oblong and elongate shot holes can be seen on unfolding leaves.



MANAGEMENT:

- Pull out and destroy by **burning dead hearts** and affected plant parts
- Placement of **granules** in central whorls as detailed under sorghum stem borer ·
- Foliar spray with endosulfan 2 ml/l

SORGHUM MIDGE *Contarinia sorghicola* ,
Stenodiplosis sorghicola
Cecidomyiidae: Diptera

DISTRIBUTION:

- One time a minor pest of sorghum in India has assumed the status of a major pest with the introduction of high yielding varieties and hybrid sorghum.
- It is distributed in all sorghum growing tracts of the country.

APPEARANCE:

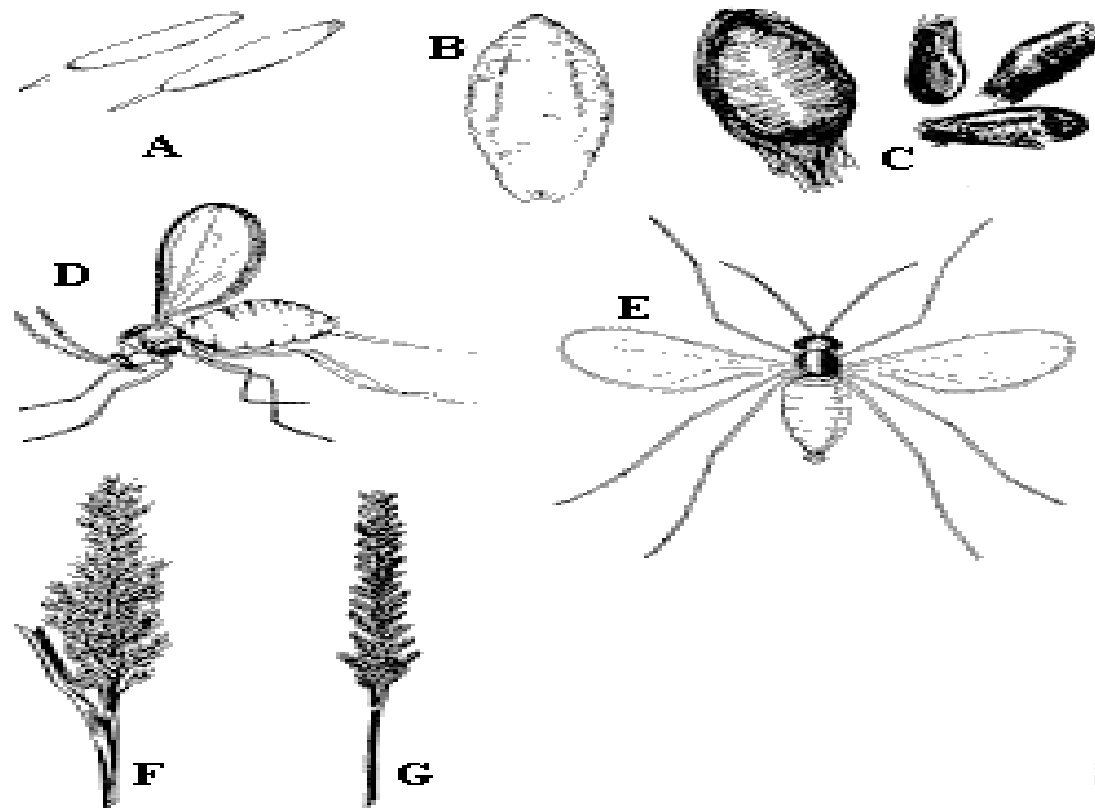
- Adult fly is a tiny, fragile, mosquito like insect with a **bright orange abdomen and a pair of transparent wings.**
- They mate soon after emergence from pupae and start laying eggs. Adult lives for 1-2 days.





LIFE CYCLE:

- Eggs are laid **singly within spikelets** of sorghum when the pollen is being shed. Single female lays 30-35 eggs @ 6-10 in each floret. Egg hatches in 3-4 days.
- Larval duration lasts for 7-11 days.
- Pupation is **within damaged spikelets**.
- The adult emerges in 3-5 days.
- The carry over of the pest from one season to the next is accomplished by the **diapausing larvae** in crop debris or on wild hosts.



Sorghum midge. A, Eggs. B, Larva. C, Pupae in cocoons. D, Adult female. E, Adult male. F, Normal sorghum head. G, Damaged sorghum head.

SYMPTOMS OF DAMAGE:

- The maggots feed on the ovaries and destroy the developing grains causing **flattening of florets**.
- The damage results in the following symptoms.
 - ❖ **Red ooze from spikelet when squeezed indicating the presence of maggot**
 - ❖ **Chaffy grains with round holes indicating fly emergence**
 - ❖ **Empty pupal cases protruding from glumes**

Chaffy grains with round holes indicating fly emergence



Empty pupal cases protruding from glumes





MANGEMENT:

- Burning panicle residues and chaff after threshing to destroy diapausing larvae. Adoption of uniform date of sowing to make varieties flower at same time
- Early sowing at monsoon to escape midge damage
- Selection of resistant varieties ICSV 197, 745, 88013, PJ 890.
- Larvae and pupae are parasitised by *Tetrastichus coimbatorensis*
- Spraying earheads when blooms first appear on panicles with or carbaryl 5 g/l or dusting carbaryl on earheads @ 8 kg/ac.

SORGHUM EARHEAD BUG *Calocoris angustatus*

Miridae: Hemiptera

DISTRIBUTION:

- It is a major pest of sorghum in South India; it also infests bajra, maize and Italian millet.

APPEARANCE:

- Adults are slender, long legged, yellowish green, about 1 cm long and are active fliers.
- Nymphs with **light orange abdomen initially turn green** as they grow.



LIFE CYCLE:

- Eggs are laid **under the glumes or into the middle of the florets** by means of long ovipositor of the female.
- A single female lays 150-200 eggs @ 1-16 in each floret.
- Bluish **cigar-shaped eggs** hatch in about 10 days.
- Nymphal stage lasts 10-16 days.
- The duration of egg to adult takes about 15-17 days. The bugs infest as soon as the ears emerge out of the leaf sheath and within a short period the population increases. There can be atleast two generations in a crop season.

SYMPTOMS OF DAMAGE:

- ❖ Both nymphs and adults suck sap from tender grains in milky stage resulting in
- ❖ Shrivelled, unfilled, chaffy grains which initially show red spots on feeding sites and later turn black
- ❖ Whole earhead turn black and later dries up.
- ❖ Varieties with compact earheads are severely infested

The sucked out grains, shrink and turn black in colour and become ill filled (or) chaffy





MANAGEMENT:

- Timely sowing at first monsoon showers .
- Avoiding compact earhead varieties
- A reduviid bug, *Reduviolus sp.*, and a lygaeid bug, *Geocoris tricolor* are predaceous on the insect
- Shaking of infested earheads in kerosinated water to destroy nymphs
- As soon as earheads emerge, dusting them with carbaryl @ 8-10 kg/ac, second dusting a week after if needed or foliar sprays with endosulfan 2 ml/l or phosalone 2.5 ml/l

RED HAIRY CATERPILLAR

Amsacta albistriga, *A. moorei*

Arctiidae: Lepidoptera

DISTRIBUTION:

- These are distributed all over India.
- *A.albistriga* is the predominant species in South India while *A.moorei* in North India.
- In South India it is very serious pest of **dry crops** especially groundnut in most of the rainfed tracts in *kharif* season.
- It also infests young **sorghum, maize, cotton, castor, cowpea, bajra.**
- Red soils are more suitable.

APPEARANCE:

- Moth is medium sized having white forewings with brownish markings and streaks and white hind wings with black spots.
- There is a yellow band on the head and a yellow streak along costal margin of the forewings in *A.albistriga* while the band on the head and streak along costal margin of the wing are red in *A.moorei*.
- Larva are reddish brown with a red head and dense large hair and body.
- On either end of the body, larva has black bands enclosing a red band in between.



A. albistriga



A.moorei



LIFE CYCLE:

- Adults pair almost immediately after the emergence and oviposit the same night.
- Oviposition is spread over 2-3 days.
- Eggs are cream or **bright yellow** and are laid in masses on young foliage or on the soil, clods of earth, stones or occasionally on other vegetation.
- A single female lays about 1000 eggs in clusters of 50-100. Larvae hatch in about 3-4 days.
- Larvae become full grown in about **40-50** days.

- Full grown larvae await next sharp **showers**.
- Failure of rains at this critical stage may result in **annihilation** of larvae due to their inability to pupate for want of sufficient soil moisture.
- In the presence of sufficient moisture, full grown larvae burrow into the soil and pupate along bunds, shady moist places under trees etc. at a depth of 10-20 cm.
- **Pupae remain in soil till next year *i.e.*, from Oct-Nov. to the following July-Aug in South India.**



SYMPTOMS OF DAMAGE:

- Dark larvae feed gregariously on the lower surface of leaves scraping for 4-5 days. In about 10 days, they turn **ashy brown** and slowly spread from plant to plant feeding voraciously.
- These larvae feed on leaves in large numbers and march from field to field in thousands resulting in following symptoms.

Heavy defoliation

Entire crop looks as though grazed by cattle



Red head hairy caterpillar
Amsacta albistriga

Caterpillars feeds on leaves and ear heads

MANAGEMENT:

- Deep ploughing to expose pupae after harvest
- **Bonfires** at night between 7-11 pm within 48 hours after monsoon rains to attract and kill emerging moths
- Collection and destruction of egg masses and gregarious larvae .
- Growing **cowpea or castor** as trap crops
- Placing shoots of *jatropha*, *Ipomoea* on the field bunds to attract and kill migrating larvae

- Larvae are parasitised by *tachinids*, *Exorista civiloides*, *sturmia inconspicuella* and preyed upon by a pentatomid predator, *Eocanthecona furcellata*
- Digging trenches around the field and dusting them with methyl parathion (Folidol) .
- Dusting with methyl parathion or quinalphos @ 10 kg/ac for early instars
- Foliar sprays with dimethoate 2 ml/l or monocrotophos 1.6 ml/l for grown up caterpillars .
- Distribution of poison baits (rice bran 10 kg + jaggery 1 kg + quinalphos 1 litre or methomyl 350 ml + water in sufficient quantity for making balls) in the evening hours.

DECCAN WINGLESS GRASSHOPPER

Colemania sphenarioides

Acrididae: Orthoptera

- It causes appreciable damage to rainfed millets. Both nymphs and adults feed on the leaves in early stage of the crop. However, the crop suffers at the **earhead** stage.
- Grasshoppers devour flowers and ripening ears wholly, sometimes leading to total loss of crop.
- Deep **ploughing** after harvest to expose eggs and dusting all around borders and then entire crop with carbaryl 10 D or endosulfan 4D @ 10 kg/ac are effective measures.



SORGHUM APHID / CORN APHID

Rhopalosiphum maidis

Aphididae: Hemiptera

- It is confined to unopened leaves of sorghum, maize and other millets.
- Nymphs and adults suck sap from leaves and tender earheads leading to mottled appearance with yellow patches, failure of grains to develop in earhead and formation of sooty mould due to honeydew excretion on the plants.
- It transmits maize dwarf mosaic virus in sorghum leading to death of young seedlings.
- Coccinellids, syrphids and chrysopids suppress the population in nature. However, need based treatments with dimethoate 2 ml/l or monocrotophos 1.6 ml/l or acephate 1 g/l are recommended.



MAIZE SHOOT BUG *Peregrinus maidis*

Delphacidae: Hemiptera

- It is one of the important sap feeders of millets, found **within leaf whorls or on the leaves**.
- Both nymphs and adults suck sap from tender portions of plants causing **yellowing** of foliage, **stunted** growth and **scorched** appearance. The ants, *Camponotus compressus*, *Monomorium destructor* are seen attending on the bugs for honeydew on which sooty mould develops.
- It is a vector of **stripe disease of sorghum, maize, sugarcane** and other millet crops.
- If predatory population is not found sufficient, dusts of carbaryl 10 D @ 10 kg/ac or foliar sprays with dimethoate 2 ml/l or monocrotophos 1.6 ml/l are effective.



Peregrinus maidis



FLEA BEETLE *Chaetocnema pusaensis*

Chrysomelidae: Coleoptera

- Beetles bite small holes on leaves which affect **photosynthetic** activity. Leaves or seedlings of various millets such as **sorghum**, **maize and bajra** are damaged. Grubs are not destructive and are found in the soil.
- Dusting **carbaryl** @ 10 kg/ac or spraying 2% neem oil is effective.



BLISTER BEETLES

Orange banded blister beetle: *Mylabris pustulata*

Brown blister beetle : *Gnathospastoides rouxi*

Meloidae: Coleoptera

- Blister beetles prefer yellow and red flowers.
- Beetles attack **inflorescence** and feed on **flower petals**, **pollen** adversely affecting grain set.
- They can also feed on tender foliage.

Beetles can be collected by **hand nets** and destroyed. They are highly **phototropic** and get attracted to light traps. Dusting earheads with carbaryl @ 10-15 kg/ha is effective.



RAGI CUTWORM

Spodoptera exigua

Noctuidae: Lepidoptera

- It infests among millet crops, ragi, sorghum and bajra. It is widely distributed in India and highly polyphagous. The pest is serious in ragi nurseries feeding on leaves causing extensive defoliation. **The grown up larva coils with slightest touch and drops down.** The larvae hide during day time in the soil and feed on the foliage at night.
- In nature, larvae are infected by entomopathogenic fungus, *Nomuraea rileyi* and parasitised by Bracon sp. Thiodicarb 1 g/l or acephate 1 g/l or chlorpyrifos 2.5 ml/l as foliar sprays are recommended.

RAGI ROOT APHID

Tetraneura nigriabdominalis

Aphididae: Hemiptera

- Pale greenish, plumpy aphids suck sap from roots of ragi plants in nursery as well as main field resulting in gradual fading and drying up of plants.
- Activities of ants which move about at collar region of plant for honeydew indicate the infestation by aphids. Upon examination aphids are seen attached to roots when pulled. Collar region turns black.
- Mixing crude oil or emulsion of OP compound in irrigation water is a common method. Drenching the soil with a solution of dimethoate 0.05% is effective.



Root aphids feeds on roots of Ragi plants

ARMY WORMS / CUTWORMS

Agrotis basiconica, A. flammatra, A.ipsilon,

A.spinifera Mythimna separate

Noctuidae: Lepidoptera

- Caterpillars are defoliators of ragi, maize, bajra and sorghum. They also feed on earheads. They cut **tender stems of young and growing plants**. Larvae hide during day time in the soil and become active at dusk. In severe cases, entire leaf is eaten. The field looks as if grazed by cattle.
- Dusting or spraying during afternoon or evening hours with carbaryl 10 kg/ac or methyl parathion 2 ml/l or chlorpyrifos 2.5 ml/l or dichlorvos 1 ml/l is effective.



Thank You!

