

INSECT PESTS OF WHEAT

- Wheat is comparatively less susceptible to insect pests in the field.
- However, in recent years, about dozen pests have become quite serious.



MAJOR PESTS OF NATIONAL SIGNIFICANCE

Sl. No.	Common Name	Scientific Name	Family	Order
1	Termite	<i>Odontotermes obesus</i> and <i>Microtermes obesi</i>	Termitidae	Isoptera
2	Grain aphid	<i>Sitobion avenae</i>	Aphididae	Hemiptera
3	Cutworm/ army worm/ ear cutting worm	<i>Mythimna separata</i>	Noctuidae	Lepidoptera
4	American boll worm	<i>Helicoverpa armigera</i>	Noctuidae	Lepidoptera
5	Brown Wheat Mite	<i>Petrobia latens</i>	Tetranychidae	Acarina
6	Pink stem borer	<i>Sesamia inferes</i>	Noctuidae	Lepidoptera
7	Shoot fly	<i>Atherigona naqvii</i> and <i>A. oryzae</i>	Muscidae	Diptera

MAJOR PESTS OF REGIONAL SIGNIFICANCE

Sl. No.	Common Name	Scientific Name	Family	Order
1	Thrips	<i>Anaphothrips favicinctus, A. sudanensis</i>	Thripidae	Thysanoptera
2	Thrips	<i>Haplothrips tritici</i>	Phlaeothripidae	Thysanoptera
3	Gujhia weevil	<i>Tanymecus indicus</i>	Curculionidae	Coleoptera

MAJOR RODENTS OF NATIONAL SIGNIFICANCE

Sl. No.	Common Name	Scientific Name	Family	Order
1	Lesser 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 booduga</i>	Muridae	Rodentia
5	Palm rat/ house rat	<i>Rattus rattus</i>	Muridae	Rodentia

OTHER PESTS

Sl. No.	Common Name	Scientific Name	Family	Order
1	Small brown plant hoppers	<i>Laodelnhax striatella</i>	Delphacidae	Hemiptera
2	Mite	<i>Aceria tulipe</i>	Eriophidae	Acarina
3	Leaf hopper	<i>Pyrilla perpusilla</i>	Lophopidae	Hemiptera
4	Jassids	<i>Amrasca spp.</i>	Cicadellidae	Hemiptera
5	Wheat bug	<i>Eurygaster maura</i>	Pentatomidae	Hemiptera
6	Wheat thrips	<i>Anaphothrips favicinctus</i>	Thripidae	Thysanoptera

OTHER PESTS

Sl. No.	Common Name	Scientific Name	Family	Order
7	Cut worms	<i>Agrotis spp.</i>	Noctuidae	Lepidoptera
8	Leaf Folder	<i>Cnaphalocrosis trapezalis</i>	Crambidae	Lepidoptera
9	Bajra Midge	<i>Geromyia penniseti</i>	Cecidomyiidae	Diptera
10	Maggot	<i>Hydrellia griseola</i>	Ephydriidae	Diptera
11	Flea beetle	<i>Chaetocnema basalis</i>	Chrysomelidae	Coleoptera

CROP STAGE WISE IPM

STAGE	PEST
Pre Sowing	Termites, soil borne insects
Sowing/ seeding	Termites
Vegetative	Aphids
	Pink borer
	Shoot fly
	Brown mite
	Army worm/Cutworm
	Ghujhia Weevil, Wheat bug, Wheat thrips
Ear head	<i>Helicoverpa</i> , armyworm

1. Pink borer

S.N: *Sesamia inferens*

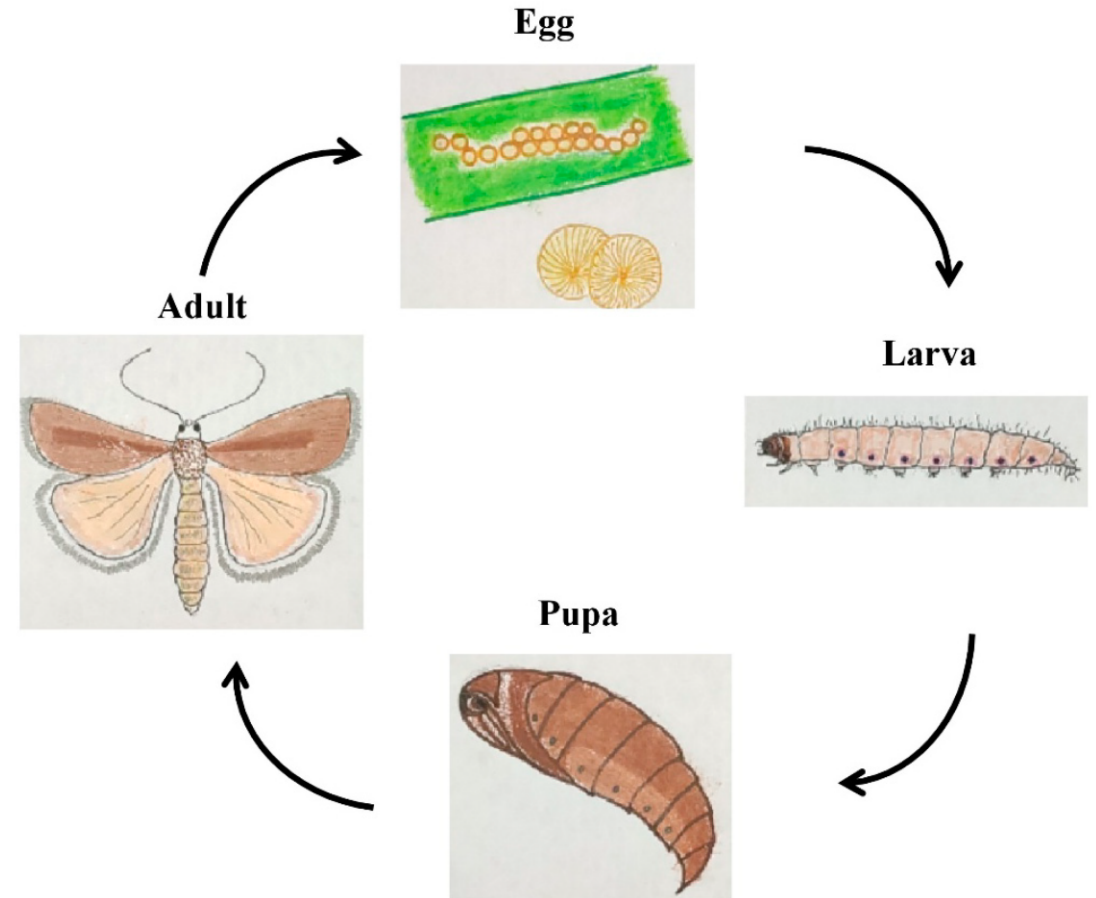
(Noctuidae: Lepidoptera)

- **Host range:** wheat ragi, bajra, sorghum, maize, rice
- **Morphology:** Round pearl like yellowish eggs.
- Full grown larvae are stout smooth, purplish pink on the dorsal side and white on ventral side.
- Pupa is dark brown in colour.
- The adult moth is straw-coloured with white wings.



Biology

- S.O.O.- 2-3 longitudinal rows usually within the sheaths of bottom leaves of young plant of two to three weeks old.
- Newly hatched larvae remain in group behind the leaf sheath and begin chewing on the stem and epidermal layer of the sheath.
- Life cycle is completed in 6-7 weeks with 4-5 generations in a year





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Nature of Damage

- Larvae bore in to central shoot resulting in the drying up of the growing point and formation of "dead heart" in young plant as a result of larval feeding sometimes the bottom internodes show circular ring like cuts
- At ear head stage "white ears" are produced.
- Severe damage causes the stem to break.



Management

- Conserve natural enemies like *Apanteles*, *Tetrastichus*, *Telenomus*, *Trichogramma japonicum*, *T. chilonis*, *Bracon* etc.
- Bird perches @ 10/acre should be erected for facilitating field visits of predatory birds.
- Dichlorovos 76% EC @ 112.8-150.4 ml in 200-400 liter of water per acre



2. Brown Wheat Mite

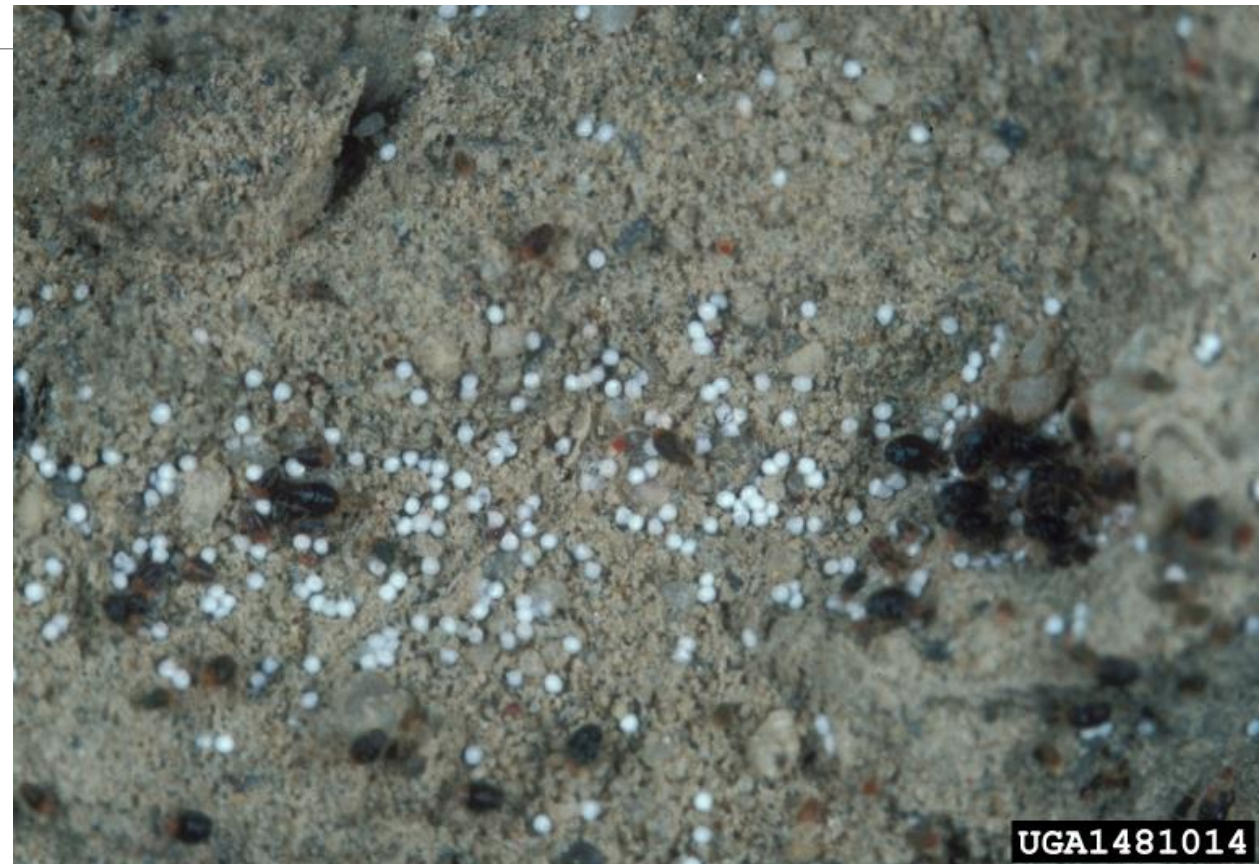
S.N: *Petrobia latens*
(Tetranychidae: Acarina)

- **Distribution:** It occurs on wheat in the summer rainfall regions and expected to be severe where drought conditions are frequently encountered.
- **Morphology:** Eggs are Hyaline, globular laid in mass.
- Nymphs are yellowish in colour.
- Adults are very small, metallic brown to black with pale yellow legs and their forelegs are distinctively longer than the other three pair of legs.



Biology

- **S.O.O.- beneath clods and are either active ie. red in colour and not visible to the naked eye or dormant i.e. white eggs. Clearly visible on the underside of clods.**
- The egg, nymphal and adult durations are 2-4, 3-12 and 14-21 days respectively.
- Dormant eggs may remain in the soil for long periods and hatch during July/August following light rainfalls
- Dry conditions favour larval development and adulthood can be attained within 8 - 11 days.
- The total life cycle is completed in 25.5 days.
- Showers of 12mm or more may lead to the eradication of the mite population, but eggs present in the soil may start a new generation.







Nature of Damage

- During high mite populations the leaves may have a bronze appearance with some leaves even dying off as a result of sucking from leaves by inserting two needle-like stylets.
- They have a tendency to feed on the tips of the leaves.
- Heavily infested fields present a scorched withered appearance.



Management

- Follow common cultural practices.
- Growing of tolerant wheat variety such as **C-306**.
- Conserve these natural enemies like *Oligota spp.*, *Anthrocnodax occidentalis*, *Feltiella minuta* etc.,
- Green lacewings (*Mallada basalis* and *Chrysoperla zatrowii sillemi*), Predatory mites *Amblyseius alstoniae*, *Phytoseiulus persimilis* etc. Predatory coccinellid beetle- *Stethorus punctillum*
- Use Neem oil (2%) or NSKE (5%).
- Spraying formothion or oxydemeton methyl or phosphomidon @ 250 g a.i/ha.
- Spraying may be repeated after 15 days in case of severe infestation.
- Quinalphos 25% EC @ 640 ml in 200-400 lt of water per acre.



3. Wheat Aphid

S.N: *Macrosiphum miscanthi*
(Aphididae: Hemiptera)

- **Distribution:** Widely distributed in India.
- **Host range:** wheat, barley, oats, etc.,
- If available, barley is preferred to wheat.
- **Morphology:** The insects are green, inert, louse like and appear on young leaves or ears in large numbers during the cold and cloudy weather.
- The nymphs and the females look alike, except that the latter are larger.
- The winged forms appear only in early summer.



Biology

- Like other winter aphids, the wheat aphid breeds at fast rate during the cold weather and reaches the height of its population in **February-March when the ears are ripening**.
- **Viviparous reproduction and parthenogenesis is observed.**
- During the active breeding season, there are no males and the rate of reproduction is very high.
- **When the wheat crop is ripe and the summer is approaching, the winged forms of both males and females are produced and they migrate to other plants like doob grass.**
- It is not known how the pest passes the summer and the monsoon season.
- In October-November, the aphids again appear on wheat.

Nature of Damage

- Nymphs and adults suck sap from the ears and tender leaves, and decrease yield of the crop.
- The damage is particularly severe in years of cold and cloudy weather.
- A heavily manured, well-irrigated and succulent crop will harbor the pest for a longer period and suffer greater damage.
- The losses due to aphids have been reported up to 36 %.





Management

- Regular field monitoring for pest & defender population, barrier crops like mustard crop around the field.
- Plant tall border crops like maize, sorghum or millet to reduce pest population.
- For others follow common cultural practices.
- Conserve the natural enemies.
- Control aphids at ear head stage at economic threshold level of 5 aphids/ear head.
- Since the aphids appear first on the borders of the crop, spray only the infected strip to check their further spread.
- Spray 375 ml of dimethoate 30EC or oxydemeton methyl 25EC or monocrotophos 36SL in 250 litres of water per ha.
- Quinalphos 25% EC (a 400 ml in 200-400 l of water per acre or Thiamethoxam 25% WG @ 20 g in 200 lts of water per acre.

4. Grain aphid

S.N: *Sitobion avenae*
(Aphididae: Lepidoptera)

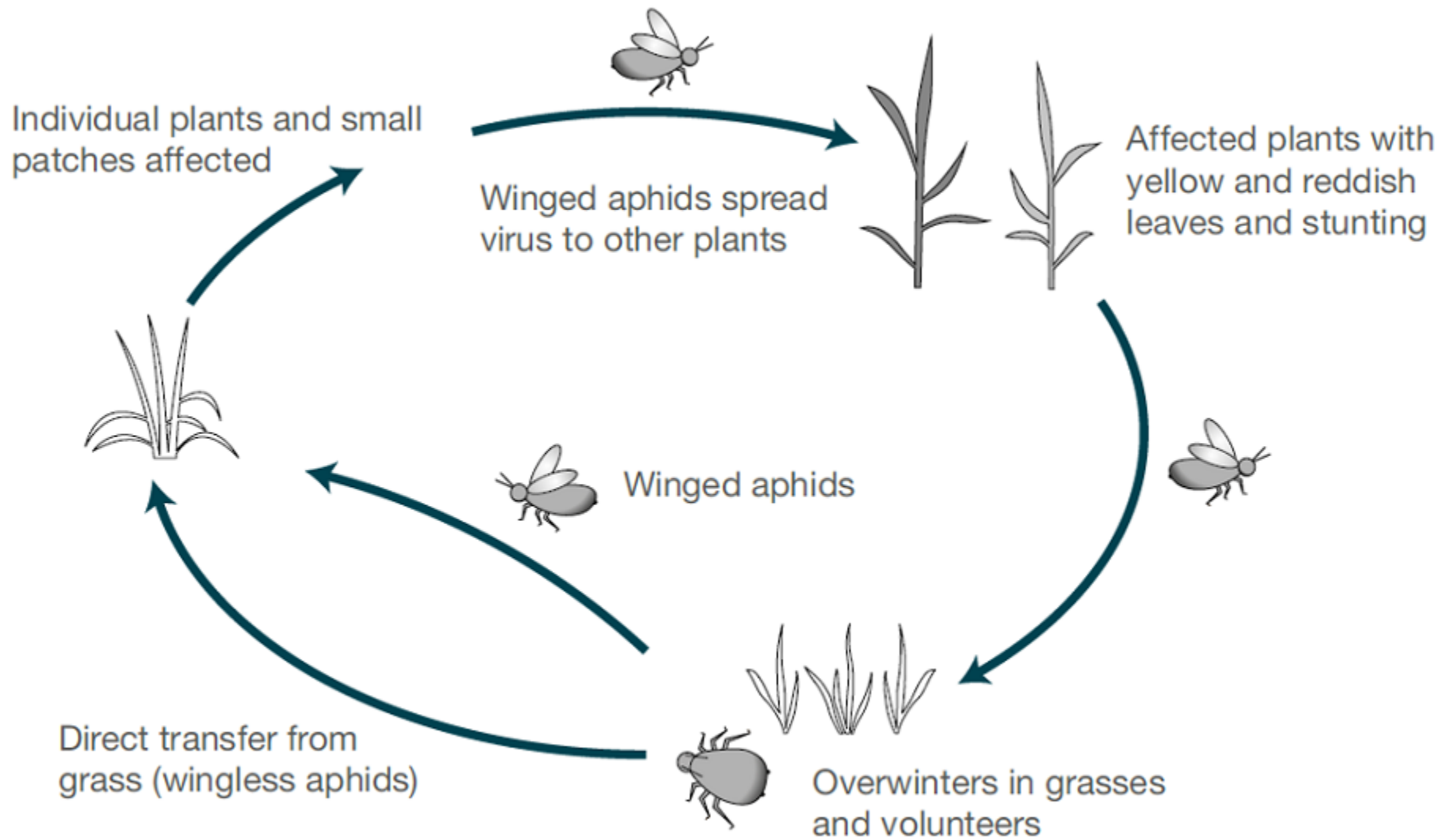
- **Distribution:** Delhi, Haryana, Himachal Pradesh, Jammu and Kashmir, Madhya Pradesh, Punjab, Rajasthan, Uttar Pradesh and West Bengal.
- **Host range:** oats, wheat, rye, barley etc.





Biology

- S.O.O.-Winter eggs are laid on the straw of graminaceous plants and hatch in late winter, giving rise to several generations of apterous, virginoparous fundatrigeniae.
- Winged aphids emerge, spreading to other graminaceous plants and developing on the uppermost leaves before moving to ears as soon as these emerge.
- When populations are abundant or when the ripening grain hardens, winged aphids appear in a few days, leaving to create new colonies on Poaceae which are still green.
- During mild winters, this species survives parthenogenetically on new growth of winter cereals and other Poaceae.



Nature of Damage

- A major pest of cereal crops in the spring.
- Like other aphids, the nymphs and adults suck the sap from plants, particularly from their ears.
- Sooty mould develop on the honeydew which they secrete.
- They appear on young leaves or ears in large numbers during the cold and cloudy weather
- The damage is particularly severe in years of cloudy weather.
- A heavily manured, well-irrigated and succulent crop will harbor the pest for a longer period and suffer greater damage.
- Heavy infestations can cause a reduction of the number of grains per ear and thus a noticeable reduction of the yield.
- **This aphid is also a vector of the barley yellow dwarf virus (BYDV).**

Management

- Early sowing of barley by 1st fortnight of November usually reduces aphid attack.
- Growing aphid resistant barley varieties DL117 or DL200.
- Regular field monitoring for pest & defender population, barrier crops like mustard crop around the field
- Plant tall border crops like maize, sorghum or millet to reduce pest population.
- Conserve the natural enemies
- Quinalphos 25% EC @ 400 ml in 200-400 l of water per acre or Thiamethoxam 25% WG @ 20 g in 200 lts of water per acre.

5. Shoot fly

S.N: *Atherigona naqvii*

(Cecidomyiidae: Diptera)

- **Distribution:** Occurs in all wheat growing areas.



Biology

- The egg, maggot and pupal durations are 1-3, 6-10 and 44 days respectively.
- Maggots which are yellow in colour migrate to the dorsal surface of the leaf, enter the space between the leaf sheath and the axis and make a clean cut at the base of the leaf.
- The growing point of the plant dies and decays on which the maggots feed.
- S.O.P.- inside the stem itself.
- The adult is a small dark fly.
- S.O.O.- whitish eggs singly on the central surface of the leaves,
- Life cycle occupies 17 - 20 days.

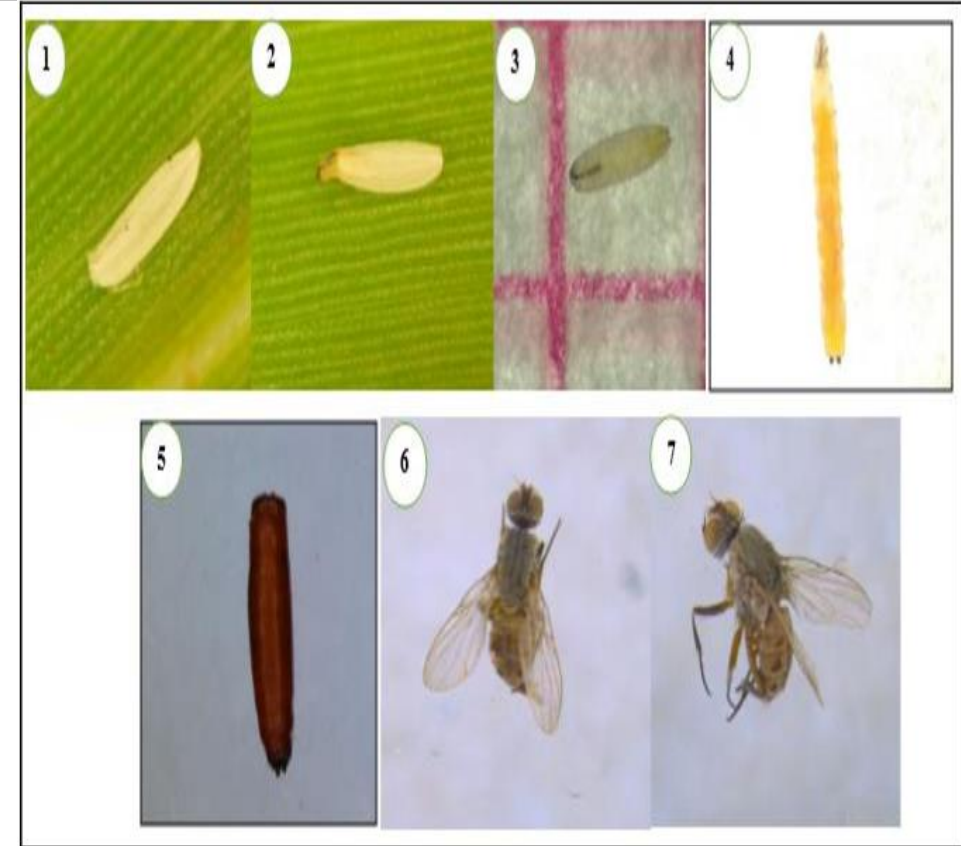


Plate 1: 1. Egg on lower surface of leaf. 2. Larva hatches out from egg. 3. First instar larva (0.73 x 0.40mm). 4. Final instar larva (7.05



32

1 mm

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33

1 mm

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34

1 mm

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36

1 mm

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35

1 mm

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Nature of Damage

- The maggots bore into the shoot of young plants a week after germination to about one month and as a result the central shoot dries up resulting in **dead hearts**.
- If it is a little later the mother plant may produce side tillers, But the tillers also may be attacked.
- The infestation often goes as high as 60%.

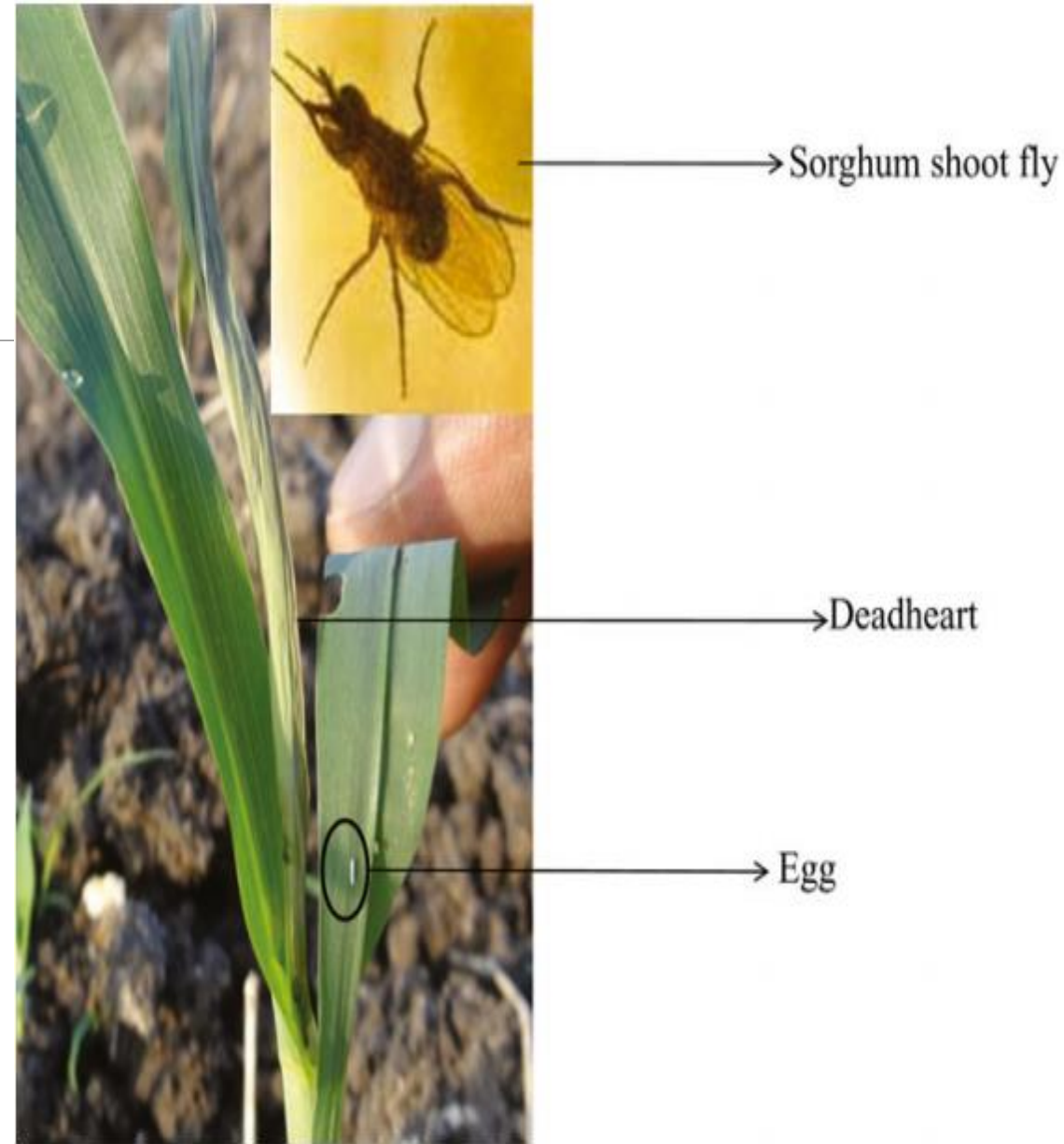


Fig. 1: Shoot fly deadheart bearing an egg under the surface of the leaf
Inset: sorghum shoot fly, *Atherigona soccata*

Management

- Regular field monitoring & pest & defender population, barrier crops like mustard crop a the field.
- Plant tall border crops like maize, sorghum or millet to reduce pest population.
- For monitoring fish meal traps can be used.
- Early sowing of wheat will reduce the attack.
- In late sown crops (end of December to 1st weck of January) spraying of cypermethrin 0.0029% twice at fortnightly intervals in seedling stage was found effective.
- The most vulnerable period of crop is being up to 60 days of germination. Or Cypemethrin 10% EC@ 220 ml in 200-320 lts of water/acre or Phorate 10% CG @7500 g per acre

6. Armyworm

S.N: *Mythimna separata*

(Noctuidae: Lepidoptera)

- **Distribution:** All over the world.
- **Host range:** In India, it is a sporadic pest of wheat, sugarcane, maize, jowar, bajra and other graminaceous crops.
- It has gained prominence as a pest of wheat only recently, particularly after the introduction of Mexican wheat varieties.
- **Morphology:** The eggs are round, light green, when freshly laid, and turn pale yellow and finally black.
- Freshly emerged larvae are very active, dull white and later turn green.

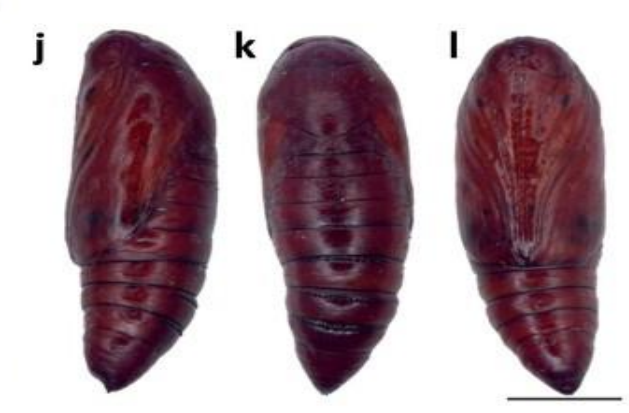
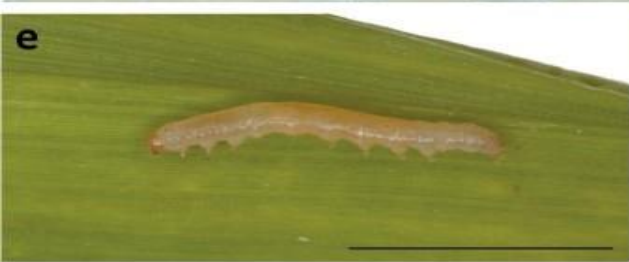


Noctuidae
Mythimna separata

10 mm

Biology

- The egg, larval, pupal and adult periods are 4-5, 15, 13-21 and 9 days respectively.
- After hatching the caterpillars start feeding on the leaves of the seedlings.
- Larvae usually have 6 instars (very seldom 7 instars).
- Larva with one intermediate light dorsal stripe, with brown lateral stripe along spiracle line: spiracles brown with black rim.
- S.O.P- Larvae pupate in soil at depths to 2 cm, under lumps of ground or under tussocks.
- Generally, the larvae before pupation seem to select sites near the water-channels.
- Adult is brownish white in colour. Forewings are grayish-yellow, with dark-gray or reddish-yellow tint.
- Round and reniform spots are light or yellowish with indistinct edges; reniform spot with white point lower margin.
- Hind wings are gray, with dark external margin. Antennae are thread-like.
- S.O.O.- On dry or fresh plants or on the soil



Nature of Damage

- The larvae feed voraciously and migrate from one field to another. Feed during dawn and dusk (shy of sunlight)
- The freshly emerged larvae spin threads from which they suspend themselves in the air and then with the help of air currents reach from one plant to another (Ballooning).
- In the early stages, they feed on tender leaves in the central whorl of the plant.
- As they grow, they are able to feed on older leaves also and skeletonize them totally.
- The grown-up caterpillars throw out fecal pellets, which are quite prominent.
- In the case of a severe attack by the army worms, whole leaves, including the mid-rib, are consumed and the field looks as if grazed by cattle.
- The pest may also eat away ears, including the awns and immature grains.
- Infestations can be very destructive: larvae may climb the plant and sever the neck just below the head. Some species may be found feeding at the soil surface, others underground feeding on roots, and still others feeding inside the stem.



Management

- The pest can be suppressed by collecting and destroying the caterpillars.
- Regular field monitoring of pest & defender population, barrier crops like mustard crop around the field.
- Pheromone traps @ 4-5/acre can be installed for monitoring fruit borer activity.
- Replace the lures with fresh lures after every 20-25 day interval.
- ETL for fruit borer is 8 to 10 moths /day/trap.
- Bird perches @ 10/ acre should be erected for facilitating field visits of predatory birds.
- 3 Spray 500 ml of dichlorvos 85SL or 3 kg of carbaryl 50WP or one liter of quinalphos 25EC in 250 liters of water per ha.

7. Ghujhia Weevil

S.N: *Tanymecus indicus*
(Curculionidae: Coleoptera)

- **Distribution:** widely distributed in the Indian Sub-continent and is a sporadic pest of considerable importance.
- **Host range:** wheat, barley, gram, mustard etc.
- **Morphology:** Weevils are earthen grey.
- Their fore wings are oblong and hind wings are more or less triangular, but they cannot fly.
- Their mouthparts are light brown and are practically concealed beneath the head.



Biology

- The pest is active from June to December and passes the rest of the year as a grub or pupa in the soil.
- Weevils emerging in June mature sexually sometime in October.
- The egg, grub and pupal periods are 44-51, 10-18 and 51-71 days respectively.
- **S.O.O.-in the soil under clods or in crevices in the ground.**
- The young grubs enter the soil where they feed, probably on soil humus.
- **S.O.P.-in earthen chambers at a depth of 15-60 cm.**
- The adults emerge next year in June or July.
- **The pest is monovoltine.**

Nature of Damage

- The adults feed on leaves and tender shoots of the host plants.
- The damage is particularly serious during October-November, when the rabi crops are germinating.
- The damage is caused by the adult weevils only and they cut the germinating seedlings at the ground levels

Management

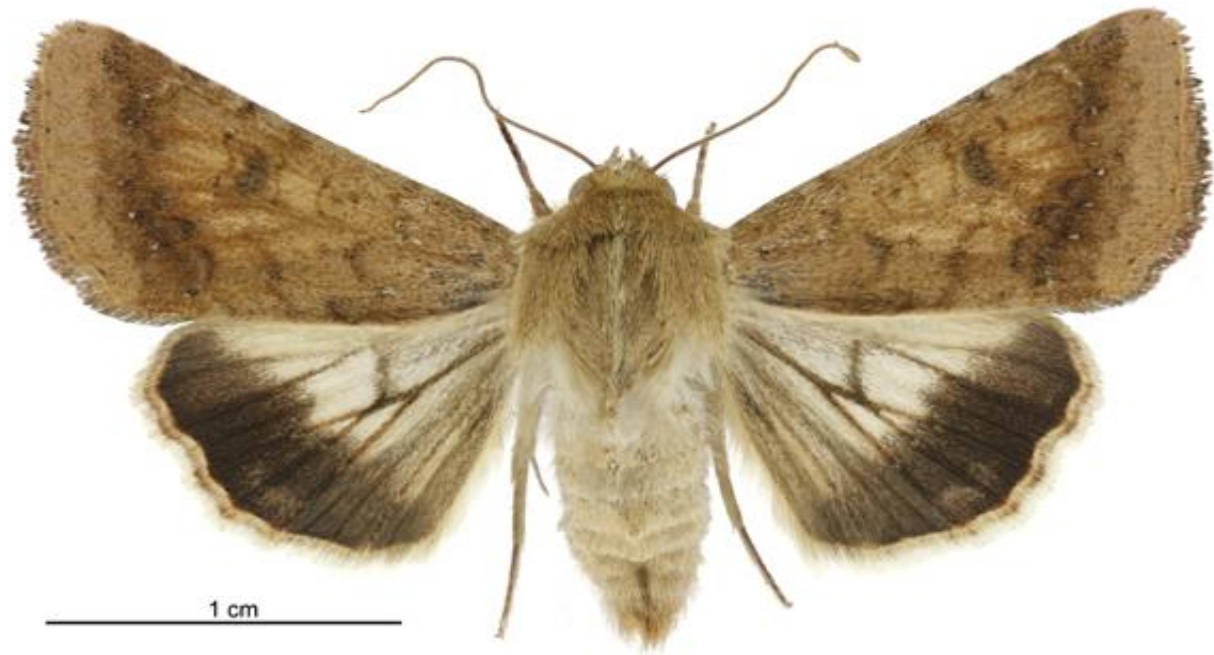
Dust carbaryl or malathion 5 per cent @ 25 kg per ha.

8. Gram Pod Borer

S.N: *Helicoverpa armigera*
(Noctuidae: Lepidoptera)

- Young larva feeds on the leaves for some time and then attacks ear heads.
- Internal tissues are eaten severely and completely hollowed out.
- While feeding the caterpillar thrust its head inside leaving the rest of the body outside.
- Fed leaves awns and ear heads.
- The gram pod borer attacks wheat at maturity.
- The damage is more where wheat follows cotton.





As I. Palares 31.VIII.1965
E. von Mentzer



Management

- Growing intercrops such as cowpea, onion, maize, coriander, urd bean in 1:2 ratio.
- Guard crop sorghum or maize in 4 rows all around wheat crop as guard crop.
- Rotate the wheat crop with a non host cereal crop, cucurbit, or cruciferous vegetable.
- Bird perches @4-8/ acre should be erected for facilitating field visits of predatory birds.
- Pheromone traps @ 4-5/acre can be installed for monitoring fruit borer activity.
- Replace the lures with fresh lures after every 20-25 day interval. ETL for fruit borer is 8 to 10 moths /day/trap.
- Either conserve the natural enemies spider dragonfly, predatory beetles Coccinelids, lacewing, syrphid flies, *cotesia spp.* etc. or inundatively release of *T pretiosum* (@ 0.4 /acre 4-5 times from flower initiation stage at weekly intervals, larval parasitoids *Chrysoperla zatrovii* and *Campoletis chloridae* in field.
- Quinalphos 25% EC @ 640 ml in 200-400 l of water per acre.

9. Termites

S.N: *Odontotermes obesus* and *Microtermes obesi*

- Termites damage the crop soon after sowing and sometimes near maturity.
- They feed on roots, stem of growing plants, even dead tissues of plant feeding on cellulose.
- The damaged plants dry up completely and are easily pulled out.
- The plants damaged at later stages give rise to white ears.
- Infestation is heavy under unirrigated conditions and in the fields where un-decomposed farmyard manure is applied before sowing.
- **Serious polyphagous pest of wheat in India**
- **Feed in semicircular fashion on wheat leaf margin and roots partially eaten**
- **Termites damage the wheat crop soon after sowing and near maturity•**
- **The plants damaged at later stages give rise to white ears.**





Management

- In the termite prone areas, especially in the northern states, seed treatment with chlorpyrifos @ 9 g a.i. or fipronil SFS @ 0.3 g a.i. per kg seed can be taken up.
- In the standing crop chlorpyrifos 20 EC 3 litres mixed in 50 kg soil be broadcast in one-hectare field.
- Application of the entomo-pathogenic fungus *Metarhizium anisopliae* at the time planting is done for the management of Termites.
- Deep ploughing of fields during summer.
- Three summer ploughings at 10 days interval reduces juvenile population.
- Apply well rotten farmyard manure only to discourage termite infestation.
- For termite and shoot fly destruct the crop residues which form the sources of infestation.
- Use of crude oil emulsion to destroy the termite colony in the termitarium,

THANK
YOU