

Insect Pests of Cole Crops and Their Management

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Introduction:

Cole crops have an important place in the diets of ordinary Indian people. Cabbage, cauliflower, Knol-khol, etc. are popular vegetables that are grown in all the states of India and have appreciable nutritional and economic value. But the qualitative and quantitative value of these crops is affected by different insect-pest and they are a very serious menace to the profitable cultivation of cruciferous vegetables. The important insect pests that infest them are the tobacco caterpillar (*Spodopteralitura* Fab.), diamond back moth (*Plutellaxylostella* L.), cabbage semilooper (*Trichoplusiani* Hubner), painted bug (*Bagradahilaris* Burmeister and *Bagrada cruciferarum* Kirk.), cabbage butterfly (*Pieris brassicae* L.), flea beetle (*Phyllotretacruceferae* Goeze), aphids (*Lipaphiserysimi* Kalt. and *Brevicoryne brassicae* L.), cabbage leaf webber (*Crocitolomiabionotalis* Zell) (Ayyar, 1963, Lall, 1964, Choudhary *et al.*, 2001, and Rao and Lal, 2005).

Table: Major and minor insect pests of cole crops

S. No.	Common Name	Scientific Name	Order	Family
1.	Cabbage Caterpillar	<i>Pieris brassicae</i>	Lepidoptera	Pieridae
2.	DBM	<i>Plutellaxylostella</i>	Lepidoptera	Plutellidae
3.	Cabbage Semilooper	<i>Thysanoplusia orichalsea</i> <i>Autographanigrisigna</i>	Lepidoptera	Noctuidae
3.	Tobacco caterpillar	<i>Spodopteralitura</i>	Lepidoptera	Noctuidae
4.	Leaf webber	<i>Crocitolomiabionotalis</i>	Lepidoptera	Pyralidae
5.	Cabbage borer	<i>Hellula undalis</i>	Lepidoptera	Pyralidae
6.	Cabbage flea beetle	<i>Phyllotretacruceferae</i> , <i>P. chotanica</i> , <i>P. birmanica</i> , <i>P. downesi</i>	Coleoptera	Chrysomelidae

Minor insect pests				
1.	Paired bug	<i>Bagradahilaris, Eurydemapulchrum</i>	Hemiptera	Pentatomidae
2.	Aphid/Plant lice	<i>Lipaphiserysimi, Myzuspersicae, Brevicorynebrassicae</i>	Hemiptera	Aphididae
3.	Thrips	<i>Thripstabaci, Caliothripsindicus</i>	Thysanoptera	Thripidae
4.	Bihar hairy caterpillar	<i>Spilosomaoblique</i>	Lepidoptera	Arctidae
5.	Cutworms	<i>Agrotisipsilon, A. segetum</i>	Lepidoptera	Noctuidae
6.	Cabbage looper	<i>Trichoplusiani</i>	Lepidoptera	Noctuidae
7.	Mustard sawfly	<i>Athalialugensproxima</i>	Hymenoptera	Tenthredinidae

1. Cabbage Caterpillar: *Pierisbrassicae* (L.)

Identification: Yellow cylindrical eggs, pale yellow larvae when young, turn greenish yellow later on. The head is black and the dorsum is marked with black spots and short hair. Butterflies are pale white, with a smoky shade on the dorsal side of their bodies. The wings are pale white with a black patch on the apical angle of each hind wing. The females have two conspicuous black dots on the dorsal side of each forewing. The males are smaller than females and have black spots on the underside of each fore wing.

Nature of damage: The caterpillars alone cause damage. The first instar caterpillars just scrape the leaves; later on, they eat up leaves from the margins inwards, leaving the main veins only.

Management:

- Collection and destruction of the egg masses and early gregarious caterpillars.
- Sprays of NSKE @ 5.0% and Bt @ 1000g/ha are also effective.
- The larvae are parasitized by *Apantelesglomerata*, a major mortality factor for this pest.
- The pest can also be controlled by spraying the crop with malathion at 0.1 percent or quinalphos (0.04%), spinosad @ 250ml or Fame 200ml/Emamectin benzoate @ 200g/ha.

2. Diamond back moth: *Plutellaxylostella* (L.)

Identification: The full-grown larvae measure about 8 mm in length and are pale yellowish green with fine black hair scattered all over their bodies. The moth measures about 8-12 mm in length and is brown or grey with conspicuous white spots on the fore wings, which appear like diamond patterns when at rest.

Nature of damage: Young caterpillars scrap epidermal leaf tissue, producing typical white patches, and the older larvae bite holes in the leaves. The infestation is more severe in the dry season when it causes growth retardation (undersized heads).

Management:

- Hand picking of egg masses, larvae, or plucking of infested leaves
- Removal and destruction of plant debris after harvest and ploughing
- Grow bold-seeded mustard as a trap crop.
- Intercropping with tomato or carrot reduces the incidence.
- Erection of pheromone trap @ 10/ha
- NSKE at 5% and Bt formulations (Halt/Dipel) at 1000g/ha are also effective against DBM.
- Trichogramma brassicae is released on a regular basis at a rate of 100,000/ha.
- Conserve the natural enemy's larval parasitoid, *Diadegma semiclausum* in nature.
- Spraying the crop with malathion (0.1%) or quinalphos (0.04%), spinosad (250ml or Fame 200ml/Emamectin benzoate @ 200g/ha, fenvalerate (0.01%) or cypermethrin (0.0075%) or deltamethrin (0.0028%) can also be used to control the pest if the population persists.

3. Tobacco caterpillar: *Spodopteralitura* (Fab.)

Identification: Larvae are about 35–40 mm in length when fluffed. They are velvety black with yellowish green dorsal strips and lateral white bands. Adult moths are about 22 mm in length and about 40 mm across the wings. The fore wings have a beautiful golden and grayish brown pattern.

Nature of damage: The damage is caused by the caterpillars. The larvae feed on leaves and fresh growth. Young caterpillars bite holes in leaves, and older larvae defoliate the entire foliage, and fruits are also destroyed.

Management:

- Hand picking of egg masses, larvae, or plucking of infested leaves
- Removal and destruction of plant debris after harvest and ploughing
- Deep summer ploughing during summer
- Grow castor as a trap crop.
- Intercropping with tomatoes reduces the incidence.

- Erection of pheromone trap @ 10/ha
- Use of light traps for monitoring and mass trapping
- NSKE at 5%, Bt formulation (Halt/Dipel) at 1000 g/ha, or SINPV at 250 le/ha.
- Trichogramma spp. releases on a regular basis at a rate of 250000 eggs/ha.
- Conserve natural enemies.
- The pest can also be controlled by spraying the crop with malathion @ 0.1 percent or quinalphos (0.04%), spinosad @ 250ml or Fame 200ml/Emamectin benzoate @ 200g/ha.

4. Crucifer Leaf-webber: *Crocidolomiabinotalis*(Zeller)

Identification: The larva is green with a red head and it has longitudinal red stripes on the body.

Nature of damage: The caterpillars cause considerable damage to the crops by webbing the leaves together and feeding on them. They also feed on flower buds and bore into the pods.

Management:

- Remove and destroy webbed leaves with larvae inside.
- Deep summer ploughing.
- Mustard can be used as a trap crop.
- Spray NSKE at 5% or other neem-based insecticides.
- Bt formulations should be sprayed at a rate of 1000g/ha.
- The larvae are parasitized by *Apanteles oblique*, *Apanteles* sp., *Enicospilus xanthocephalus*, *Palloxrista solennis*, and *Eocanthecona furcellata*.
- The pest can also be controlled by spraying the crop with malathion @ 0.1 percent or quinalphos (0.04%), spinosad @ 250ml or Fame 200ml/Emamectin benzoate @ 200g/ha.

5. Cabbage head borer: *Hellula undalis* (Fab.)

Identification: The caterpillar, which is 12–25 mm long and creamy yellow with a pinkish tinge, has seven purplish brown longitudinal stripes. The adult moth is slender, pale yellowish brown, with grey wavy lines on the fore wings, and the hind wings are pale dusky.

Nature of damage:The caterpillars first mine the leaves. Later on, they feed on the leaf surface, sheltered within the silken passages. When the attack is heavy, the plant is riddled with worms and, outwardly, the head looks deformed.

Management:

- Pest monitoring at the seedling or early growth stage using light traps
- Collection and destruction of early-stage caterpillars
- Grow Indian mustard as a trap crop.
- Spray Bt products at a rate of 1.25-1.25kg/ha
- Botanical pesticides, such as neem, are sprayed.
- Early Kumari, 78-1S, 234-S, Sel.916 and Sel.1012 cauliflower lines were resistant to this pest (Brar et al., 1993).
- The pest can also be controlled by spraying the crop with malathion @ 0.1 percent, spinosad @ 250ml, or Fame 200ml/Emamectin benzoate @ 200g/ha.

6. Cabbage Semi-looper: *Thysanoplusiaorichalsea*(Fab.) *Autographanigrisigna*(Walk.)

Identification:The larvae are plump and pale green, and have three pairs of prolegs. *Thysanoplusia* adults are light brown with a large golden patch on each fore wing, while *Autographa* are darker and have dark brown and dirty white patches on the fore wings.

Nature of damage: Larvae caused the damage by biting round holes into the leaves.

Management:

- Collection and destruction of the egg masses and early gregarious caterpillars.
- Sprays of NSKE @ 5.0% and Bt @ 1000g/ha are also effective.
- The larvae are parasitized by *Apantelesglomerata*, a major mortality factor for this pest.
- The pest can also be controlled by spraying the crop with malathion @ 0.1 percent or quinalphos (0.04%), spinosad @ 250ml or Fame 200ml/Emamectin benzoate @ 200g/ha.

7. Cabbage flea beetles: *Phyllotretacruciferae*, *P. chotanica*, *P. birmanica*, *P. downesi*

Identification:The larvae are dirty white with a pale white head and are 5 mm in length. The dorsum of the adult beetle, *Phyllotretacruciferae*, is metallic blue in colour with a greenish hue. The body is elongated, narrow in front but broadly distally. The adults vary

in colour from shiny black to black. All species have very stout femora with which they jump like fleas.

Nature of damage: Adults feed on the cotyledons and leaves, making round holes in the host plant. The stems, flowers, and even pods may also be attacked. The old, eaten away leaves dry up and the young leaves are rendered unfit for consumption. The attacked plants give off a decaying odour. Larvae live in soil and feed on the roots of plants.

Management:

- Deep summer ploughing to annihilate the overwintering population.
- In endemic areas, the off-season or late-season crop should be avoided.
- In early planted crops or seedlings, malathion (5%) dust @ 10-15 kg/ha should be used.
- Oxy-demeton methyl @ 0.025%
- Parasitoid *Microctonus indicus* also parasitizes adult *cruciferae*.

Conclusion:

Insect pests are a serious menace to the profitable cultivation of Cole crops. Reduce this issue by implementing Integrated Pest Management technology. An eco-friendly alternative to chemical pesticides is the use of bio-pesticides, which encompasses a broad array of microbial pesticides and bio-chemicals derived from micro-organisms and other natural sources, which confer protection against pest damage. The use of bio-pesticides and other natural sources could have a big impact on farming and public health programs.

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