

INSECT PEST OF SORGHUM



MAJOR PESTS OF NATIONAL SIGNIFICANCE

Sl. No.	Common Name	Scientific Name	Family	Order
1	Shoot fly	<i>Atherigona soccata</i>	Muscidae	Diptera
2	Stem borer	<i>Chilo partellus</i>	Pyralidae	Lepidoptera
3	Midge	<i>Contarinia sorghicola</i>	Cecidomyiidae	Diptera
4	White grubs	<i>Holotricha consanguinea</i> , <i>H. insularis</i> , <i>Anomala bengalensis</i>	Scarabaeidae	Coleoptera

MAJOR PESTS OF REGIONAL SIGNIFICANCE

Sl. No.	Common Name	Scientific Name	Family	Order
1	Shoot bug	<i>Peregrines maidus</i>	Delphacidae	Hemiptera
2	Pink stem borer	<i>Sesamia inferens</i>	Noctuidae	Lepidoptera
3	Ear head bug	<i>Calocoris angustatus</i>	Miridae	Hemiptera
4	Cutworm	<i>Mvthimna separata</i>	Noctuidae	Lepidoptera
5	Root aphid	<i>Tetraneura nigriabdominalis</i>	Aphididae	Hemiptera
6	Web worm	<i>Cryptoblabes gnidiella</i>	Pyralidae	Lepidoptera
7	Semilooper	<i>Autoba silicula</i>	Noctuidae	Lepidoptera
8	Gram caterpillar	<i>Helicoverpa armigera</i>	Noctuidae	Lepidoptera
9	Deccan wingless GH	<i>Colemania sphenarioides</i> , <i>Hieroglyphus nigrorepletus</i>	Acrididae	Orthoptera

MAJOR PESTS OF REGIONAL SIGNIFICANCE

Sl. No.	Common Name	Scientific Name	Family	Order
10	Red hairy Caterpillar	<i>Amsacta albistriga</i> , <i>A. moorei</i>	Arctiidae	Lepidoptera
11	Aphids	<i>Rhopalosiphum maidis</i> , <i>Melanaphis sacchari</i> , <i>Hysteroneura setariae</i>	Aphididae	Hemiptera
12	Mealy bug	<i>Heterococcus rehi</i>	Pseudococcidae	Hemiptera
13	Whitefly	<i>Neomaskellia bergii</i>	Aleyrodidae	Hemiptera
14	Rice gundhy bug	<i>Leptocorisa acuta</i>	Coreidae	Hemiptera
15	Leafhopper	<i>Pyrilla perpusilla</i>	Lophopidae	Hemiptera
16	Plant bugs	<i>Nezara viridula</i> , <i>Dolycoris tndieis</i> , <i>Menida histrio</i>	Pentatomidae	Hemiptera

MAJOR PESTS OF REGIONAL SIGNIFICANCE

Sl. No.	Common Name	Scientific Name	Family	Order
17	Thrips	<i>Anaphothrips sudanensis</i> , <i>Sorghothrips jonnaphilus</i> , <i>Florthrips traegardhi</i>	Thripidae	Thysanoptera
18	Cut worm	<i>Spodoptera mauritia</i>	Noctuidae	Lepidoptera
19	White borer	<i>Saluria inficita</i>	Phycitidae	Lepidoptera
20	Blister Beetles	<i>Zonabris phalarata</i> , <i>Lytta tenuicollis</i>	Meloidae	Coleoptera
21	Leaf roller	<i>Marasmia trapezalis</i>	Pyralidae	Lepidoptera

MAJOR RODENTS OF REGIONAL SIGNIFICANCE

Sl. No.	Common Name	Scientific Name	Family	Order
1	Smaller bandicoot	<i>Bandicota bengalensis</i>	Muridae	Rodentia
2	Soft furred field rat	<i>Millardia meltada</i>	Muridae	Rodentia
3	Indian gerbil	<i>Tatera indica</i>	Muridae	Rodentia
4	Field mice	<i>Mus spp.</i>	Muridae	Rodentia
5	Blue rock pigeons	<i>Columbia livia</i>	Columbidae	Columbiformes
6	Rose ringed parakeet	<i>Psittacula krameri</i>	Psittaculidae	Psittaciformes
7	House crow	<i>Corvus splendens</i>	Corvidae	Passeriformes

CROP STAGE-WISE IPM

STAGE	PEST
Sowing/ seeding	Shoot fly
	Sorghum white grub
Vegetative stage	Stem borer
Reproductive stage	Midge
	Ear head caterpillar
	Birds

1. Sorghum shoot/ stem fly

S.N: *Atherigona soccata*
(Muscidae: Diptera)

- **Distribution:** Occurs throughout the country but more serious in southern parts.
- **Host range:** Wheat, maize, broom corn, small millets and grasses, besides sorghum.
- **Morphology:** The eggs are elongate, flattened and somewhat boat-shaped and are provided with two wing-like lateral projections.
- Adult fly resembles house fly, little smaller and grayish brown in colour with 6 black spots on the abdomen
- It is active during early morning and evening.



Biology

- **S.O.O. eggs singly or in rows on the underside of the leaves during its life span of 12-14 days during morning hours. [JRF 2002]**
- **Eggs are pale white, cigar shaped or cylindrical and distal surface flattened.**
- The tiny maggots creep out and reach in between the sheath and axis, and bore into the stem.
- They feed inside the main shoot for 6-10 days.
- There are 4 larval instars and the larval period lasts 8 to 10 days.
- **S.O.P either inside the stem or come out and pupate in the soil. the pupal duration in 7 days.**
- Several generations are completed in a year.
- In northern India, the pest over-winters in the pupal stage.
- The whole life-cycle occupies 17 to 21 days.



Maggot inside the shoot



Full grown maggot

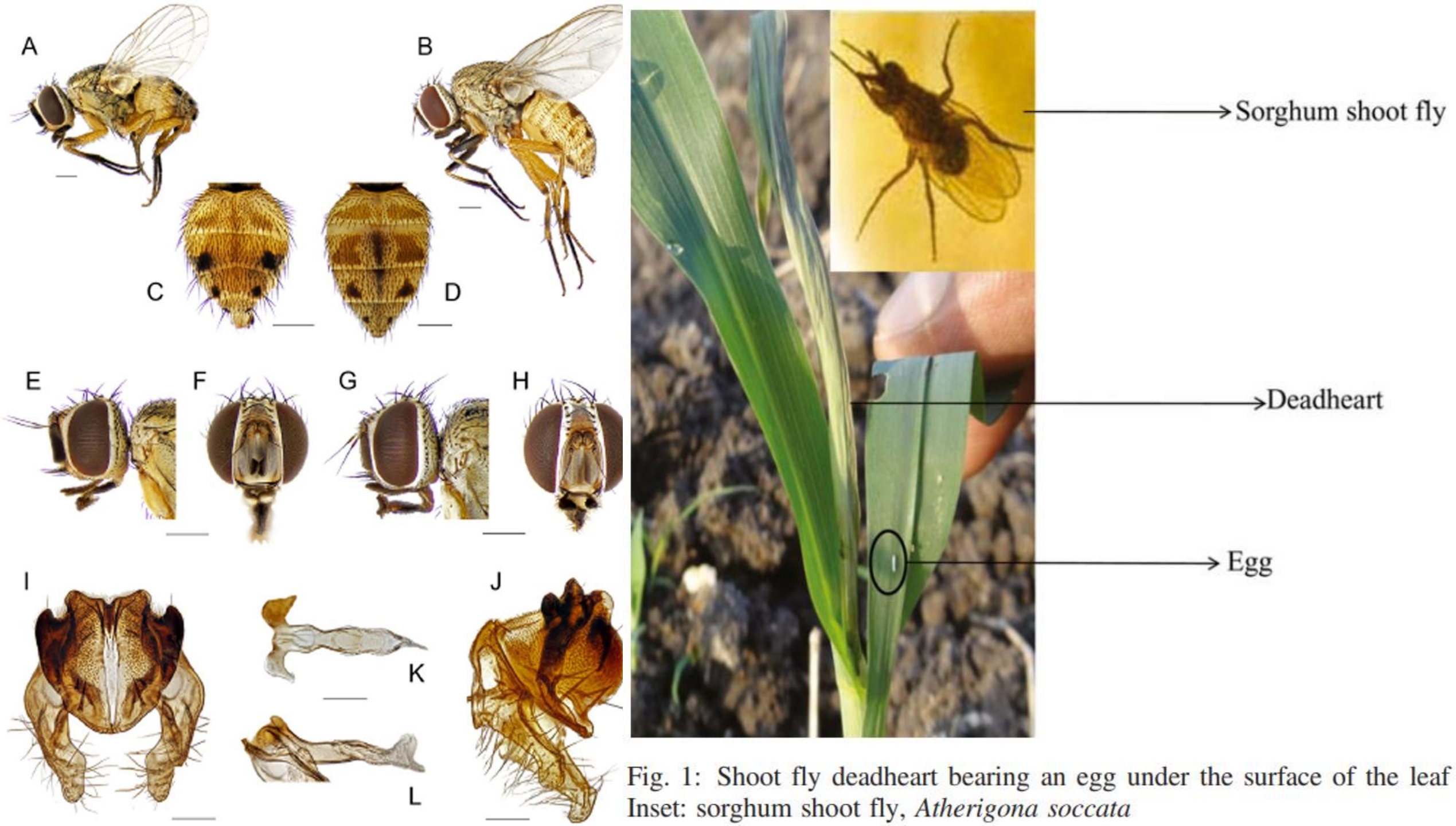


Fig. 1: Shoot fly deadheart bearing an egg under the surface of the leaf
 Inset: sorghum shoot fly, *Atherigona soccata*

Favourable conditions

- The late sown crops generally suffer greater shoot fly damage because of high humidity and moderate temperature.
- Infestation is normally high in the post rainy season crop, which is sown in September- October.
- Temperature above 35°C and below 18°C reduces shoot fly survival.
- Cloudy weather favours the multiplication of this insect .
- It is believed that infestation is also higher in irrigated fields.
- The population density of the pest is lower during hot summer in South India and winter in North India
- The 1-6 weeks old seedlings are more susceptible and also high rainfall is unfavourable .
- **Temp.- 25-30°C; RH – More than 60% (Cloudy condition); Continuous rain fall decrease pest incidence**

Nature of Damage

- **The insect attacks the young crop when it is in the six leaf stage i.e. a week after germination to about one month (upto 4 weeks).** Six weeks after planting, the crop is seldom attacked.
- It causes damage to the seedlings as well as to the early stages of the crop.
- **The maggot that hatches out of the egg migrates to the upper surface of leaf, moves along the leaf margin towards the leaf sheath and on entering between the leaf sheath and axis nibbles at the tissues and effects horizontal cut.**
- **The growing point dies and being succulent and protected by leaf sheath it decays and the maggots feed on this rotten matter.**
- **This results in foul smell.**
- As the maggots feed on the main shoot, the growing point is destroyed and by the time they pupate, the plant is almost dead.

Nature of Damage (Cont..)

- **The young plants show typical dead-heart symptoms.**
- When the attacked plants are somewhat older, tillers are produced, which mature later than the main crop.
- **Attack results in the production of dead heart and formation of side tillers (bunchy top) [JRF 2016]**
- **The total loss in yield is sometimes as high as 60 per cent.**
- **The high-yielding hybrids are more susceptible to the attack of this fly.**



Dead heart symptoms



Management

- **The crop sown from early June to the second week of July (after on-set of monsoon) normally escapes the attack i.e. Early sowing reduces the incidence [ARS 2005]**
- **Fish meal trap is used.**
- **High seed rate @ 12 kg/ha and removal of infested and extra plants 3 or 4 weeks after germination may be useful [ARSNET/ PRE2005, 2013, 2015, IARI PhD 2000]**
- **Grow resistant varieties like CHS-7, CHS-8, Indian sorghum types IS-5566, 5285 and 5613.**
- **Sorghum Coimbatore 30- Moderately resistant to shoot fly and stem borer.**
- **Resistant to shoot fly- IS-2205, IS- 3962, 1-5469. IS-1054. S-386, SPV-102.**
- **Maldandi and Hagari varieties have been reported to show slight- resistance to the attack of the fly.**
- **In resistant varieties the irregular shaped silica units are well formed from the fourth leaf onward whereas in susceptible varieties it is noticed only from sixth leaf.**

Management (Cont...)

- Seed coating with isofenphos 5G @ 30 g per 100 g seed provides protection upto 2 weeks.
- Seed treatment with imidacloprid 48% FS @12ml/Kg seeds or imidacloprid 70% WS@ 10g/Kg seeds or thiamethoxam 30% FS@ 10 ml/Kg seeds.
- A higher seed rate is adopted and the affected seedlings are pulled out and destroyed.
- Seed rate of @ 12 kg/ha may be followed and the infected plants are removed
- In case seed treatment has not been done, apply 12.5 kg of carbofuran 3G or 10 kg of phorate 10G per ha in furrows before sowing
- Spraying of cypermethrin @ 0.0059% or cartap hydrochloride 0.5 kg a.i. /ha or triazophos @0.5 kg a.i. /ha twice a week after sowing or during second week or spray 1.25 litres of malathion 50EC or 2.0 kg of carbaryl 50WP in 500 litres of water/ha.

2. Sorghum stem borer

S.N: *Chilo partellus*
(Pyralidae: Lepidoptera)

- **Distribution:** It is found in all places of India where sorghum is grown.
- **Host range:** Finger-millet, maize, pearl-millet, sugarcane, wild grasses, *Sorghum halepense*, sugarcane etc.
- **Morphology:** The eggs are flat, oval, yellowish.
- The grown up caterpillars are long and dirty greyish white, with black head and four brownish longitudinal stripes on the back.
- The adults are yellowish-grey moths
- **The moths are usually nocturnal in habit**



Biology

- The moth is medium sized and straw coloured.
- **The female lays flat oval eggs on the underside of the leaves, near the midrib. The eggs hatch in 2 - 6 days.**
- The larva is pale white with black dots and brown head.
- It bores into the stem near the node and feeds upwards.
- Most of the second instar larvae migrate to neighboring plants.
- The larva is yellowish brown with brown head and prothoracic shield.
- The larvae remain dormant in winter and hibernate.
- The average number of caterpillars per plant is four.
- The larval period lasts from 28 - 50 days in summer to 193 days in winter.
- Pupation take place inside the stem and the adults emerge in 7- 15 days depending upon the climatic conditions.
- Total life cycle is completed in 30- 40 days.

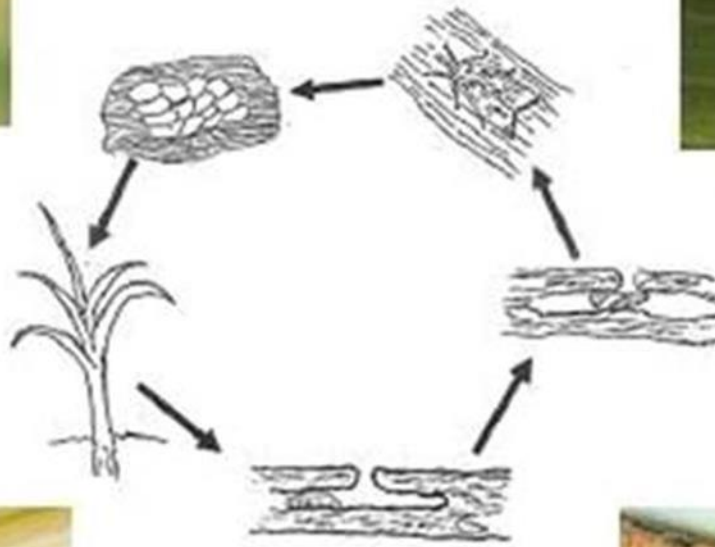
Life cycle of *Chilo partellus*



Egg batch



Adult Moth



Larvae



Pupae



Nature of Damage

- **It infests the crop usually a month after sowing.**
- **Presence of dead heart and window like symptoms on leaves in the early stages one the main symptom** [JRF 2000, ARS PRE/ NET 2010]
- **The bore holes may be visible in contrast to the dead-heart caused by the stem fly.**
- Later it acts as an internode borer and is found till the time of harvest.
- **In the grown up plants, when damaged, lose their vigour and put forth weak ears.**
- Yield is affected much and the quality of the fodder is also reduced.
- **The damage caused to the crop by this pest is estimated to range between 70 - 80 %.**
- **Causes bore holes at the base of the stem resulting in dead hearts, reddening of midrib and pinholes on the whorl of newly opened leaves.**







**Dead
heart**

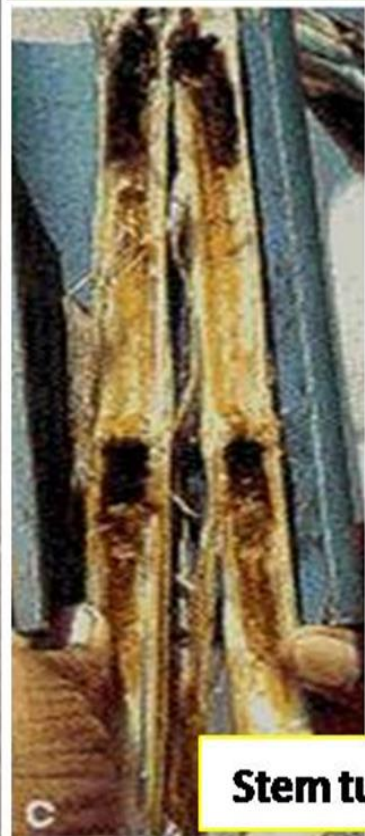




Deadheart



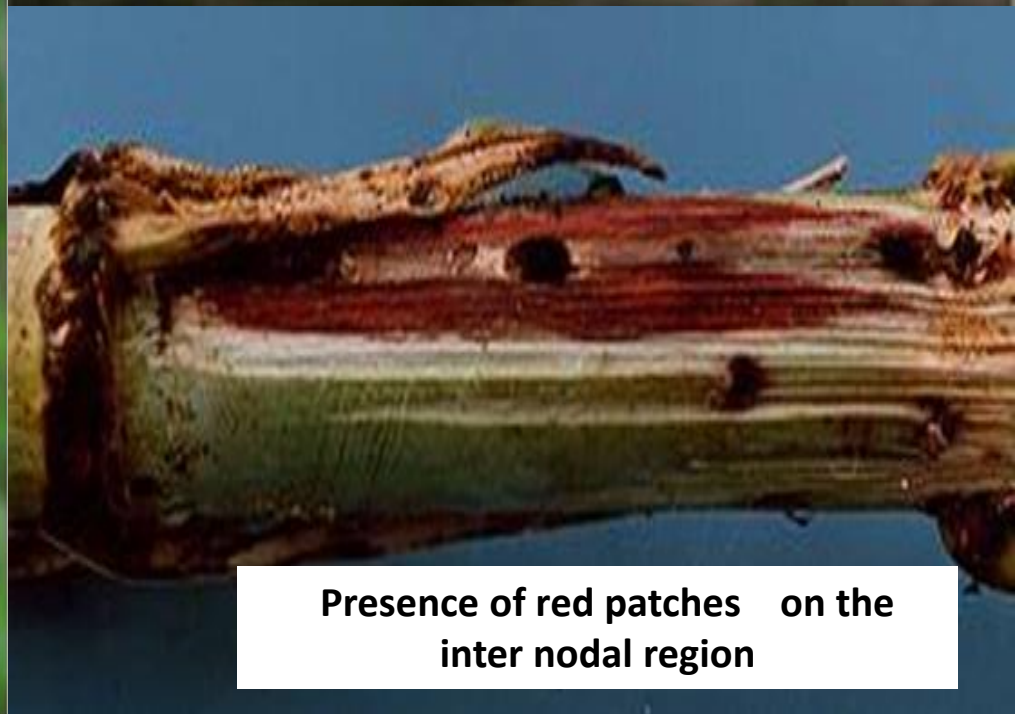
Shot-holes



Stem tunneling



Bored hole on the stem



Presence of red patches on the inter nodal region

Field symptoms

- **Mid rib tunneling by early instar larva**
- **A series of pin holes on newly emerged leaves / windowing**
- **In young plants, the pest causes a typical dead hearts**
- **In older plants the upper part of the stem usually dies due to boring of the caterpillars in the stem pith**
- **The feeding areas turns red colour on the inter node / mid rib**
- **Larval entry hole can also be seen near feeding site**

Management

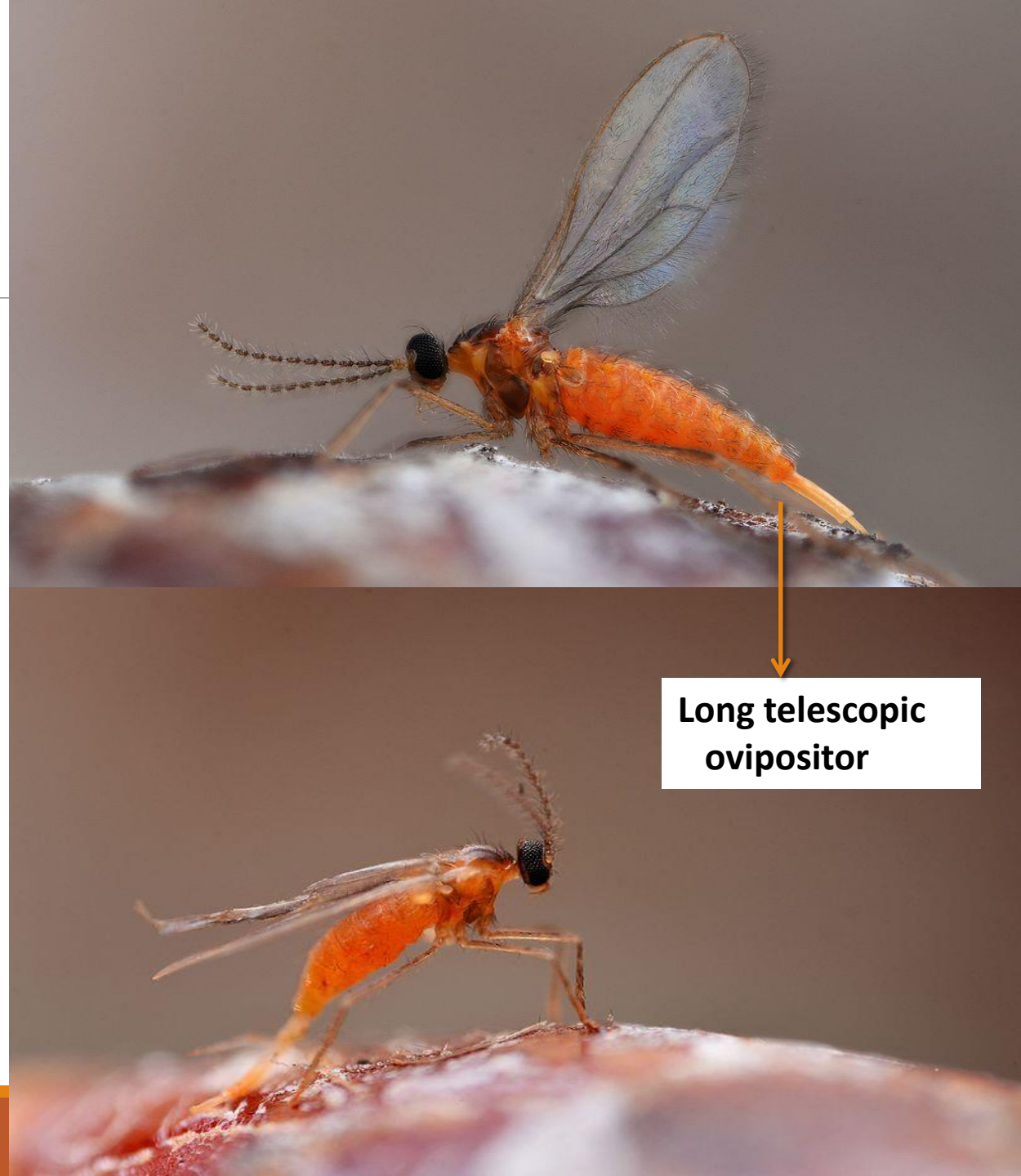
- Collection and destruction of the stubbles which are left in the field or heaped in one corner of the field since they act as a source of infestation, as the larvae hibernate in them.
- **Select and grow varieties resistant to spotted stem borer. Sow the lablab or cowpea or pigeon pea as an intercrop (Sorghum: Lablab, 4:1) reduces the damage by stem borers [ICAR NET 2019]**
- Spray carbaryl 50% WP @ 800g in 200-400 lt of water/acre;
carbofuran 3% CG @ 3320gm/acre or
quinalphos 5% G 6000 @ g/acre.

3. Sorghum midge

S.N: *Contarinia sorghicola*

(Cecidomyiidae:Diptera)

- **Distribution:** world-wide
- **Morphology:** The adult fly is fragile mosquito-like insect with long legs and moniliform antennae and a bright orange abdomen and a pair of transparent wings.
- Adult emerge during morning and active at 8:00-10:00 am
- Female emerges earlier than the male, the life span of male is very short and the female life span – 24-28 hours.
- **loss varies – from 20-50 %**



Biology

- **S.O.O.- singly into developing florets, about 30-100 eggs.**
- **S.O.P.- Inside the florets.**
- The egg, maggot and pupal durations are 2- 3, 10-11 and 7 days respectively.
- The total life-cycle is of 14-22 days.
- Larvae diapause in debris or wild plants.
- **The infestation is dependent on humidity (more severe in low lying humid areas), initial infestation and duration of flowering of sorghum**

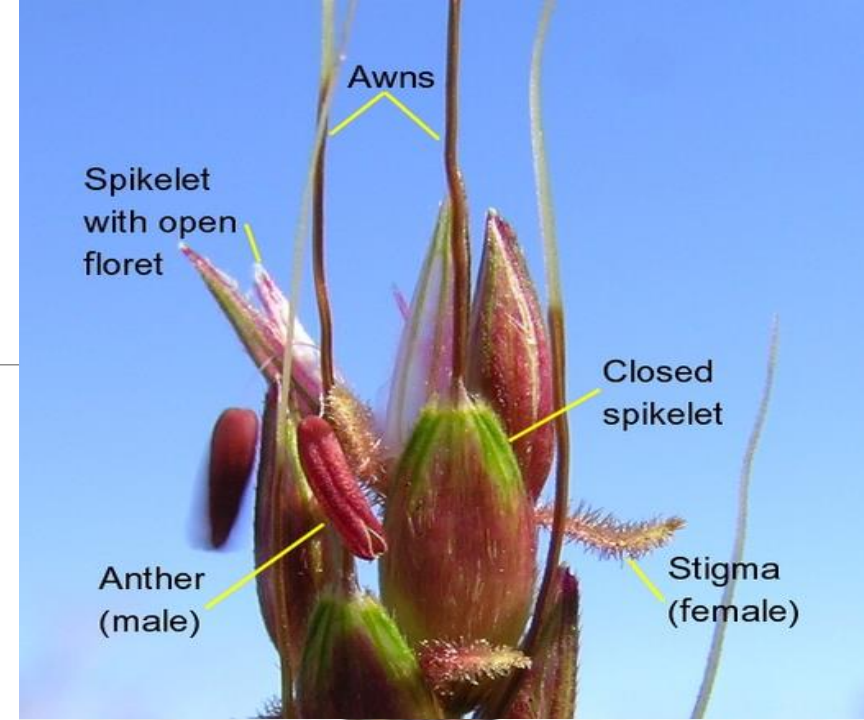


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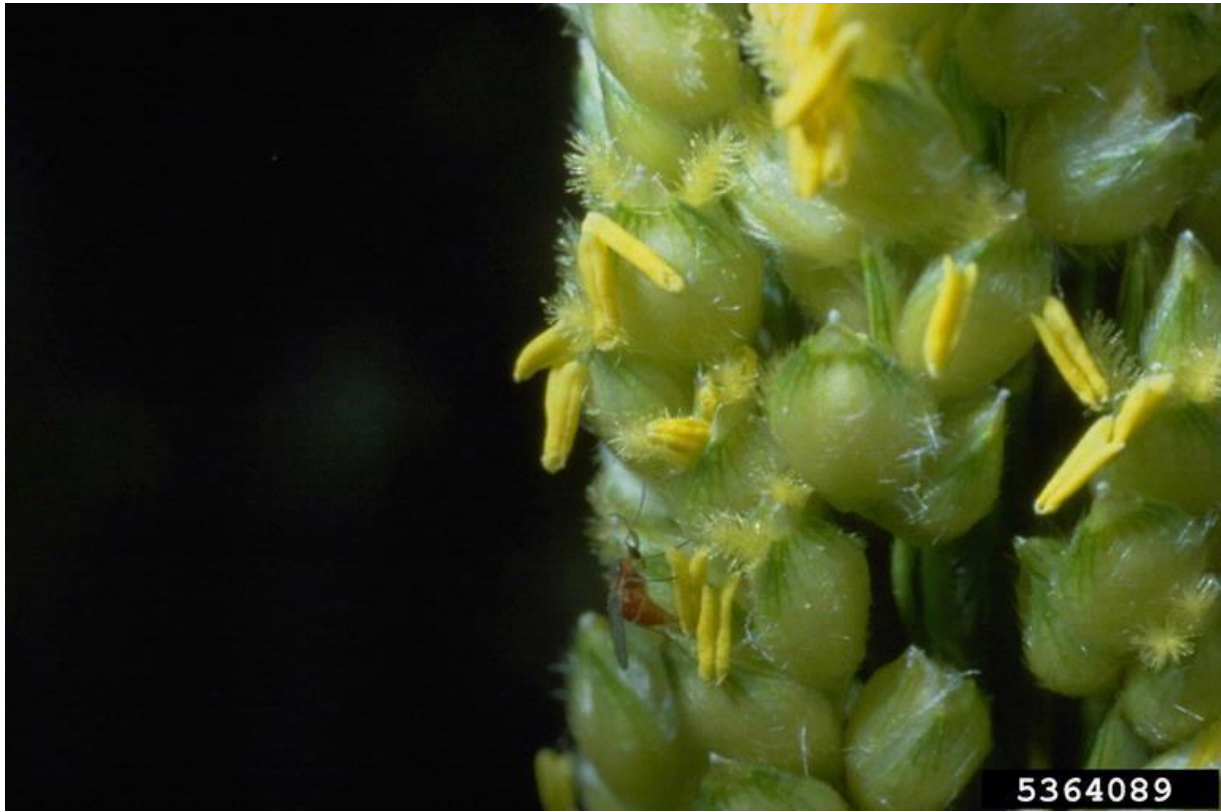
Nature of Damage

- **Serious pest of ear head** [JRF 2000, 2007]
- **The damage is caused by the maggots which feed on the ovaries and thus preventing the formation of grains and grains are chaffy.**
- **It emerges between the tip of the glumes with circular hole, leaving the white pupal case attached to the tip of the floret which is very characteristic** [IARI PhD 2014]
- The loss in yield varies from 20 to 50 per cent. The 50 % yellow and 50 % red bloom stage in sorghum ear was found to be more sensitive for attack.
- **Red ooze comes out when the developing seed in the spikelets are pressed with fingers, the body contents of the midge larva or pupa.**



partial filling of grains ←







Symptoms

- **Red ooze from the spikelet when squeezed indicating the presence of Maggots**
- **Chaffy grains with round holes indicating fly emergence**
- **Empty pupal cases protruding from glumes**



Management

- Avoid growing early and late maturing varieties as it provided continuous breeding of pest.
- Removal and destruction & damaged panicles and infested seeds
- Removal and destruction of Johnson grass
- *Orius tantilus* is a predator on gall midge.
- ETL 1 insect/ear
- The insecticides recommended are phosalone 35 EC 1 litre,
or malathion 50 EC 1 litre,
or carbaryl 50WP 2 kg per hectare



4. Sorghum Earhead Bug

S.N: *Calocoris angustatus*
(Miridae: Hemiptera)

- **Distribution:** most destructive pests in southern India.
- **Host range:** cereals, pearl millet, finger millet, sugarcane and grasses, but its breeding is mainly restricted to sorghum.
- **Morphology:** The adult is a small, slender, greenish yellow bug. Eggs are cigar-shaped [ARS PRE/ NET 2013]
- It attack the crop from ear head emergence to Ear head dough stage and severe damage to irrigated sorghum crop during April to June and to lesser extent to rainfed crop during August to January.



Biology

- **S.O.O.- under the glumes or in between anthers of florets, by inserting its ovipositor.**
- The nymphs pass through 5 instar and develop into adults in about 3 weeks.
- As soon as the grains are ripe, the bugs stop multiplying on that crop.
- Multivoltine pest and each cycle is completed in 1 month



Nature of Damage

- It inflicts severe damage to irrigated sorghum than rain-fed crop.
- Compact ears show a higher population level of the insect.
- Both the nymphs and the adults feed in the green ear heads
- As a result of feeding by the bugs, the grains remain chaffy or shriveled
- Attack is more during the milk stage.
- When a large army of tiny nymphs feeds, the whole ear may become blackened at first and may eventually dry up, producing no grains.
- Grain loss ranging from 15 to 30%.



Management

- A reduviid bug *Redviolus sp.* is predaceous on it.
- Spray 625 ml of malathion S0 EC
or 3 kg of carbaryl 50 WP
or 200 ml of phosphamidon 85 WSC in 500 litres of water per ha synchronizing with the milky stage of the crop has been found effective.
- 3 Spray Neem seed kernel extract 5% or Azadirachtin 1%



5. Sorghum Shoot Bug

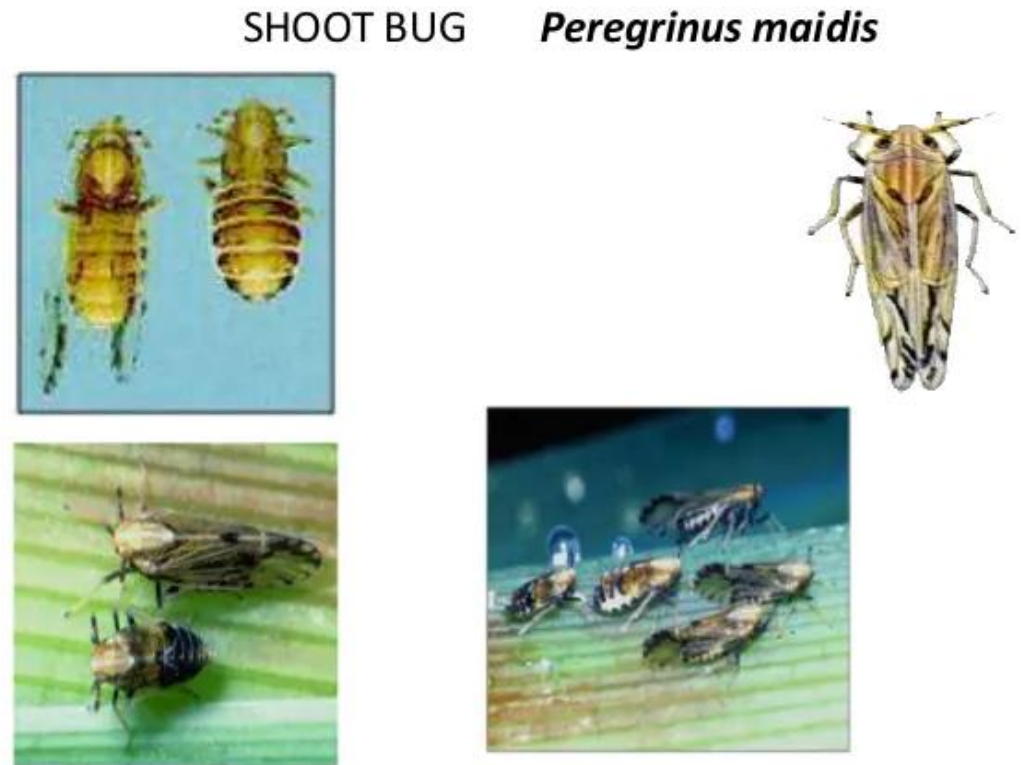
S.N: *Peregrinus maidis*
(Delphacidae: Hemiptera)

- **Distribution:** wide distribution
- **Host range:** sorghum, maize, sugarcane, oats and various species of grasses.
- **Morphology:** The adult hopper is yellowish brown, with translucent wings and The full-grown nymphs are light brown with prominent eyes and wing pads.
- Eggs are white, elongated and cylindrical.
- **Shoot bugs are found in semi gregarious or gregarious condition on leaves, leaf whorls, within the inner side of the leaf sheaths, in compact ear heads and on exposed roots**



Biology

- **S.0.0- midrib of the leaves in groups.**
- The egg, nymphal and adult periods are 7-10, 16-18 and 5 days respectively
- Adult bugs occur in 2 forms
- Adult longevity of the macropterous type is 43 and 16 days for females and males respectively.
- Adult longevity of the brachypterous type is 44 and 14 days for females and males respectively.
- The pest is more abundant from September to January and population declines from March onwards



Nature of Damage

- The adults and nymphs feed gregariously within the leaf whorls, the leaf sheaths and also on the leaves.
- As a result of their sucking the cell sap, the leaves become yellow and the growth of the plants is retarded.
- They excrete honey dew and ants therefore attend on them.
- When the attack is severe, the ears fail to emerge.
- The adults also transmit the virus diseases, corn mosaic and freckled yellow of sorghum and other virus diseases of sugarcane and pearl millet.
- Also transmits sorghum mosaic and stripe virus



Management

- **Same as in case of ear-head bug.**

Caterpillars damaging ears



Web worm/ Honey dew moth

S.N: *Cryptoblahes gnidiella*

(Pyralidae: Lepidoptera)



Semilooper

Auto basilicula

(Noctuidae: Lepidoptera)



Gram caterpillar

Helicoverpa armigera

(Noctuidae: Lepidoptera):

Nature of Damage

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

**Castor shoot and capsule borer: *Conogethes punctiferalis*
(Pyralidae : Lepidoptera)**



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- **Young caterpillar make webbings and feed on flowers and grains and they pupate with in the webbings**
- **Each larva destroys about 1gm of grains**

**Chafer beetle : *Oxycetonia* spp.
(Scarabaeidae : Coleoptera)**



**A light brown coloured beetle with white spots on the elytra
Adults feeds on ear heads of sorghum and maize**

Blister beetle : *Zonabris pustulata*
(**Meloidae : Coleoptera**)

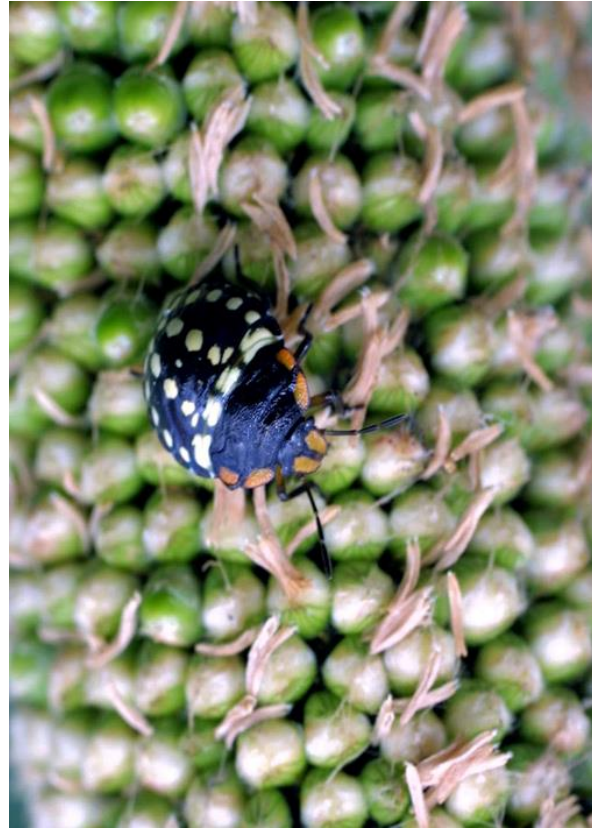


- Adult beetle with pink coloured zigzag markings on black coloured elytra
- Grubs are predators on short horned grass hopper ‘egg pods’
 - Adults feeds on flowers and tender grains of sorghum and cause damage

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



**Adults are large
green coloured
bug with 5 segmented
filiform antennae**



Nymph is brownish red or dark
brown with multicoloured spots



**Adults congregate on
The bajra ear head**

Nymphs and adults suck the sap from the softer part of the plant but principally from the developing seeds. The Injury is very negligible

Thank
you

