

Lecture No 8

PEST OF OIL SEEDS – GROUNDNUT, SUNFLOWER AND SAFFLOWER

Oilseeds occupy a prominent place among the principal commercial crops grown in India. The important oilseeds cultivated in India are *Brassica sp*, groundnut, sunflower, safflower, castor, sesame and linseed. These crops are damaged by number of pests, of which mustard aphid, mustard sawfly and the painted bug are the most serious. The aphid is the most serious pest on brassica oilseeds throughout India. On groundnut crop, the white grub has recently assumed serious proportions in Rajasthan, Gujarat, Maharashtra, Karnataka and Uttar Pradesh. The leaf miner and the red hairy caterpillar are the serious in central and southern India. The groundnut aphid is a menace throughout the groundnut growing areas. Its incidence during different years varies with rainfall. Intermittent rains have a depressing effect on the aphid population.

I. PEST OF GROUNDNUT

Major pests				
1.	Aphids	<i>Aphis craccivora</i>	Aphididae	Hemiptera
2.	Leaf hopper	<i>Empoasca kerri</i>	Cicadellidae	Hemiptera
3.	Thrips	<i>Scirtothrips dorsalis</i>	Thripidae	Thysanoptera
4.	Red hairy caterpillar	<i>Amsacta albistriga</i>	Arctiidae	Lepidoptera
5.	Leaf miner	<i>Aproaerema modicella</i>	Gelechiidae	Lepidoptera
6.	Tobacco caterpillar	<i>Spodoptera litura</i>	Noctuidae	Lepidoptera
7.	Gram pod borer	<i>Helicoverpa armigera</i>	Noctuidae	Lepidoptera
8.	Pod borer (Ear wig)	<i>Anisolabis stali</i>	Forficulidae	Dermaptera
9.	Pod bug	<i>Elasmolomus sordidus</i>	Lygaeidae	Hemiptera
Minor pests				
10.	Bud borer	<i>Anarsia ephippias</i>	Gelechiidae	Lepidoptera
11.	Stem borer	<i>Sphenoptera perotetti</i>	Buprestidae	Coleoptera
12.	Termites	<i>Odontotermes sp.</i>	Termitidae	Isoptera
13.	White grub	<i>Holotrichia consanguinea</i>	Melalonthidae	Coleoptera

Major pests

I. Sap feeders

1. Aphids - *Aphis craccivora* (Aphididae: Hemiptera)

Distribution and status: India, Africa, Argentina, Chile, U.S.A. Europe and Australia.

Host Plants: Groundnut, beans, safflower, lablab, niger, peas, pulses and some weeds.

Damage symptoms

Both nymphs and adults suck the sap from the leaflets and tender shoots mostly upto two months after germination. It results in wilting of tender shoots during hot weather. Leaves mottled with chlorotic or dark green spots and plant growth becomes stunted. Sometimes honey dew deposited on the leaves and shoots could be seen which attract the ants.



Bionomics

Reddish to dark brown coloured aphids.



Management

1. Spray the infested crop with methyl demeton 25 EC 500 ml or Imidacloprid 17.8 SL 100 -125 ml in 700 L of water per ha. As the strong point of this pest lies in its very quick multiplication the insecticidal treatment has to be repeated as soon as aphid population is found to have built again.
2. Release *Chrysoperla carnea* grubs @ 5000 / ha.

2. Leaf hopper: *Empoasca kerri* (Cicadellidae: Hemiptera)

Damage symptoms

Both adults and nymphs suck sap from young leaves, mostly from the lower surface. The first symptom of attack is a whitening of the veins. Chlorotic (yellow) patches then appear, especially at the tips of leaflets, probably caused by a reaction between the jassids salivary secretion and plant sap. Under severe



infestation, the leaf tips become necrotic in a typical V shape , giving the crop a scorched appearance known as 'hopper burn'



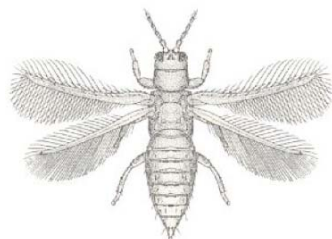
Bionomics

Elongate, active wedge shaped green insects found on the under surface of leaves.

Management

Spraying the infested crop with endosulfan 35 EC 750 ml or imidacloprid 17.8 SL 100 - 125 ml in 700- 1000 L of water per ha.

3. Thrips: *Scirtothrips dorsalis* (Thripidae: Thysanoptera)



Damage symptoms

Nymphs and adults suck sap from the surface of the leaflets. This results in white patches on the upper and necrotic patches on the lower surface of the leaves. It consists of distortions of the young leaf lets and patchy areas of necrotic tissue that puncture and split as the leaflets grow. Injury is normally seen in seedlings.



Bionomics

Nymphs and adults dark coloured with fringed wings. Female thrips lay 40-50 eggs inside the tissues of leaves and shoot. Egg period 5 days, nymphal period 7-10 days and adult period is 25-30 days. There are several overlapping generations.

Management

1. Intercrop lab lab with groundnut 1:4 ratio
2. Spray methyl demeton 25 EC 500 ml or dimethoate 30 EC 500 ml/ ha

II. Leaf feeders

4. Red hairy caterpillar: *Amsacta albistriga* (Arctiidae: Lepidoptera)

Distribution and status

Oriental in distribution including India. It is a serious pest under rainfed conditions 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. Seasonal outbreak largely depends on the climatic conditions and local agricultural practices of the region concerned. It takes place twice a year May-June and August-October. It's outbreak occurs only once in Rajasthan during August- October

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 scraping 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 though they are grazed by cattle. Sometimes it



results in the total loss of pods. They also feed on sorghum, cotton, finger millet, castor, pulses and cowpea, etc.

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 hind wings white with black markings. A yellow band is found on the head. In *A. moorei* all markings are red in white wings. On receipt of heavy rains, about a month after sowing in *kharif* season, white moths with black markings on the hind wings emerge out from the soil in the evening hours. It lays about 600-700 eggs on the under surface of the leaves. Egg period is 2-3 days. Tiny greenish caterpillar feeds on the leaves gregariously. A full grown larva measures 5 cm in length, reddish brown hairs all over the body arising on warts. The larval period is 40-50 days. With the receipt of showers, the grown up larva pupates 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

1. Organize campaign to collect and destroy the pupae after summer ploughing on receipt of showers.
2. Grow cowpea or red gram as an intercrop to attract adult moths to lay more eggs.
3. Set up 3-4 light traps and bonfires immediately at the onset of rains at 4 weeks after sowing in the rainfed season to attract and kill the moths and to know brood emergence.
4. Collect and destroy egg masses in the groundnut, cowpea and redgram.
5. Collect and destroy gregarious early instar larvae on lace like leaves of inter crops viz., red gram and cowpea.
6. Organize campaign by involving school children (or) general public to collect and destroy the migrating grown up caterpillars from the field.
7. Dig out a trench around the field to avoid the migration of caterpillars, trap larvae and kill them.
8. Use nuclear polyhedrosis virus @ 250 LE/ha.
9. For young caterpillars - apply endosulfan 4D 25 kg/ha (or) carbaryl 10 D 25 kg/ha.
10. Organize mass ground spraying in endemic areas if necessary in the case of outbreak of the pest.
11. For grown up caterpillars - spray endosulfan 750 ml/ha (or) dichlorvos 625 ml/ha (or) chlorpyrifos 1250 ml/ha in 375 litres of water.

5. Leaf miner: *Approaeroma modicella* (Gelechiidae: Lepidoptera)

Distribution and status

India, Pakistan, Sri Lanka, Burma and South Africa.

Host range

Groundnut, soybean and redgram.

Damage symptoms

It prefers rainfed crop and bunch varieties. Young newly hatched green caterpillar mines into the leaflets and feed on green tissues resulting in brownish dried up patches. Later instars caterpillars fold the leaves together and feed on the green tissues by remaining inside. Severely infested crop presents a burnt up appearance. Caterpillars (or) pupae can be seen inside the mines and folded leaflets. It also attacks red gram and soybean.



Bionomics

Adult is dark brown with a white spot on the coastal margin of each forewing. The small hind wings are covered by fringe of minute hair. Adults are found briskly whirling around the plants in field and lay shiny transparent eggs singly on the under surface of leaflets. A female moth lays 150-200 eggs that hatch in 2-3 days. The larvae are pale brown. Fully grown larva measures 6-8 mm. The larval period is 4-17 days. They pupate in white silken cocoons within webbed leaflets and the pupae are reddish brown. The pupal period is 5-7 days. Adult longevity is 5-6 days. Life cycle is completed in 20-25 days. They cause severe damage from September to November to the rainfed crop and during March & April to irrigated crop.



ETL: 1 larva per meter row or five or more active larvae per plant are found up to 30 days after seedling emergence (DAE), 10 larvae per plant at 50 DAE and 15 larvae per plant at 75 DAE or later.

Management

1. Grow resistant cultivars like ICGV 86031, ICGS 156 (M 13), FDRS 10, ICG 57, 156, 541, 7016, 7404, 9883
2. Sow groundnut early and synchronously in rainy and rabi season.
3. Intercrop groundnut with pearl millet @ 4:1 ratio.
4. Set up light traps between 8 and 11 PM at ground level.
5. Mulch the soil with straw within 10 days after germination wherever possible.
6. Avoid water stress in irrigated crop to avoid the pest infestation.
7. Maintain the fields and bunds free from weeds.
8. Apply either endosulfan 4D or carbaryl 10 D at 25 kg/ha when the pest crosses ETL.
9. Spray any one of the following insecticides - endosulfan 35 EC 750 ml/ha, dichlorovos 76 SC 625 ml/ha, quinolphos 25 EC 750 ml/ha, lambda cyhalothrin 5 EC 200-300 ml in 375 L of water,

6. Tobacco caterpillar: *Spodoptera litura* (Noctuidae: Lepidoptera)

Distribution and status

India, Sri Lanka, Indonesia, Bangladesh, Pacific Islands, China, Pakistan, Korea and Japan.

Host range

Groundnut, citrus, soybean, cotton, tobacco, castor, pulses, millets, safflower, banana, cabbage, tomato, sweet potato, bhendi, chillies, etc.

Damage symptoms

Neonate, green caterpillars feed on the leaves voraciously and present an appearance to the field as if grazed by cattle. Since this pest is nocturnal in habit larvae hide under the plants, cracks and crevices of soil and debris during the day time. Faecal pellets are seen on the leaves and on the ground which is the indicator of the pest incidence.



Bionomics

Adult moth is stout with wavy white markings on the brown forewings and white hind wings with a brown patch along its margin. Eggs are laid in groups and covered with hairs on the leaves. The egg period is 4-5 days. Larva is stout, cylindrical, pale brownish with dark markings. The body may have row of dark spots or transverse and longitudinal grey and yellow bands. When fully grown, measures about 35-40 mm in length. The larval period is 14-21 days. It pupates in earthen cells in soil for 15 days. Life cycle is completed 30-40 days.



ETL: 1-2 egg masses per meter crop row of 7-12 plants or pheromone trap catches exceed 100 moths per night, averaged over a week.

Management

1. Grow castor as a border (or) intercrop in groundnut fields to serve as indicator (or) trap crop.
2. Grow resistant cultivars like ICGV 86031, FDRS 10
3. Monitor the emergence of adult moths by setting up of light traps.
4. Set up pheromone trap (Pherodin SL) to monitor, attract and kill the male moths @

- 12 nos./ha and change the septa once in 3 weeks.
5. Collect egg masses and destroy.
 6. Collect the gregarious larvae and destroy them as soon as the early symptoms of lace-like leaves appear on castor, cowpea and groundnut.
 7. Avoid migration of larvae by digging a trench 30 cm deep and 25 cm wide with perpendicular sides around the infested fields.
 8. Prepare a bait with following for 1 ha. Rice bran 12.5 kg, molasses or brown sugar 2.5 kg, carbaryl 50 WP 1.25 kg (mix the ingredients to obtain a homogenous mixture sprinkle water gradually and bring the bait to a dough consistency. Distribute the above bait on the soil, in and around the field in the evening hours immediately after preparation).
 9. Apply NPV @ 250 LE/ha with crude sugar 2.5 kg/ha which is as effective as that of chlorpyrifos at 200 g a.i./ha at 7 days interval.
 10. Apply any one of the following insecticides per ha to control early instar larvae (1st to 3rd instar). Carbaryl 10 D 25 kg, carbaryl 50 WP 2 kg, quinalphos 25 EC 750 ml, phenthoate 50 EC 1250 ml and dichlorvos 76 SC 750 ml.
 11. Spray any one of the following per ha to control 4th to 6th instar larvae. Chlorpyrifos 2 L, dichlorvos 1 L, phenthoate 2 L or Diflubenzuron 25 WP 400 g or Methomyl 40 SP 750-850 g in 375-500 L of water/ha.

7. Gram pod borer: *Helicoverpa armigera* (Noctuidae: Lepidoptera)

Distribution and status: World wide

Host range

Cotton, sorghum, lablab, soybean, pea, safflower, chillies, groundnut, tobacco, okra, maize, tomato.

Damage symptoms



Small or large irregular feeding holes on the leaves. Presence of pale green or rose or brown or chocolate colored caterpillars with dorsal and lateral stripes and hairs on the body. Caterpillars also damage the fruiting bodies by entering into them.

Bionomics

Adult is brown coloured moth with 'V' shaped speck on forewings and dull black border on the hind wing. Eggs are laid singly on host plant. The egg period is 5-7 days. Larva is greenish with dark brown to grey lines. Color varies with kind of host plant. The larval period

is 14-20 days. It pupates in soil and pupal stage lasts for 10 days. Cannibalism is common among larvae.



Management

1. Set up light trap to attract and kill the moths.
2. Set up pheromone traps @ 12 nos./ha to attract male moths.
3. Release of egg parasite *Trichogramma* spp. and egg larval parasite *Chelonus blackburnii*.
4. Apply Nuclear Polyhedrosis Virus (NPV) @ 250 LE/ha.
5. Combined use of NPV of *S. litura* and *H. armigera* on groundnut indicated that single application of NPV of each pest at 250 LE/ha with crude sugar 2.5 kg/ha is highly effective.
6. Spray endosulfan 35 EC 1000 ml or emamectin benzoate 5 SG 220 g or spinosad 45 SC 180-220 ml per ha in 375-500 L of water per ha

III. Pod feeders

8. Pod borer (Ear wig): *Anisolabis stali* (Forficulidae: Dermaptera)

Damage symptoms

Young pods showing bore holes plugged with excreta, sand particles or discoloured pulp. Bored pods are devoid of kernels.

Bionomics



Adult is dark brown to black with forceps like caudal cerci and white leg joints. It lays eggs in clusters of 20-100 in soil and sometimes inside damaged pods and hatch in about a week. The five nymphal instars resemble the adults which can live as long as 250 days. Their unique forked abdominal tip can easily be recognized as letter 'Y'.

Management

1. Apply malathion 5D or endosulfan 4D or carbaryl 10 D at 25 kg/ha prior to sowing in areas where the ear wig is endemic.
2. Repeat the soil application of any one of the above dust formulation on 40th day of sowing and incorporate in the soil during earthing up.

9. Pod bug: *Elasmolomus sordidus* (Lygaeidae: Hemiptera)

Damage symptoms

It is a serious pest at pod maturity stage, pod harvesting stage and harvested produce in the threshing floor. Both nymphs and adults suck the sap from the pod in the field and produce at threshing floor. Freshly harvested pods have shrivelled kernels.

Bionomics

The adult is dark brown, approximately 10 mm long and 2 mm wide. In the field, the females lay their eggs singly in the soil or on groundnut haulms. But in storage eggs are laid loosely among the groundnuts. A female bug may lay upto 105 eggs. The egg period is 4-5 days. The first instar nymphs have a bright red abdomen, later instar become progressively darker. Both nymphs and adults feed on kernels by piercing the pods with their rostrum. The nymphal period is 23-29 days. Since it is nocturnal in habit, it hides under weeds, cracks and crevices in soil and debris during day time.

Management

1. Set up light traps to attract and kill the bugs.
2. Keep the crop refuse in the field along irrigation channel to attract the bugs which can be killed by dusting.
3. Dust the groundnut stored in the gunny bags with malathion 4D.

IV. Borers

10. Bud borer: *Anarsia ephippias* (Gelechiidae: Lepidoptera)

Damage symptoms

The larva bores into the terminal buds and shoots. The tender leaflets emerging from central spindle shows shot-hole symptoms initially. In severe infestation emerging leaflets have only the midribs or several oblong feeding holes. The larva also bores into the apex of the stem. The infestation causes 20-35% shoot damages and yield reduction to the tune of 5%.



Bionomics

The adult moth is buff coloured, active and hovers around plant canopy during sun rise. The larva is chocolate brown to dark brown and 10-15 mm long.



Management

1. Conserve the hymenopteran parasitoids *Bracon sp.*, and *Brachymeria sp.* in the groundnut ecosystem to control the pest.
2. Spray neem oil 3% or Notchi (*Vitex negundo*) leaf extract 5%
3. Spray endosulfan 35 EC 1000 ml or indoxacarb 500 ml or spinosad 45 SC 160-220 ml per ha in 375-500 L of water per ha

11. Stem borer: *Sphenoptera perotetti* (Buprestidae: Coleoptera)

Host range

Groundnut, sesame, gram and other pulses

Damage symptoms

Grubs bore into the stem just below the soil surface and tunnel main roots resulting in wilting of plants in patches. Tunnel contains elongate flat headed grubs.

Bionomics

The dark brown shining beetle lays eggs on the stem of plants that hatch into pale white grub with flat anterior portion. It pupates in the stem itself.

Management

1. Apply malathion 5D (or) endosulfan 4D (or) carbaryl 10D at 25 kg/ha to the hole or furrow prior to the sowing.
2. Repeat the same on 40 DAS during earthing up and gypsum application.

V. Root feeders

12. Termites: *Odontotermes sp.* (Termitidae: Isoptera)

Damage symptoms

It feeds on roots result in wilting of plants in patches. It makes bore holes in pods and damages soft tissue in pod (scarification) leaving thicker portion intact. Termites hover in and around plants.

Bionomics

Cream coloured tiny insects resembling ants with dark coloured head.

13. White grub : *Holotrichia consanguinea* (Melalonthidae: Coleoptera)

Damage symptoms

Growth of plant is retarded. Plants wilt or die. Roots partially or fully eaten off by white and fleshy grubs.



Bionomics



The dark brown adult beetles reenter the soil to hide and lay eggs. Female lays 20 - 80 white, roundish eggs in clusters. Egg period 9 - 11 days. Grubs are white and translucent. Pupates in soil and remain as pupae until the following year. The adult beetles emerge with the first monsoon showers.

Management

1. Plough deep at the time of land preparation to expose grub and kill.
2. Adopt crop rotation with rice in irrigated endemic areas to bring down grub damage.
3. Ensure adequate irrigation to irrigated groundnut in endemic areas since the grub attacks roots under inadequate soil moisture condition.
4. Set up light traps or bonfires to attract and kill the adults on receipt of summer showers.
5. Apply malathion or endosulfan or carbaryl dust @ 25 kg per ha in the soil prior to sowing during last ploughing.
6. Repeat the same on 40 DAS and incorporate in the soil during earthing up.

Pest of Sunflower

Major pests				
1	Leaf hopper	<i>Amrasca biguttula biguttula</i>	Cicadellidae	Hemiptera
2	Capitulum borer	<i>Helicoverpa armigera</i>	Noctuidae	Lepidoptera
3	Tobacco caterpillar	<i>Spodoptera litura</i>	Noctuidae	Lepidoptera
4	Bihar hairy caterpillar	<i>Spilosoma obliqua</i>	Arctiidae	Lepidoptera
5	Semi looper	<i>Trichoplusia ni</i>	Noctuidae	Lepidoptera
6	Cutworms	Agrotis spp.	Noctuidae	Lepidoptera
Minor Pests				
7	Stink bug	<i>Nezara viridula</i>	Pentatomidae	Hemiptera
8	Plant bug	<i>Dolycoris indicus</i>	Pentatomidae	Hemiptera
9	Black hairy caterpillar	<i>Estigmene lactinea</i>	Arctiidae	Lepidoptera
10	Ash weevil	<i>Mylloceris</i> sp	Curculionidae	Coleoptera

1. Leaf hopper - *Amrasca biguttula biguttula* (Cicadellidae: Hemiptera)

Damage symptoms

Both nymphs and adults suck the sap from the under surface of leaves. Leaves become crinkled and cup shaped, growth gets stunted, brownish red colour develops on the edges of leaves and the condition is known as "hopper burn". They also attack brinjal, bhendi, cotton and potato.



Bionomics

Adult is a small, slender green insect. Eggs are laid singly in the leaf veins. Egg period is 4-11 days. Nymphs green, wedge shaped. Nymphal period is 7 days. Breeding is noted throughout the year.



Management

- i. Early sowing and close spacing of cotton reduces pest infestation particularly if the rainfall is heavy
- ii. Setup light trap to monitor the broods of leaf hopper and to attract and kill
- iii. Spray monocrotophos 36 WSC @ 1000 ml/ha and NSKE 5% @ 25 kg/ha or 750 ml endosulfan 35 EC in 1000 L of water per hectare.
- iv. Release predators viz., *Chrysopa carnea*

2. Capitulum borer – *Helicoverpa armigera* (Noctuidae: Lepidoptera)

Damage symptoms

Larva feeds on leaves and capitulum.

Bionomics

Adult moth is greenish to brown with a 'V' shaped speck on forewings and dull black border on the hind wings. Eggs are laid on the host plants singly. The egg period is 7 days. Fully grown larva is 2" long, greenish with dark brown grey lines and dark and pale bands. It shows colour variation from greenish to brown. The larval duration is 14 days. It pupates in soil for 10 days.

Management

1. Install bird perches @ 50/ha
2. Set up light trap to monitor, attract and kill the moths.
3. Set up pheromone traps @ 12 Nos./ha.
4. Inundative release of egg parasitoid *Trichogramma* spp. and egg larval parasitoid *Chelonus Blackburnii*.
5. Spray nuclear polyhedrosis virus (NPV) @ 500 LE/ha in 0.1 % teepol.
6. Spray NSKE 5% twice followed by triazophos 0.05%.
7. Apply any one of the insecticides at 25 kg/ha. Endosulfan 4D, quinolphos 4D, carbaryl 5D.
8. Spray endosulfan 35 EC 1.25 l or monocrotophos 1.0 L or chlorpyrifos 1.25 L/ha.

3. Tobacco caterpillar - *Spodoptera litura* (Noctuidae: Lepidoptera)

Damage symptoms, bionomics, and management are the same as given under groundnut

4. Bihar hairy caterpillar - *Spilosoma obliqua* (Arctiidae: Lepidoptera)

Distribution and status: Sporadic pest widely distributed in the Orient. It is very serious in Bihar, Madhya Pradesh, Uttar Pradesh and Punjab

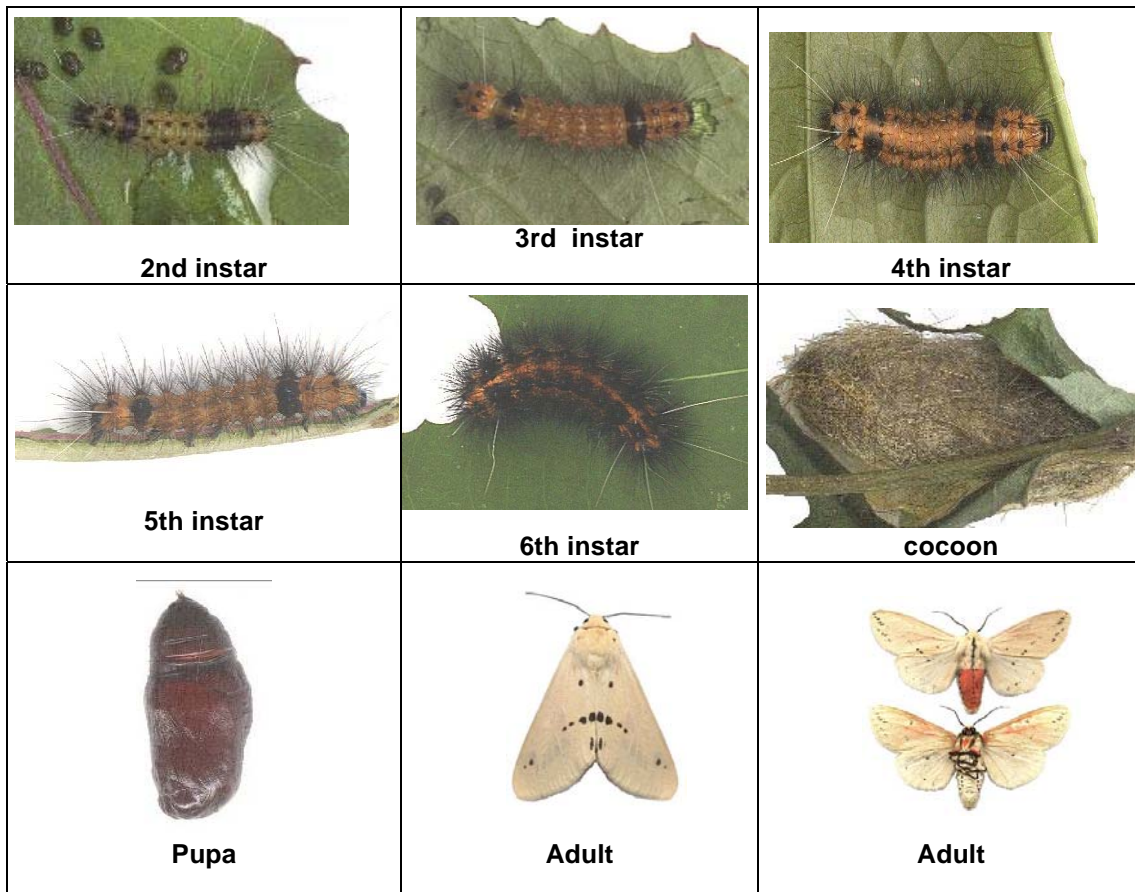
Host range: sesamum, mash (*Phaseolus mungo*), mung (*P. aureus*), linseed, mustard, sunflower and some vegetables.

Damage symptoms: Defoliation



Bionomics

Adults have crimson coloured body with black dots. Wings pinkish with numerous black spots. Larva is orange coloured with broad transverse bands with tuft of yellow hair that are dark at both end.



Pest breeds from March to April and again from July to November. Adult female lays 400-1000 light green, spherical eggs in clusters on the underside of the leaves. Egg period 8-13 days. Larval instars 7 and period 30-56 days. Pupation takes place in plant debris or soil and pupal period 7-15 days. Adult lives for 7 days. Early instars are gregarious and later instars disperse in search of food.

Management

1. Dust young caterpillars with malathion 5 D @ 25 kg/ha
2. When full grown chemical control becomes difficult as in the case of red hairy caterpillar of groundnut.
3. For chemical control measures refer red hairy caterpillar

5. Semi looper - *Trichoplusia ni* (Noctuidae: Lepidoptera)

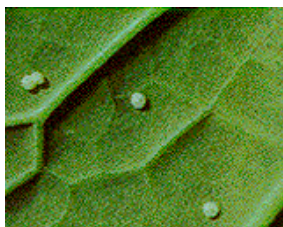
Damage symptoms

Leaves are with holes and severe damage results in skeletonization and defoliation.

Bionomics

Adult is a stout moth, head and thorax grey in color with basal tufts ferruginous, grey wavy forewings with a slender mark. Larva is slender, attenuated anteriorly and green in colour with light wavy lines and broad lateral strip on either side.

Egg



Larva



Pupal stages



Adult



Management

1. Hand-pick and destroy caterpillars
2. Use light trap to attract and kill adults
3. Spray quinolphos or endosulfan 1.0 L 2 500L of water/ha

6. Cutworms: *Agrotis* spp. (Noctuidae: Lepidoptera)

The cutworms may be serious during March - April in fields where sunflower follows potato. Caterpillars cut the seedlings at the ground level.

Management

1. Sow the crop in ridges to avoid cutworm damage in the germinating seedlings.
2. Where flat sowing is practiced, apply 5 L of chlorpyrifos 20EC per ha before sowing.

The insecticide should be mixed in 25 kg fine soil and broadcasted uniformly in the field after last ploughing but before planking.

Minor pests

7. Stink bug - *Nezara viridula* (Pentatomidae: Hemiptera)

Damage symptoms

Both nymphs and adults suck the sap from the developing seeds in the head. Seeds get shriveled.

Bionomics

Adult is a green coloured bug. Nymph is brownish red with multicolour spots.



8. Plant bug - *Dolycoris indicus* (Pentatomidae: Hemiptera)

Damage symptoms

Both nymphs and adults suck the seeds causing shrivelling of seeds.

Bionomics

Brown coloured bug with a white patch on the scutellum.

Management of sucking pest

Spray methyl demeton 25 EC 500 ml (or) dimethoate 30 EC 500 ml/ha.

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

Damage symptoms

Larva feeds on leaves voraciously and cause severe defoliation.

Bionomics

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

Management

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

10. Ash weevil: *Mylocherus* sp., (Curculionidae: Coleoptera)

Damage symptoms: Adult weevil causes marginal notching on leaves while the grub feeds on roots causing wilting of plants.

Bionomics

It is grey colour weevil measuring 3-6 mm long. It lays 360 light yellow coloured eggs

in soil at a depth of about 8 cm. The egg period is 3-5 days. The grub is apodous, cylindrical measuring 8 mm in length. The young grub feeds on roots and completes their development in 1-2 months. It pupates inside the earthen cells. The pupal period is 7 days. The life cycle of pest is completed in 6-8 weeks.

Pest of Safflower

Major pest				
1	Safflower caterpillar	<i>Perigea capensis</i>	Noctuidae	Lepidoptera
2	Safflower bud Fly	<i>Acanthiophilus helianthi</i>	Tephritidae	Diptera
3	Safflower aphid	<i>Uroleucon compositae</i>	Aphididae	Hemiptera
Minor Pests				
4	Leaf hopper	<i>Empoasca punjablensis</i>	Cicadellidae	Hemiptera
5	Green peach aphid	<i>Myzus persicae</i>	Aphididae	Hemiptera
6	Lace wing	<i>Monanthia glubulifera</i>	Tingidae	Hemiptera
7	Stink bug	<i>Dolycoris indicus</i>	Pentatomidae	Hemiptera
8	Safflower caterpillar	<i>Spodoptera exigua</i> <i>Helicoverpa armigera</i> and <i>Eublemma rivula</i>	Noctuidae	Lepidoptera
9	Leafminer	<i>Chromatomyia horticola</i>	Agromyzidae	Diptera
10	Surface weevil	<i>Tanymecus indicus</i>	Curculionidae	Coleoptera

1. Safflower Caterpillar: *Perigea capensis* (Noctuidae: Lepidoptera)

Distribution and status

Serious pest of safflower throughout India

Bionomics

The adult is a dark-brown medium-sized moth with white wavy markings on the forewings. The full grown caterpillar is about 25 mm long, smooth, greenish with purple markings and humped on the anal segment. A female lays about 60 eggs singly or in small clusters on leaves and stems. The eggs hatch in 4-5 days. The larva grows feeding on the leaves and becomes full-grown in 2-3 weeks. It pupates in the soil for 10-15 days.

Damage symptoms

The larvae feed on the leaves and defoliate the plants which lose their vigour and become stunted.

Management

Spray the crop with 2.5 kg of carbaryl 50 WP or 1.25 L of endosulfan 35 EC in 750 L of water/ha.

2. Safflower Bud Fly: *Acanthiophilus helianthi* (Tephritidae: Diptera)

Distribution and status: This pest has been reported from Delhi, Uttar Pradesh, Haryana and Madhya Pradesh in India.

Bionomics

The maggots that feed on flower buds are destructive and when full-grown they are 5 mm long. The adult fly is ash coloured with light brown legs. The adults are active from March to May. The females lay eggs in clusters of 6-24 within the flower buds or the flowers. The eggs hatch in about one day in April and young maggots start feeding on the florets and the thalamus. Within one week they grow to the full and attain a size of 5 x 1.5 mm. They pupate inside the buds. The pupal stage lasts 7 days. The adults emerge out of the bud through the holes made by the maggots before they pupate. Three generations are completed during a crop season.



Damage symptoms



The injury is caused by the maggots which feed upon the floral parts including the thalamus. The infested buds begin to rot and an offensive smelling fluid oozes at the apices giving a soaked appearance to the buds. The pest causes reduction in the yield of safflower seed.

Management

- Remove and destroy the infested buds early
- Conserve larval parasitoids viz., *Ormyrus sp.* (Ormyridae), *Eurytoma sp.* (Eurytomidae) and *Pachyneuron muscarum* (Braconidae) and predator *Chrysopa virgestes* (Chrysopidae)

3. Safflower Aphid: *Uroleucon compositae* (Aphididae: Hemiptera)

Distribution and status

This pest causes considerable damage to safflower in Karnataka, Uttar Pradesh, Madhya Pradesh, Punjab and Haryana.

Bionomics

The aphids are small shining black, soft bodied insects. The nymphs are smaller in size and are reddish brown in colour. The aphid is active from December to April. A female produces 6-56 young ones with an average of 21. It completes its life cycle in 11-16 days. The adult aphid has a life span of 17 days.

Damage symptoms

The aphids suck the sap from leaves, twigs, flowers and capsules. In infested plants, the height, number of leaves and shoots reduce significantly. The plants become weak, remain stunted and sometimes dry up. Seed production is seriously affected. The aphids secrete honeydew which attracts a black sooty mould.

Management

1. Spray 250 ml of dimethoate 30 EC or monocrotophos 36 SL or 625 ml of chlorpyrifos 20 EC in 750 litres of water/ha and repeat the spray after 15 days, if necessary.
2. Conserve parasitoid *Aphidencirtus aphidivorus* and predator *Brumoides suturalis*

Minor Pests of Safflower

- **Leaf hopper:** *Empoasca punjablensis* (Cicadellidae: Hemiptera);
- **Green peach aphid:** *Myzus persicae* (Aphididae: Hemiptera);
- **Lace wing:** *Monanthia glubulifera* (Tingidae: Hemiptera);
- *Dolycoris indicus* (Pentatomidae: Hemiptera);
- **Safflower caterpillar:** *Spodoptera exigua*, *Helicoverpa armigera* and *Eublemma rivula* (Noctuidae: Lepidoptera);
- **Leafminer:** *Chromatomyia horticola* (Agromyzidae: Diptera)
- **Surface weevil:** *Tanymecus indicus* (Curculionidae: Coleoptera)

Question

1. Severely affected groundnut field looking as if grazed by cattle is the typical symptom of ----- **Red hairy caterpillar**
2. Which life stage of red hairy caterpillar undergo diapause ? **Pupa**
3. Groundnut shows burnt appearance when severely infested with ----- **Leaf miner**
4. Intercrop cumbu in groundnut at the ratio of

