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Identification of Different Insect Pests of Soybean and Their Management

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Introduction:

Soybean (*Glycine max* (L.) Meril), one of the most important leguminous crops, belongs to the family Leguminoceae. It is grown in three seasons in most of the parts of the world. There are a wide variety of insects that may be found in soybean field at any given time of the season. Some of these insects may be pests that could reduce soybean yield. Damage caused by insect pests to the soybean crop varies with the year and place. But heavy damage to the soybean crop is caused by the species which directly attack the pods (including seeds). An overview information on significant insect pests of soybean as well as insects which may cause occasional losses in soybean has been given through this article.

1. Soybean Stem fly: ***Melanagromyza sojae*** Agromyzidae : Diptera

Marks of Identification:

- Adult fly is small, black in colour 2 mm length.
- Female fly is larger than male.
- Maggot is apodous, light yellow in colour and 3-4 mm in length.

Nature Damage:

- After hatching maggot bore the leaf vein.
- Through petiole get entry into the stem and feed inside the stem tissue.
- Due to the feeding galleries are formed, branches dried and plant killed.

Life History:

- Stem fly lay eggs in leaf tissue or on leaves.
- Incubation period is 2-7 days.
- Maggot period is 10-15 days.

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- Pupation take place in stem / soil and pupal period lasts for 7-10 days.
- Adult period is 5 days and total life cycle is completed within 25-30 days.

Management Practices:

1. Deep summer ploughing.
2. Avoid pre monsoon sowing.
3. Proper crop rotation with dissimilar crops should be followed.
4. Use resistant variety DSC-5, Pussa-16, NRC-37, PK-1248, TS-6.
5. Soil application of phorate 10 G @ 10 kg/ha or carbofuran 3 G @ 30 kg/ha at the time of sowing will prevent early infestation by stem fly.
6. One or two sprays of 0.03% dimethoate 30 EC or 0.05% quinolphos 25 EC can stop the damage.
7. Spray Triazophos 40 EC 0.04% OR chloropyriphos 20 EC 0.05%.

Host plants:

- Udid, mung, cowpea and wal.

Stem fly (*Melanagromyza sojae*)

2. Girdle Beetle : *Obereopsis brevis* Lamiidae : Coleoptera

Marks of Identification:

- Adult beetle light brown, antennae as long as body length.
- Grub is apodus, whitish yellow in colour.

Nature Damage:

- Grub bore the stem up to root and feed inside the stem tissue due to feeding plant dried and reduction in yield up to 85%.
- Girdling of stems and petioles.

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Life History:

- Female make girdle on petiole, stem, branches and lay eggs inside the girdle.
- Egg period 4-8 days, grub period 32-62 days.
- Grub enters in diapauses stage and pupated inside stem pupal period 8-11 days and after monsoon showers adult emerges.

Management Practices:

1. Deep summer ploughing.
2. Optimum seed rate (70-100 kg/ha) should be used.
3. Intercropping with maize or sorghum should be avoided.
4. Collect and destroy infested plant parts and egg masses.
5. Remove the infested plant parts at least once in 10 days and bury them in compost pit to reduce the populations of girdle beetle.
6. Apply phorate 10 G @ 10 kg/ha or carbofuran 3 G @ 30 kg/ha at the time of sowing.
7. One or two sprays of 0.03% dimethoate 30 EC or 0.05% quinolphos 25 EC or 0.05% methyl demeton 25 EC or 0.04% can check further damage.
8. Spray quinolphos 25 EC triazophos 40 EC @ 2 ml/lit. at the crop age of 30-35 days and repeal after 15-20 days (1000 l spray/ha).

Host plants:

- Mung, cowpea, Tur, Chilli and wal.

Girdle Beetle (*Obereopsis brevis*)

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3. Leaf miner : *Aproaerema modicella* Gelechidae : Lepidoptera

Marks of Identification:

- Moth is small sized; the wings are greyish with a pale dot on each of the fore wings.
- The full-grown larva is 6 to mm long, cylindrical, tapering posteriorly and light green in colour with dark head and prothorax.

Nature Damage:

- The larvae mine the upper epidermis of the leaf, the mined leaves show whitish brown streaks.
- Later, they leave the mine and fold the leaves or bring the adjacent leaves together.
- Damaged leaves dry and the plants wither. In cases of sever attack, the yield is adversely affected.

Life History:

- Oviposition: singly on the under surface of leaflets.
- Larval period is 4-17 days. Pupate in white silken cocoons within webbed leaflets and the pupae are reddish brown. PP is 5-7 days. Adult longevity is 5-6 days.
- Life cycle is completed in 20-25 days.

Management Practices:

1. Sow groundnut early and synchronously in rainy and rabi season.
2. Set up light traps between 8 and 11 PM at ground level.
3. As soon as incidence is noticed spray 0.2% carbaryl or 0.05% monocrotophos or 0.05% quinalphos or dusting with malathion 5D, quinalphos 1.5 D or methyl parathion 2D @ 20kg/ha.
4. Repeat spraying or dusting at fortnightly interval if necessary.

Host Plants:

- Besides soybean, it infests groundnut, redgram etc.

Leaf miner (*Aproaerema modicella*)

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4. Tobacco Leaf eating caterpillar: *Spodoptera litura* Noctuidae : Lepidoptera

Mark of Identification:

- Adult moth is stout with wavy white markings on the brown forewings and white hind wings with a brown patch along its margin.
- 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.

Nature of Damage:

- 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 daytime.
- Faecal pellets are seen on the leaves and on the ground which is the indicator of the pest incidence.

Life History:

- Eggs are laid in groups and covered with hairs on the leaves.
- The egg period is 4-5 days. The larval period is 14-21 days.
- It pupates in earthen cells in soil for 15 days. Life cycle is completed 30-40 days.

Management Practices:

1. Grow castor as a border (or) intercrop in groundnut fields to serve as indicator (or) trap crop.
2. Set up pheromone trap to monitor, attract and kill the male moths @ 12 nos./ha and change the septa once in 3 weeks.
3. Collect egg masses and destroy.
4. Collect the gregarious larvae and destroy them as soon as the early symptoms of lace-like leaves appear on castor, cowpea and groundnut.
5. Apply NPV @ 250 LE/ha with crude sugar 2.5 kg/ha which is as effective as that of chlorpyriphos at 200 g a.i./ha at 7 days interval.
6. Apply any one of the following insecticides per ha to control early instar larvae (1st to 3rd instar).

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7. Carbaryl 10 D @ 25 kg, carbaryl 50 WP @ 2 kg, quinolphos 25 EC @ 750 ml, phenthoate 50 EC @1250 ml and dichlorvos 76 SC @ 750 ml.

Host Plants:

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

Tobacco Leaf eating caterpillar (*Spodoptera litura*)

5. Whitefly: *Bemisia tabaci* Aleurodidae : Hemiptera

Mark of Identification:

- Nymphs and pupae: Black and round or oval. Pupae have marginal bristles.
- Adults: Small, yellow bodied insects with white wings which are densely covered with a waxy powder

Nature of Damage:

- Both nymphs and adults suck the cell sap from the leaves and devitalize the plants.
- As a result of their feeding the leaves turn yellow and become curled.
- This insect spread the mosaic disease in soybean.
- Besides, they also excrete honey-dew on leaves, on which black sooty mould develops.

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Management Practices:

1. Dusting of cow dung ash and spraying of clay suspension as asphyxiants (in small area and low incidence of sucking insects)
2. Spray 0.05 % quinolphos 25 EC oxydemeton methyl 25 EC, or dimethoate 30 EC @ 2ml /lit at the crop age of 35-40 days and repeat after 15 days if needed.

Host Plants:

- It is polyphagous species feeding on bhendi, brinjal, potato, cruciferous and cucurbits.

Whitefly (*Bemisia tabaci*)

6. Semilooper : *Chrysodeixis acuta* Noctuidae : Lepidoptera

- This is a major soybean pest in India. It is a polyphagous pest spread across the soybean growing states of India.

Marks of Identification:

- The caterpillar is a glassy green in color with 3 pairs of abdominal legs (prolegs) that typically bend their body in a semi-loop while walking.
- Adult moths are brown, the forewing bears a dark brown pattern with 2 characteristic silver spots
- Black scales are on the median region with tiny silver spots on the median line of the forewing.

Nature of Damage:

- The full-grown larva feeds on foliage, flowers and pods. In severe infestation, it defoliates the plant leaving behind only midribs.
- The newly emerged caterpillars feed on the lower surface of the upper canopy of soybean leaves in a characteristic manner, leaving the top epidermis intact.

Life History:

- The female moth lays tiny white creamy eggs on the underside of the leaves or young stems.

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- The eggs hatch 3-4 days later The larvae will go through 6 instars in 2 to 3 weeks.
- It pupates on leaves undersides in a silken cocoon; From egg to adult, it will take anywhere from 25 to 30 days.
- Soybean loopers tend to spike in population in August and September.

Management Practices:

1. Practise deep summer ploughing
2. Install bird perches at 20/ ha in the field
3. Spray *Beauveria bassiana* 4 ml/litre of water during high humidity
4. Spray 5 % Neem Seed Kernel Extract (NSKE) at flowering stage as a preventive measure.
5. Spray quinalphos 25% EC at 30 ml or chlorpyriphos 20% EC @ 30 ml in 10 litres of water.

Host Plants:

- Sorghum, linseed, barley, tomato, cotton, banana, tobacco and citrus etc.

Semilooper (*Chrysodeixis acuta*)

7. Gram Pod borer : *Helicoverpa armigera* Noctuidae : Lepidoptera

- It is a polyphagous and cosmopolitan pest.

Marks of Identification:

- The moths are stout, light yellowish- brown. Hind wings are pale smoky white with a broad blackish outer margin
- The caterpillars are greenish with darker broken grey line along the sides of the body.
- They are 37 to 50 mm in length, when full grown.

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Nature Damage:

- The caterpillars feed on chlorophyll of young leaves and skeletonise it.
- They feed voraciously on the foliage in early stage, may defoliate the plant and later they feed on flowers and pods.
- Thus, heavy losses in yields are incurred under heavy infestation level.

Life History:

- The female lay eggs singly on the tender parts of the plants or flower buds. IP- 6 to 7 days.
- Pupate in earthen cocoons in the soil near the plants.

Management Practices:

A) Preventive:

1. Ploughing the field after harvest of crop to destroy the pupae.
2. Hand picking of caterpillars during initial stages of attack.
3. Use of light trap or pheromone traps @ 12 / ha. (Use helilure)
4. Inundative release of egg parasite *Trichogramma spp.* and egg larval parasites, *Chelonus blackburnii*.
5. Install bird perches @ 50/ha to pick the larvae
6. Setting up the light traps to kill moth population.

B) Chemical control:

1. Application of fermothion or quinalphos or phosalone 0.05% spray or or phenthoate 2% or quinalphos 1.5% or phosalone 4% or malathion 5% or methyl parathion 2% dust at 50% flowering stage or as soon as pest incidence is noticed, if necessary second spraying / dusting should be undertaken 15 days after the first application.
2. Nuclear Polyhedrosis virus of *Helicoverpa armigera* (HaNPV) @ 250 LE/ha be applied instead of insecticidal application in alternation with insecticide.

- **Host Plants:**
- Besides gram, it infests cotton, tomato, peas, tobacco, tur, safflower, jowar, maize etc.

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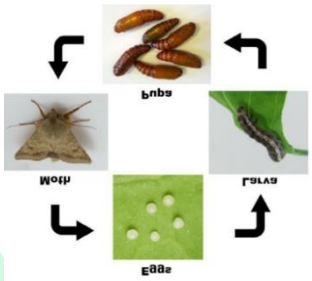

Gram Pod borer (*Helicoverpa armigera*)

Conclusion:

Soybean is the unique grain legume globally known for its dual-purpose use as pulse and oilseed containing 38-44% protein and 18-22% oil. In a large section of vegetarian people in country like India, soybean plays an important role as a rich source of protein. There are many different types of soybean pests that can affect soybean plants. But its productivity is reduced due to pest problem which causes severe damage to soybean resulting in yield losses. Sucking pests have become quite serious from seedling stage to harvesting and their heavy infestation at times reduces the crop yield to a great extent. The information generated in present study would be helpful in developing efficient pest management strategies against insect pest of soybean crop for increased production efficiency, profit besides safety to the environment.