



FACULTY OF AGRICULTURAL SCIENCES & ALLIED INDUSTRIES

Lecture 11

PEST OF OIL SEEDS – GROUNDNUT, SUNFLOWER AND SAFFLOWER

| 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 Crop Pests and Stored Grain Pests and Their Management 127 www.AgriMoon.Com 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:

Aproaeroma 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.

III. Pod feeders

6. 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.

7. 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

8. 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

9. 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 | <i>Agrotis</i> 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>Mylocerus</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 chlorpyriphos 1.25 L/ha.

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 *Aphidencyrus 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)