

## Insect Pests of Cruciferous Vegetables Crop and Their Management

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Cruciferous crops and vegetables are a good source of nutrients and other substances which may protect against cancer (Higdon., 2007). Cruciferous vegetables are important Rabi season vegetable crops. Cruciferous vegetables consist of cabbage, cauliflower, knolkhol, broccoli, brussels sprouts, mustard plant, radish, turnip and similar green leaf vegetables, 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 (Kumar et al., 2022). The important insect pests that infest them are the major defoliating caterpillars like the diamondback moth (DBM) (*Plutellaxylostella*), leaf webber (*Crocidolomiabinotalis*), Cabbage webworm (*Hellulaundalis*), Cabbage butterfly (*Pierisbrassicae*), Tobaccocaterpillar (*Spodopteralitura*), Mustard sawfly (*Athalialugensproxima*) and sucking pests like aphids (*Brevicorynebrassicae*) and painted bug (*Bagradahilaris*) resulting causes significant losses in production. This article focuses on the identification, damage and sustainable management of major pests of cruciferous crops and vegetables.

### 1. Diamond Back Moths, *Plutellaxylostella* L. (Lepidoptera: Plutellidae):

This is a major pest of cruciferous crop.

#### Identification

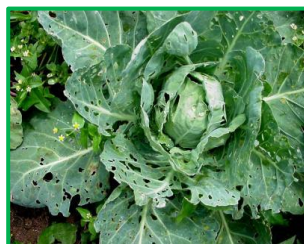
- **Egg:** Small yellow eggs laid singly or in groups on the surface of leaves. A female can lay up to 40-60 eggs. The incubation period is 3-6 days.
- **Larva:** Light yellow-green caterpillar.
- **Pupa:** The Pupal stage occurs in the transparent cocoon (silken cocoon) of the leaf.
- **Adult:** Small grey-brown moth. Forewings have three white triangular spots along the inner-margin. Adult folds the wings that appear with triangular markings, opposite wing with diamond shape.

#### Symptoms of damage

- Young caterpillars cause small yellow mines on leaves.
- Scraping of epidermal leaf tissue produces characteristic white spots on leaves.
- Fully mature larvae cause holes in the leaves and feeds on curd.

#### Management

- Sow Indian mustard as a trap crop at 2:1 ratio (cabbage:mustard).<sup>TMM</sup>
- Spray Azadirachtin 00.03 % WSP



(300 PPM) Neem Oil Based @ 2500-5000 ml/ha in 500-1000 liter water.

- Install light traps (3-4 with 60 or 100 Watt bulbs /acre) to control adults. For one acre plot use 3-4 light traps (60 or 100 Watt bulbs) by hanging above a bucket half filled with water. Alternatively, hang the bulb above a gunny bag (slating below) smeared with grease or oil. Illuminate the bulbs for full night. Adults of DBM will get attracted to light and get trapped in the water/oil. Use the light traps for 3-4 days for effective control of DBM adults.
- Remove and destroy all debris and stubbles after harvest of crop.
- Encourage the natural enemies *Diadegma semiclausum*, *Cotesia plutellae*, syrphid flies, coccinellids and spiders.
- Spray indoxacarb 14.50 % SC @ 400-750 ml/ha in 200-266 liter water or flubendiamide 39.35 % w/w SC 37.5-50 ml/ha in 375-500 liter water

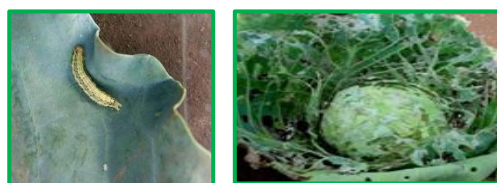
## 2. Cabbage Leaf Webbers, *Crocidolomia binotalis* Zeller (Lepidoptera: Pyralidae)

### Identification

- **Egg:** 40-100 eggs are laid in clusters under the surface of leaves and hatch within 5-7 days.
- **Larva:** Green colour, larval period lasts for 20-25 days.
- **Pupa:** pupation takes place within the webbed up leaves/soil, which varies from 15-40 days.
- **Adult:** Forewings have distinct wavy stripes and prominent wavy spots. The hind wings are semi hyaline coloured.

### Symptoms of damage

- Mature larva eats gregariously on leaves
- Then webs together the leaves feed within and results in rotting of cabbage head and cauliflower curds.



### Management

- Removal and destruction of webbed bunches of leaf help to check the further spread of the disease.
- *Bt* formulation should be spray at a rate of 1000g/ha.
- Encourage the activity of parasitoid: *Cotesia crocidolomiae*.
- Spray Phenthoate 50 % EC @ 1000 ml/ha in 500-1000 litre of water or indoxacarb 14.5% SC @ 0.5 ml per litre of water.

## 3. Cabbage Stem Borer, *Hellula undalis* Zeller (Lepidoptera: Crambidae)

### Identification

- **Egg:** Yellow eggs are laid singly on the leaves and the hatched larvae burrow into the leaves along the outer veins.
- **Larva:** Mature larvae are greyish-yellow with seven purplish-brown longitudinal stripes.
- **Adult:** light grey-brown moth with grey wavy markings.

### Symptoms of damage

- Larvae form web on leaves and bore into the stem, stalks or leaf veins, preventing the head initiation, resulting in the numerous shoot and head formation.

### Management

- Collect and destroy mechanically caterpillars in the early stages of attack helps to check the infestation.
- Spray *Bacillus thuringiensis* @ 2g/lit at primordial stage.



- Azadirachtin 05.00 % w/w @ 200 ml/ha in 400 liter of water sprayed.
- The pest can also be controlled by spraying the crop Quinalphos 25 % EC @ 1300 ml/ha in 500-1000 liter water or Malathion 50.00 % EC 1500 ml/ha in 500-1000 liter of water.

#### 4. Cabbage butterfly, *Pieris brassicae* (Lepidoptera: Pieridae)

##### Identification

- **Larva:** Velvety blue-green, with black dots, yellow dorsal and lateral stripes, covered with white hairs.
- **Pupa:** chrysalis seen on leaves and stem.
- **Adult:** White Butterfly.



##### Symptoms of damage

- Defoliation of leaves.
- Bores into the cabbage head.

##### Management

- Handpicking and destruction of caterpillars in the early stage of attack can reduce infestation.
- Conserve the parasitoids like *Cotesia glomeratus*.
- Spraying the crop with quinalphos 25 EC @ 1000 ml/ha excellent control of the pest.

#### 5. Cabbage Aphids, *Brevicoryne brassicae* Linn, *Myzus persicae* Sulzer (Hemiptera: Aphididae)

##### Identification

- Nymphs and adults are yellow-green with wavy white wavy threads over the body.

##### Symptoms of damage

- Aphid suck the leaves cell sap and yellowing of the leaves.
- Crinkling and cupping.
- Twisted primordia.
- A white epidermis appears at the base of the plant.



##### Management

- Spray pulverized neem seed powder extract (NSPE) 4%.
- Follow mustard trap crop IPM as mustard will attract all aphids after flowering and main crop will be spared of the pest incidence.
- Early sowing in case of rape-seed mustard.
- Set up yellow sticky trap to monitor aphid population.
- Spray Imidacloprid 17.1 % w/w SL @ 250 ml/ha in 500 liter water or Malathion 50.00 % EC 1500 ml/ha in 500-1000 liter of water.

#### 6. Tobacco Caterpillar, *Spodoptera lituara* Fab. (Lepidoptera: Noctuidae)

##### Identification

- **Egg:** They are laid in clusters, the masses appear golden brown and covered with buff-coloured hairs.
- **Larva:** mature caterpillars are light green with black head or black balls. Well-developed caterpillars are gray or dark brown, and the larvae feed on leaves until the third instar.
- **Adult:** Adult moths are brownish. The forewings are brown with wavy white marking and the hindwings are white with brown colour spot along the margin.



### Symptoms of damage

- Damage leaves and heads of cabbage and cauliflower or leaves of radish and beet root, during high incidence, attain cutworm status, hind during day time, come out during night and devastate the crop and feeding on tender leaves in tobacco.

### Management

- Collect and destroy egg masses and gregarious feeding larvae.
- Scouting regularly helps to locate egg masses and skeletonised leaves.
- Poison baiting (10 kg rice/wheat flour + 1 kg of jaggery + 500 g of Methomyl formulation per acre)- Mix the flour with jaggery, leave for 6-8 hrs, in the morning. In the evening add insecticide and mix carefully by wearing gloves with a stick. Sprinkle the mixture in furrows. The fermenting jaggery attracts the caterpillars and will be killed due to poison baiting. Repeat the baiting 2-3 days for total control.
- Grow castor along border and irrigation channel as trap crop.
- Handpicking and destruction of grown up larvae.
- Set up light trap @ 1/ha.
- Install pheromone traps @ 15/ ha to attract male moths.
- Spray Novaluron 10 % EC 375 ml/ha in 500 liter water or Spinetoram 11.70 % SC @ 420 ml/ha in 500 liter water.

## 7. Cabbage semilooper, *Trichoplusia ni* (Lepidoptera: Noctuidae)

### Identification

- **Egg:** Green-white, spherical, sculptured eggs laid singly on ventral surface of the leaf.
- **Larva:** Slender, green colour with light wavy stripes.
- **Adult:** A stout, brown moth with head and thorax grey in colour and white abdomen. The forewings grey wavy in colour with a long marking.



### Symptoms of damage

- Larvae bite holes, scabbing of leaves initially and drop leaves.

### Management

- Handpicking and destruction of grown up larvae.
- Sprays of NSKE @ 5.0% and *Bt* @ 1000g/ha are also effective.
- The larvae are parasitized by *Apanteles glomerata*, a major mortality factor for this pest.
- Spraying the crop Flubendiamide 39.35 % w/w SC @ 150 ml/ha in 500 liter water.

## 8. Painted bug, *Bagrada hilaris* (Hemiptera: Pentatomidae)

### Identification

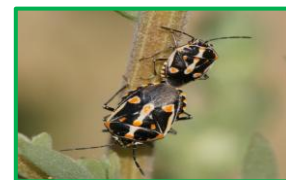
- Adults: These insects are black in colour with red and yellow stripes.

### Symptoms of damage

- Seedling wilt and wilt due to attack.
- Resinous substances released by adults which spoils the pods.

### Management

- Deep ploughing so that the eggs of painted bugs are destroyed.
- Early sowing is needed to avoid pest attack.
- Sprays Azadirachtin 00.03 % EC @ 2500-5000 ml/ha in 500 liter water.
- Spray the crop with malathion 50 EC @ 1000 ml or dimethoate 30 EC @ 625 ml in 600-700 liter water/ha.



## 9. Mustard sawfly, *Athalia lugens proxima* (Hymenoptera: Tenthredinidae)

**Identification: Eggs** –The female lays 30-35 eggs individually in slits made with saw like ovipositor along the underside of the leaf margin.

- **Larva** – Green-black with a wrinkled body and eight pairs of pro-legs. The larva falls to ground and feigns death when touched.
- **Adult**- Head and thorax is black in colour, abdomen is orange colour. The wings are translucent, smoky and black veins.



#### Symptoms of damage

- Larvae initially feed on leaves, then feeds from the margins towards the midrib.
- The grubs cause numerous holes and even riddled the entire leaf by voracious feeding.
- They feed the epidermis of the branch, causing the drying up of seedlings and failure to bear seeds in older plants.

#### Management

- Summer ploughing to destroy the pupa.
- Apply irrigation in seedling stage is very crucial for sawfly management because most of the larvae die due to drowning effect.
- Collection and destruction of grubs of sawfly in morning and evening.
- Quinolphos 25 EC @ 625 ml/ha in 600-700 liter of water.

### 10. Flea beetles, *Phyllotreta cruciferae* (Coleoptera: Chrysomelidae)

#### Identification

- **Eggs** – lying in the soil.
- **Adult** – Reddish-brown, shiny, six spots on elytra.
- **Grub** – Brown and black colour head.

#### Symptoms of damage

- Causes two types of damage.
- Larvae and adults eat on the upper and lower parts of leaf surfaces – leaves injury.
- Adult eat on swollen grape buds.
- Chew holes in the sides of the newly developing grape buds.
- Small holes on tender leaves by adult.
- Roots damaged by grub.



#### Management

- Remove the loose bark at the time of pruning to prevent egg laying.
- Spray the crop with chlorpyrifos 20 EC @ 2ml/litre of water.

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