

Lecture No 9

PESTS OF GINGELLY, CASTOR, MUSTARD AND LINSEED

Pests of Gingelly

Though a dozen pests attack gingelly, only leaf webber, gall fly and leaf hopper as vector are important and cause economic damage in gingelly.

Major pests				
1.	Leaf webber	<i>Antigastra catalaunalis</i>	Pyralidae	Lepidoptera
2.	Sphinx moth	<i>Acherontia styx</i>	Sphingidae	Lepidoptera
3.	Gall fly	<i>Asphondylia sesami</i>	Cecidomyiidae	Diptera
4.	Leaf hopper	<i>Orosius albicinctus</i>	Cicadallidae	Hemiptera
5.	Pod bug	<i>Elasmolomus sordidus</i>	Lygaeidae	Hemiptera
Minor pests				
6.	Aphid	<i>Aphis gossypii</i>	Aphididae	Hemiptera

I. Leaf feeders

1. Leaf webber: *Antigastra catalaunalis* (Pyralidae: Lepidoptera)

Distribution and status: India, Africa, South Europe, Malta, Burma, Bangladesh, Indonesia, Sri Lanka and U.S.S.R.

Host range: Sesame, *Antirrhinum* and *Duranta*.

Damage symptoms

Larva webs the top leaves together and bore the tender shoots in the vegetative phase. Flowers and young capsules are bored at reproductive stage.



Bionomics



Moth is brown with yellowish brown wings. It lays eggs on tender parts of plants. The egg period is 4-5 days. Fully grown pale green larva with black head and dots all over the body measures 20 mm in length. The larval period is 11-16 days. It pupates in leaf folds in a white silken cocoon for 4-7 days.

ETL: 2 webbed leaves/sq.m. (or) 10% damage.

Management

1. Culture of sesame like EH7, 57, 84, 105, 106 and 156 should be encouraged as these are observed to be completely resistant against *A. catalaunalis*.
2. Dusting the crop with 2% parathion.
3. Spraying with dimethoate 30 EC 500 ml or methyl parathion 50 EC 500 ml or endosulfan 35 EC 1.25 L or carbaryl 50% WP 1 kg in 700 L water per hectare.

2. Sphinx moth: *Acherontia styx* (Sphingidae: Lepidoptera)

Distribution and status: India, Sri Lanka, Burma, Indonesia, Philippines, Malaysia.

Host range: Sesame, Potato, Brinjal and Jasmine

Damage symptoms

The damage is caused by the larvae which feed voraciously on leaves and defoliate the plants. The moth is also harmful as it sucks honey from the honey combs in apiaries.



Bionomics



The adult moth is giant hawk moth, brownish with a characteristic skull marking on the thorax and violet yellow bands on the abdomen. Hind wings yellow with black markings. It lays globular eggs singly on the under surface of leaves. The egg period is 2-5 days. The larva is stout, green with yellowish oblique stripes and curved anal horn. The larval period lasts for 60 days. It pupates in earthen cocoon in soil. The pupal period lasts 14-21 days and 7 months in summer and winter respectively. This insect completes three generations per year.

Management

1. Hand-pick the larvae in the initial stages of attack and destroy by keeping in kerosene oil.
2. Plough the field during winter to expose the hibernating larvae.

II. Borers

3. Gall fly: *Asphondylia sesami* (Cecidomyiidae: Diptera)

Distribution and status: East Africa, India

Host range: Sesame

Damage symptoms

Maggots feed on the ovary and results in the malformation of pods without proper setting of seeds. Flowers and young capsules with gall like swelling is the typical symptom of attack.



Bionomics

Adult is a small mosquito like fly. It lays eggs in the flowers or buds. The egg period is 2-4 days. The maggot is white, found inside the flowers. The larval period is about 2-3 weeks. It pupates inside the malformed capsules. The fly emerges from galls in 7-12 days. The total life cycle is completed in 23-27 days.

Management

1. Dust any one of the insecticides per ha on 25, 35 and 50th day of sowing. Endosulfan 4D 25 kg, phosalone 4D 25 kg, malathion 5D 25 kg.
2. Spray any one of the insecticides on 25, 35 and 50th days of sowing endosulfan 1.0 L, phosalone 1.0 L, quinalphos 1.0 L, dichlorvos 500 ml/ha in 700 L water per hectare
3. Alternate insecticides each time

III. Sap feeders

4. Leaf hopper: *Orosius albicinctus* (Cicadallidae: Hemiptera)

Damage symptoms

Both nymphs and adults suck the sap from leaves and transmit phyllody disease.

Bionomics: Light brown coloured hoppers.

Management

1. Remove sesame phyllody diseased plants from the field.
2. Spray dimethoate 30 EC 500 ml (or) methyl demeton 25 EC 500 ml/ha.

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

Damage symptoms

Both nymphs and adults suck the sap from the young capsules and seeds in field and threshing floor. It results in appearance of black spots on the capsules. The damaged pods shrivel up. It causes reduction in seed weight and oil content.

Bionomics

Adults are dark brown in colour. It lays eggs singly or in batches in the soil. The egg period is 4-5 days. Nymphs are pinkish. It is nocturnal in habit. It hides under the weeds, cracks and crevices in soil and debris during the day time. The nymphal period is 23-39 days.

Management

Control as given in groundnut

Minor pests

6. Aphid: *Aphis gossypii* (Aphididae: Hemiptera)

Damage symptoms

Both nymphs and adults suck the sap from the leaves resulting in curling and crinkling of leaves.

Bionomics

Yellowish to dark insects mostly wingless (apterous) on the under surface of leaves. Quite often attended by ants for the sweet honey dew secretion. Winged forms may be seen under crowded condition.

Pests of Castor

Castor is attacked by more than twenty pests of which capsule borer, hairy caterpillars, other defoliators, leaf hopper and white fly are serious.

Major pests				
1.	Capsule & Shoot borer	<i>Conogethes punctiferalis</i>	Pyraustidae	Lepidoptera
2.	Castor semi looper	<i>Achaea janata</i>	Noctuidae	Lepidoptera
3.	Slug caterpillar	<i>Parasa lepida</i>	Cochilididae	Lepidoptera
4.	Hairy caterpillar	<i>Euproctis fraterna</i>	Lymantriidae	Lepidoptera
5.	Hairy caterpillar	<i>Porthesia scintillans</i>	Lymantriidae	Lepidoptera
6.	Tussock caterpillar	<i>Notolophus posticus</i>	Lymantriidae	Lepidoptera
7.	Hairy caterpillar	<i>Dasychira mendosa</i>	Lymantriidae	Lepidoptera
8.	Castor butterfly / spiny caterpillar	<i>Ergolis merione</i>	Nymphalidae	Lepidoptera
9.	Wooly bear	<i>Pericallia ricini</i>	Arctiidae	Lepidoptera

Minor pests

10.	Leaf hopper	<i>Empoasca flavescens</i>	Cicadellidae	Hemiptera
11.	White fly	<i>Trialeurodes ricini</i>	Aleyrodidae	Hemiptera
12.	Thrips	<i>Retithrips syriacus</i>	Thripidae	Thysanoptera
13.	Castor gallfly	<i>Asphondylia ricini</i>	Cecidomyiidae	Diptera

I. Borers

1. Capsule & Shoot borer: *Conogethes punctiferalis* (Pyraustidae: Lepidoptera)

Distribution and status

India, Australia, Burma, Sri Lanka, China, Indonesia and Malaysia.

Host range

Castor, mango, sorghum ears, guava, peaches, cocoa, pear, avacado, cardamom, ginger, turmeric, mulberry, pomegranate, sunflower, cotton tamarind, hollyhock.

Damage symptoms



The damage is caused by the caterpillar, which bores into the main stem of young plant and ultimately into the capsules. The borer is distributed throughout India where castor is grown.

Bionomics

Adult is medium sized with small black dots on pale yellow wings. It lays eggs on the developing capsules. Egg period is 6 days. Larva measures 24 mm when fully grown. Larva is pale green with pinkish tinge and fine hairs with dark head and prothoracic shield. Larva lives under a cover of silk, frass and excreta. Larval period is 12-16 days. It pupates in the stem or capsule.



Management

Spraying the infested crop with endosulfan 35 EC 2.0 L (or) carbaryl 50 WP 2 kg or methyl parathion 50 EC 2.0 L @ 1000-1200 L water per hectare proved effective in controlling the pest.

II. Leaf feeders

2. Castor semi looper: *Achaea janata* (Noctuidae: Lepidoptera)

Distribution and status: India, Pakistan, Sri Lanka, Thailand, Laos, Malaysia, Philippines.

Host range: Castor, rose, pomegranate, tea, citrus, mango, *Cadiospermum helicacabum*

Damage symptoms

The damage is caused by both the caterpillar and adult moth. The caterpillars feed voraciously on castor leaves. Feeding from the edges inwards, leave behind only the mid rib and the stalk. The damage is maximum in August, September and October. The adult of this species are fruit sucking moths and cause serious damage to citrus crop.



Bionomics



Adult is a pale reddish brown moth with black hind wings having a median white spot on the outer margin. Eggs are laid on the tender leaves. Egg period is 2-5 days. Larva is a semilooper with varying shades of colour with black head and a red spot on the third abdominal segment and red tubercles in the anal region. Larval period is 11-15 days. It pupates in soil for 10-14 days. (*Parallelia algira* looks very similar to *Achaea janata* but the wings have black stripes or triangles)

Management

1. Dusting the infested crop with 2% parathion dust @ 20-25 kg/ha.

2. Spray endosulfan 35 EC 2.0 L or carbaryl 50% WP 2 kg in 1000-1200 L water/ha.
3. Conserve braconid parasitoid *Microplitis ophiusae* since it keeps the pest under check. (Cocoons are often seen on the ventral surface of the posterior side)

3. Slug caterpillar: *Parasa lepida* (Cochilididae: Lepidoptera)

Distribution and status: India, Malaysia, Sri Lanka, South East Asia.

Host range: Castor, pomegranate, citrus, coconut, palm, rose, wood apple, country almond, mango, palmyrah, cocoa, coffee, banana, rice and tea.

Damage symptoms

Larva feeds on leaves voraciously leaving only the midrib and veins resulting in severe defoliation.



Bionomics

Adult moth is green with brown band at the base of each forewing. Eggs are laid in groups and covered with hairs on the leaves. Egg period is 4-5 days. Larva is stout, slug like ventrally flat, greenish body with white lines and four rows of spiny scoli tipped red or black; larval period is 40-45 days. It pupates in plant as cocoons covered with irritating spines and hairs



Management

Spray endosulfan 2.0 L in 1000 L of water per ha

4. Hairy caterpillar: *Euproctis fraterna* (Lymantriidae: Lepidoptera)

Distribution and status: India

Host range: Castor, linseed, groundnut pigeonpea, grapevine, cotton, pomegranate, mango,

coffee, pear and rose

Damage symptoms

Defoliation is the main symptom. The pest is active throughout the year but its activity is reduced in winter.

Bionomics

The adult moth is yellowish with pale transverse lines on fore wings. It lays egg in groups on lower surface of the leaves. The egg period is 4-10 days. The caterpillar possesses red head with white hairs around and a long tuft and a reddish brown body with hairs arising on warts and a long pre- anal tuft. There are six larval instars. The larval periods last for 13-29 days. It pupates in a silken cocoon in leaf folds for 9-25 days. The larva over-winters during winter season.



Management

1. Release larval parasitoids viz., *Helicospilus merdarius*, *H. horsefieldi*, *Apanteles* sp., *Disophrys* sp.
2. Dust the infested crop with parathion 2 D @ 20-25 kg per ha or malathion 5 D 25-30 kg/ha (or) carbaryl 10 D @ 20 kg/ha.

5. Hairy caterpillar: *Porthesia scintillans* (Lymantriidae: Lepidoptera)

Distribution and status, damage symptoms and management as given for *Euproctis fraterna*

Host range: Castor, rose, cotton, redgram, mango, linseed, gogu and sunnhemp

Bionomics

Larva has yellowish brown head, a yellow dorsal stripe with a central red line on the body and tufts of black hairs dorsally on the first three abdominal segments. Adult is yellowish with spots on the edges of forewings. Life cycle is very similar to that of *Euproctis fraterna*.



6. Tussock caterpillar: *Notolophus posticus* (Lymantriidae: Lepidoptera)

Distribution and status, damage symptoms and management as given for *Euproctis fraterna*

Host range: Castor

Bionomics

Male is winged and female being apterous, sluggish cling to the cocoon after emergence. Males are attracted to the females at dusk. Females lay 350 cream coloured subspherical eggs in mass on the cocoon itself.

Egg period 7 days and larval period 16 to 19 days. Larva has brown head with a pair of long pencils of hair pointing forward from prothorax, tuft of yellowish hairs laterally on first two abdominal segment and dorsally on first four abdominal segments and long brown hairs dorsally from 8th abdominal segment. It pupates in transparent silken cocoon inside leaf roll.

7. Hairy caterpillar: *Dasychira mendosa* (Lymantriidae: Lepidoptera)

Distribution and status, damage symptoms and management as given for *Euproctis fraterna*

Bionomics



Adult is yellowish brown moth. Larva is greyish brown with dark prothoracic and preanal tufts of hairs. Prolegs are crimson coloured.

8. Castor butterfly / spiny caterpillar: *Ergolis merione* (Nymphalidae: Lepidoptera)

Damage symptoms

It is a serious though sporadic pest. Insect attacks the crop at an early stage. Insects feed on the leaf tissue and cause defoliation.

Bionomics

Brown butterfly with black wavy lines on the wings. Larva green coloured, spiny (spines branched at the tip) caterpillar with yellow stripe on the dorsal region. Pupates in a brown chrysalis. The adult lays dome shaped, shiny white eggs singly on the underside of the leaves. Single female lays 42 to 50 eggs during her life span. The eggs hatch in about a week. The duration of the pupal stage lasts 5-6 days in September to October and 8 to 9 days in December to January. The life cycle of the pest is completed in 20 to 21 days in August to September and 37 to 42 days in December to January.





Management

1. Collect and destroy promptly the affected leaves, etc., which contain larvae inside.
2. Dust the infested crop with parathion 2 D @ 20-25 kg per ha or malathion 5 D 25 - 30 kg/ha (or) carbaryl 10 D @ 20 kg/ha.

9. Woolly bear: *Pericallia ricini* (Arctiidae: Lepidoptera)

Damage symptoms

The damage is caused by caterpillar. It feeds on leaves resulting in defoliation.

Bionomics



The larva is robust, greyish black or blackish brown with red head and thick tuft of hairs arising from the body. The adult is greyish brown or black with black spots on wings. Hind wings are pink or red colour with black spots.

Management

1. Collect and destroy the caterpillars

2. Dust the infested crop with parathion 2 D @ 20-25 kg per ha or malathion 5 D 25 - 30 kg/ha (or) carbaryl 10 D @ 20 kg/ha for young caterpillars.
3. Spray endosulfan 35 EC 2.0 L or carbaryl 50% WP 2 kg in 1000-1200 L water/ha.

10. Leaf hopper: *Empoasca flavescens* (Cicadellidae: Hemiptera)

Damage symptoms

Nymphs and adults suck the sap from the under surface of the leaves and cause "hopper burn". Leaves become crinkled and cup shaped.

Bionomics

Adult is green, wedge shaped hopper. It lays eggs within the leaf veins. A female lays 15-37 eggs during an oviposition period of 5-7 days. The egg period is 7-8 days. The nymphal period is 9 days.



11. White fly: *Trialeurodes ricini* (Aleyrodidae: Hemiptera)

Damage symptoms

Water soaked spots on the leaves which become yellow and dried. Colonies of whitefly are found on the under surface of leaves.

Bionomics

The adults are pale yellow with white wings covered with waxy powder. It lays eggs in clusters on the under surface of leaves. Nymphal stage undergoes four instars. The life cycle is completed in 19-21 days during July-September.



12. Thrips: *Retithrips syriacus* (Thripidae: Thysanoptera)

Damage symptoms

Nymphs and adults feed on the upper surface of the leaves. Affected leaves give a shiny appearance. It is also found on cotton and rose.

Bionomics: Pinkish nymph, black adult with fringed wings.

13. Castor gallfly: *Asphondylia ricini* (Cecidomyiidae: Diptera)

Damage symptoms

The damage is caused by maggots. As a result of feeding by them, the buds develop into galls and produce no fruits and seeds. This pest is active from September to March.

Bionomics

Adults are a mosquito like small fly. The female lays eggs singly in the buds. Incubation period is 2-4 days. The young maggot feeds on the floral parts and cause malformation of buds which fail to develop into seeds. Larval period lasts for 14-21 days. The pupal period is 7-12 days. Complete life cycle takes 23-37 days.

Management

Spraying the infested crop with 0.07% endosulfan 35 EC or 0.05% methyl demeton 25 EC @ 1000-1200 L water/ha.

Integrated pest management of castor crop

I. Cultural method

1. Resistant varieties: (a) Variety C3 Pakistan is tolerant. R.C.1098 and R.C.1096 coonoo are resistant to jassid attack. (b) Varieties R.C.1066, R.C.1067, R.C.1092, R.C.1069, R.C.1071 and R.C.1072 are resistant to mite infestation.
2. Summer ploughing: Deep summer ploughing should be followed, so that the larvae of semilooper, hairy caterpillar pupated in the soil will be killed due to scorching sunlight.

II. Mechanical method

1. Set up light trap to attract and kill lepidopteran moths
2. Collect and destroy the egg masses of *Spodoptera litura* and slug caterpillar.
3. Collect and destroy the early instar larvae of *Spodoptera litura*, semilooper and hairy caterpillar.

III. Microbial method

1. Use of bacteria: Spraying of thuricide (*Bacillus thuringiensis*1%) is found to be effective in controlling the larvae of *A. janata* and other lepidopterous larvae.
2. Use of virus: *Nuclear polyhedrosis*, *Cytoplasmic polyhedrosis* and pox-like virus has been found effective against *A. moorei* and *Euproctis* spp.
3. Use of nematodes: *Mermis submigrescens* have been found effective against *A.moorei*.
4. Use of antifeedants: Triphenyl tin compound 45% WP @ 0.06% and other fentin compounds will protect the crop from the attack of *Spodoptera mauritia*, *Spodoptera littoralis*, *Pericallia ricini*, *Spodoptera litura*.
5. Apply NSKE 3% + neem oil 2% for the control of semilooper.
6. Apply dimethoate 500 ml/ha or methyl demeton 25 EC 1500 ml/ha to control sucking pests.
7. Apply endosulfan 4D 25 kg/ha to control semilooper and other pests.
8. Spray any one of the following insecticides/ha thrice from flowering at three weeks interval to control capsule and shoot borer. Malathion 2 L, and carbaryl 50 WP 2 kg in 1000 L of water.

Pests of Brassica

The important cruciferous oilseeds cultivated in India are yellow and brown sarson (*Brassica campestris* var. *sarson*), toria (*B.campestris* var. *toria*), raya (*B. juncea*) and taramira (*Eruca sativa*). These crops are damaged by a number of pests, of which mustard aphid, mustard sawfly and the painted bug are more serious. The aphid is the most serious pest on Brassica oilseeds throughout India.

Major pests				
1.	Mustard Aphid	<i>Lipaphis erysimi</i>	Aphididae	Hemiptera
2.	Painted Bug	<i>Bagrada hilaris</i>	Pentatomidae	Hemiptera
3.	Mustard Sawfly	<i>Athalia lugens</i>	Tenthredinidae	Hymenoptera
4.	Green Peach Aphid	<i>Myzus persicae</i>	Aphididae	Hemiptera
5.	Pea Leaf-miner	<i>Chromatomyia horticola</i>	Agromyzidae	Diptera
6.	Bihar Hairy Caterpillar	<i>Spilosoma obliqua</i>	Arctiidae	Lepidoptera
7.	Cabbage butterfly	<i>Pieris brassicae</i>	Pieridae	Lepidoptera
8.	Diamondback moth	<i>Plutella xylostella</i>	Yponomeutidae	Lepidoptera
Minor pests				
9.	Jassid	<i>Empoasca binotata</i>	Cicadellidae	Hemiptera
10.	Leaf webber	<i>Crocidolomia binotalis</i> <i>Hellula undalis</i>	Pyralidae	Lepidoptera
11.	Noctuid caterpillars	<i>Agrotis ipsilon</i> , <i>Mythimna loreyi</i> and <i>Helicoverpa armigera</i>	Noctuidae	Lepidoptera
12.	Flea beetles	<i>Phyllotreta cruciferae</i> and <i>Phaedon hrassicae</i>	Coleoptera	Chrysomelidae
13.	Leaf-miner	<i>Chromatomyia horticola</i>	Agromyzidae	Diptera

1. Mustard Aphid: *Lipaphis erysimi* (Aphididae:Hemiptera)

Distribution and status

Distributed worldwide and is a serious pest

Host range

Cruciferous oilseeds like toria, sarson, raya, taramira and Brassica vegetables like cabbage, cauliflower, knol-khol,.

Bionomics

They are louse like, pale-greenish insects



abundant from December to March. During summer, it is believed to migrate to the hills. The pest breeds parthenogenetically and the females give birth to 26-133 nymphs. They grow very fast and are full-fed in 7-10 days. About 45 generations are completed in a year. Cloudy and cold weather (20°C or below) is very favourable for the multiplication of this pest. The winged forms are produced in autumn and spring, and they spread from field to field and, from, locality to locality.

Damage symptoms

Both the nymphs and adults suck cell-sap from leaves, stems, inflorescence or the developing pods. Vitality of plants is greatly reduced. The leaves acquire a curly appearance, the flowers fail to form pods and the developing pods do not produce healthy seeds. The yield of an infested crop is reduced to one-fourth or one-fifth.

Management

1. Sow the crop early wherever possible, preferably up to third week of October.
2. Apply recommended dose of fertilizers.
3. Apply anyone of the following insecticides when the population of the pest reaches 50-60 aphids per 10 cm terminal portion of the central shoot or when an average of 0.5-1.0 cm terminal portion of central shoot is covered by aphids or when plants infested by aphids reach 40-50 per cent

Foliar sprays - 625 -1000 ml of oxydemton methyl 25 EC, dimethoate 30 EC, endosulfan 35 EC, quinalphos 25 EC, malathion 50 EC; 940-1500 ml of chiorpyriphos 20 EC in 600-1000 L of water per ha depending on the stage of the crop.

Granular insecticides - 10 kg of phorate IO G, 33 kg of carbofuran 30 per ha followed by a light irrigation.

4. Conserve parasitoids *Ischiodon scutellaris* (Fabricius), *Diaeretiella rapae* M'Intosh (Braconidae) and *Lipolexis gracilis* Forester (Aphididae), predators viz., *Syrphus serarius* (Wiedmann) (Syrphidae), *Brinckochrysa scelestes* (Banks) (Chrysopidae), *Coccinella septempunctata* Linnaeus, *Menochilus sexmaculatus* (Fabricius) (Coccinellidae) and entomopathogens viz., *Entomophthora coronata* and *Cephalosporium aphidicola*.

2. Painted Bug: *Bagrada hilaris* (Pentatomidae: Hemiptera)

Distribution and status: Widely distributed in Myanmar, Sri Lanka, India, Arabia and East Africa.

Host range: Crucifers, rice, sugarcane, indigo and coffee

Bionomics

The full-grown black nymphs are about 4 mm long and 2.66 mm broad. Sub-ovate, black adult bugs are 3.71 mm long and 3.33 mm broad with a number of orange or brownish spots. It is active from March to December and during this period all the stages can be seen. It passes the winter months of January and



February in the adult stage under heaps of dried oilseed plants lying in the fields. These bugs lay oval, pale-yellow eggs singly or in groups of 3-8 on leaves, stalks, pods and sometimes on the soil. Eggs may be laid during day or night. A female bug may lay 37-102 eggs in its life-span of 3-4 weeks. Egg period is 3-5 days during summer and 20 days during December. There are five nymphal instars with a duration of 22 -34 days. The entire life cycle is completed in 19-54 days and it passes through 9 generations in a year.

Damage symptoms

Both nymphs and adults suck cell sap from the leaves and developing pods, which gradually wilt and dry up. The nymphs and adult bugs also excrete a sort of resinous material which spoils the pods.



Management

1. Give first irrigation 3-4 weeks after sowing as it reduces the bug population significantly. (ii) Spray 1.0 L of malathion 50 EC or 625 ml of endosulfan 35 EC or quinalphos 25 EC in 500-600 L of water per ha once in October and again in March-April.
2. Conserve egg parasitoid *Gryon* sp. (Scelionidae) and the adult parasitoid *Alophora* sp. (Tachinidae).

3. Mustard Sawfly: *Athalia lugens* (Tenthredinidae: Hymenoptera)

Distribution and status: Widely distributed in Indonesia, Formosa, Myanmar and the Indian Sub-continent.

Host range: Mustard, toria (*Brassica campestris*), rapeseed, cabbage, cauliflower, knolkhol, turnip, radish, etc

Bionomics



Dark green larvae have 8 pairs of abdominal prolegs. There are five black stripes on the back, and the body has a wrinkled appearance. A full-grown larva measures 16-18 mm in length. The adults are small orange yellow insects with black markings on the body and have smoky wings with black veins. The mustard sawfly breeds from October to March and undergoes pupal diapause during summer. The adults emerge from these cocoons early in October. They live for 2-8 days and lay 30-35 eggs singly, in slits made with saw like ovipositors along the underside of the leaf margins. Egg period is 4-8 days and the larvae feed exposed in groups of 3-6 on the leaves during morning and evening. They remain hidden during the day time and, when disturbed, fall to the ground and feign death. There are 7 instars with a larval period of 16-35 days. Pupation is in water proof oval cocoons in soil

and the pupal period is 11-31 days. Lifecycle is completed in 31-34 days. It completes 2-3 generations from October to March..

Damage symptoms

The grubs alone are destructive. They bite holes into leaves preferring the young growth and skeletonize the leaves completely. Sometimes, even the epidermis of the shoot is eaten up. Although the seedlings succumb; the older plants, when attacked, do not bear seed.

Management

1. Give first irrigation 3-4 weeks after sowing as it reduces the bug population significantly. (ii) Spray 1.0 L of malathion 50 EC or 625 ml of endosulfan 35 EC or quinalphos 25 EC in 500-600 L of water per ha once in October and again in March-April.
2. Conserve larval parasitoid *Perilissus cingulator* Morby (Ichneumonidae) and the bacterium, *Serratia marcescens* Bizio (Enterobacteriaceae)

4. Green Peach Aphid: *Myzus persicae* (Aphididae: Hemiptera)

Distribution and status: Throughout India

Host range: Mustard, peaches, beans, potato, tobacco, turnip, radish, etc

Bionomics

The aphids are minute (2.0-2.5 mm long), delicate, pear-shaped, yellowish-green winged or wingless insects. It remains active from December to March with peak activity during February. The nymph undergoes 4-5 instars taking 4-7 days for apterous and 5-8 days for alate forms. Apterous adults produce 5-92 young ones per female while the alate forms produce 8-49 nymphs. Longevity of adult is 15-27 days for alate and 10-25 days for apterous forms.



Damage symptoms

Both nymphs and adults damage plants by actively sucking their sap. After the appearance of inflorescence, the aphid congregates on terminal buds and feeds there. As a result, there is flower shedding, poor-pod formation and shriveling of grains. The insect also transmits virus diseases. The honeydew attracts sooty mould.

Management

1. Sow the crop in first week of October.
2. Spray 500 ml of dimethoate 30 EC or 625 ml of oxydemeton methyl 25 EC in 750 L of water/ha when aphids start congregating on top flower buds. Only one spray is needed.

5. Pea Leaf-miner: *Chromatomyia horticola* (Agromyzidae: Diptera)

Distribution and status: Northern India

Host range: Cruciferous plants, antirrhinum, nasturtinum, pea, linseed (*Linum usitatissimum*)

L.) and potato (*Solanum tuberosum* L.).

Bionomics

The adults are two-winged flies having greyish black mesonotum and yellowish frons. It is active from December to April or May and is believed to pass the rest of the year in soil, in the pupal stage. The adults emerge at the beginning of December and after mating, start laying eggs singly, in leaf tissues. The eggs hatch in 2-3 days and the larvae feed between the lower and upper epidermis by making zig-zag tunnels. Maggot after 5 days pupates within the galleries. The adults emerge in 6 days and lifecycle is completed in 13-14 days. The pest passes through several broods from December to April-May.



Damage symptoms

The large number of tunnels made by the maggots interferes with photosynthesis and proper growth of the plants, making them look unattractive. If the attacked leaves are held against bright light, the minute slender larvae can be seen feeding within the tunnels

Management

Spray 1.0 L of dimethoate 30 EC in 750 L of water per ha and repeat spray at 15 days interval. A waiting period of 20 days should be observed for picking of pods.

6. 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.

Bionomics

The moth measures about 50 mm across the wing spread. 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.



Damage symptoms

The caterpillars eat leaves and soft portions of stems and branches. In severe infestation, the plants may be completely denuded of leaves.

Management

1. The young caterpillars can be killed easily by dusting the infested crop with malathion

5 per cent @ 25 kg/ha.

2. When they are full-grown, it is difficult to kill them and very high doses of the pesticides are needed. The chemical control measures are same as in case of red hairy caterpillar.

7. Cabbage butterfly: *Pieris brassicae* (Pieridae: Lepidoptera)

Distribution and status: Throughout India

Host range: cabbage, cauliflower, knol-khol and it may also attack turnip, radish, sarson, toria (*Brassica campestris*) and other cruciferous plants

Bionomics



Full-grown pale yellow larva becomes greenish and measures 40-50 mm in length. In adults, the wings are pale white, with a black patch on the apical angle of each fore wing and a black spot on the costal margin of each hind wing. The females have two conspicuous black circular dots on the dorsal side of each fore wing. Males are smaller than the females and have black spots on the underside of each fore wing

In the Indo-Gangetic plains, this pest appears on cruciferous vegetables from October to April. From May to September, the pest is not found in the plains but breeding takes place in the mountains. The butterflies are very active in the field and lay, on an average, 164 yellowish conical eggs in clusters of 50-90 on the upper or the lower side of a leaf. Egg period is 3-17 days. The caterpillars feed gregariously during the early instars and disperse as they approach maturity. They pass through five stages and are full-fed in 15-40 days. The larvae pupate at some distance from the food plants, often in barns or on trees. The pupal stage lasts 7-28 days. The butterflies live for 3-12 days and the pest breeds four times during October-April.

Damage symptoms

The caterpillars alone feed on leaves, young shoots and green pods. When young, they feed gregariously but the grown-up caterpillars migrate from one field to another. The

first instar caterpillars just scrape the leaf surface, whereas the subsequent instars eat up leaves from the margins inwards, leaving intact the main veins. Often, entire plants are eaten up.

Management

1. When in the gregarious stage, the caterpillars can be easily controlled by picking and destroying the infested leaves.
2. The grown-up caterpillars should be controlled with malathion 5 per cent @ 37.5 kg per ha or by spraying 1.25 L of endosulfan 35 EC or 500 ml of dichlorvos 76 SC in 600-900 L of water per ha.
3. Conserve larval parasitoid *Apanteles glomeratus* (Braconidae) in the natural populations.

7. Diamond backmoth: *Plutella xylostella* (Plutellidae: Lepidoptera)

Refer crucifers

Minor Pests of Brassica Oilseeds

The other insects which appear as minor pests of Brassica crops include the

- Jassid: *Empoasca binotata Pruthi* (Cicadellidae: Hemiptera)
- Leaf webber *Crociodolomia binotalis* Zeller and *Hellula undalis* (Pyalidae: Lepidoptera)
- Noctuid caterpillars: *Agrotis ipsilon*, *Mythimna loreyi* and *Helicoverpa armigera* (Noctuidae: Lepidoptera)
- Flea beetles: *Phyllotreta cruciferae* and *Phaedon hrassicae* (Coleoptera : Chrysomelidae)
- Leaf-miner: *Chromatomyia horticola* (Agromyzidae: Diptera)

Pest of linseed

1. Linseed Gall-midge: *Dasineura lini* (Cecidomyiidae: Diptera)

Distribution and status: Serious in Andhra Pradesh, Madhya Pradesh, Bihar, Uttar Pradesh, Delhi and Punjab.

Host range: Linseed

Bionomics

The adult of this gall-midge is a small orange fly. The female lays 29-103 smooth, transparent eggs in the folds of 8-17 flowers or in tender green buds, either singly or in clusters of 3-5. The eggs hatch in 2-5 days. Just after emergence, the larvae are transparent, with a yellow patch on the abdomen. They pass through four instars in 4-10 days and when full-grown become deep pink and measure about 2 mm in length. The full-grown maggots drop to the ground, prepare a cocoon and pupate in the soil. The pupal period lasts 4-9 days. A generation is completed in 10-24 days. There are four overlapping generations during the season.

Damage symptoms

Damage is the result of feeding by maggots on buds and flowers. Consequently no pod-formation takes place.

Management

1. The adult flies can be killed by using light traps. The flies are also attracted in day-time to molasses or gur added to water.
2. As the incidence of this pest is more on the late-sown crop as compared with the nonnal-sown crop, the practice of nonnal-sown crops should be adopted if possible.
3. Dust 5 per cent carbaryl 15-20 kg/ha or spray carbaryl 50 WP 1.125 kg/ha in 600-750 L of water/ha.
4. Conserve larval parasitoids viz., *Systasis dasyneurae* Mani (Miscogasteridae), *Elasmus sp.* (Elasmidae), *Eurytoma sp.* (Eurytomidae), *Torymus sp.* (Torymidae) and *Tetrastichus sp.* (Eulophidae).

2. Beet Armyworm: *Spodoptera exigua* (Noctuidae: Lepidoptera)

The beet armyworm may cause damage by feeding on leaves. Spray the crop with 1.125 kg of carbaryl 50 WP or 1.0 L of malathion 50 EC in 600-750 L of water per ha.

Minor Pests of Linseed

- **Jassid:** *Empoasca kerri var. motti* (Cicadellidae: Hemiptera)
- **Whitefly:** *Bemisia tabaci* (Aleyrodidae: Hemiptera)
- **Mirid bug:** *Creontiades pallidifer* (Miridae: Hemiptera)
- **Stink bug:** *Piezodorus hybneri* (Pentatomidae: Hemiptera)
- **Thrips:** *Caliothrips indicus* (Thysanoptera : Thripidae)
- **Bihar Hairy caterpillar:** *Spilosma obliqua* (Arctiidae: Lepidoptera)
- **Leaf caterpillar:** *Grammodes stolidia* (Noctuidae: Lepidoptera)
- **Hairy caterpillar:** *Euproctis scintillans* (Lymantriidae: Lepidoptera)
- ***Spodoptera litura*, *Thysanoplusia orichalcea* and *Helicoverpa armigera*:** (Noctuidae: Lepidoptera).

Question paper on Gingelly, Castor, Mustard and Linseed

1. Flowers and young sesame capsules with gall like swelling is the typical symptom of -----
----- **Gall fly**
2. Lymantriid hairy caterpillars are polyphagous – Say **true** or false
3. Gingelly phyllody is transmitted by
 - a. **Orosius albicinctus**
 - b. *Bemisia tabaci*
 - c. *Aphis craccivora*
 - d. *Cestius physinctus*
4. ----- is the scientific name of Gingelly gallfly - **Asphondylia sesame**
5. Pod bug, *Elasmolomus sordidus* is nocturnal in habit. Say true or false -**True**
6. Name the insect where larvae feed on castor leaves voraciously and adult cause damage to citrus fruits - **Achaea janata**
7. Water soaked spots on the castor leaves become yellow and dried are symptoms of
 - a. **White fly**
 - b. Thrips
 - c. Leaf hopper
 - d. Aphids
8. Which one of the following is a serious but sporadic pest on castor
 - a. **Castor butterfly**
 - b. Castor semilooper
 - c. Castor gallfly
 - d. Woolly bear
9. *Parasa lepida* belongs to family
 - a. Arctiidae
 - b. HesperIIDae
 - c. **Cochilididae**
 - d. Lymantriidae
10. *Pericallia ricini* is the scientific name of wooly bear- Say **True** or false
11. Presence of holes in the leaves of mustard is a symptom of ----- **Plutella xylostella**
12. ----- is a hymenopteran insect without crochets on its pseudolegs - **Sawfly**
13. Saw fly is having ----- pairs of abdominal pseudo legs
 - a. 4
 - b. 2-5

c. 5-8

d. **8 only**

14. A hymenopteran insect having saw like ovipositor on its abdomen - **Sawfly**

15. ETL of sesame leaf webber is _____ **2 webbed leaves/ sq.m**

16. Name some resistant cultivars of gingelly leaf webber - **EH7, 57, 84, 105, 106 and 156**

17. ETL of mustard aphid is _____ **-50-60 aphids per 10 cm**

18. _____ excretes a sort of resinous material that spoils the mustard pods

Painted Bug, *Bagrada hilaris*

19. Braconid parasitoid _____ keeps the population of *Achaea janata* under check

Microplitis ophiusae

20. Larva with branched spines in castor **spiny caterpillar - *Ergolis merione***

21. Which pest lays eggs on the cocoon itself

a. *Euroctis fraterna*

b. *Ergolis merione*

c. *Achaea janata*

d. ***Notolopus posticus***