



Insect/Pests Identification and Their IPM in Cabbage Crop

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Imported cabbageworm, cabbage looper, diamondback moth larvae can be each cause substantial damage to cabbage. These pests can cause serious damage to young transplants as well as causing serious leaf feeding damage to older plants. Damage to the head or wrapper leaves often reduces marketability. Because many of these pests are much more difficult to control as large larvae, controls will always be most effective when directed toward small larvae. So early detection of economic infestations is critical to the management of these pests.

Introduction Cabbage (*Brassica oleracea*, capitata group) is a member of the crucifer crop group, which also includes cauliflower, broccoli, collards, kale and Brussels sprouts. All crucifers belong to the mustard family (Brassicaceae). Cabbage is one of the world's leading vegetables in terms of total production. In Uganda, cabbage is grown in all districts and is steadily becoming an economic enterprise, being particularly favoured for its high yield potentials, high market demand and reliable ease of storage and transport. The economic benefits aside, cabbage is a good source of many minerals particularly calcium and potassium, and is also relatively high in vitamins A and C. Cabbage, like other *brassicacae* contains mustard oils, compounds that inhibit the growth of cancer. These substances boost the body's production of the enzymes that disable potential carcinogens and then remove them from the system. In addition cabbage also contains a number of antioxidants that protect the body from cancer and heart disease.

VARIETIES

- **Early duration:** Pride of India, Golden acre, Early drum head.
- **Long duration:** Late drum head, Danish ball head.

Yield

- **Early:** 20-25 tons/ha.
- **Late:** 25-30 tons/ha.

PESTS OF NATIONAL SIGNIFICANCE

- **Diamond back moth**
- **Head borer**
- **Leaf webber**
- **Cabbage aphid**
- **Cabbage butterfly**
- **Tobacco caterpillar**

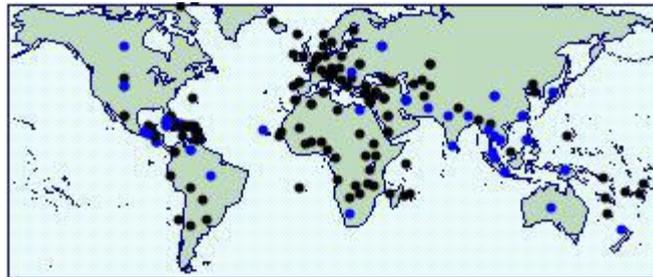
PESTS OF REGIONAL SIGNIFICANCE

- **Gram caterpillar**
- **Leaf eating caterpillar**
- **Mustard aphid**
- **Painted bug**
- **Mustard sawfly**



➤ **Cabbage semilooper**

1. Diamondback moth: *Plutella xylostella* (L.) (Plutellidae :Lepidoptera)

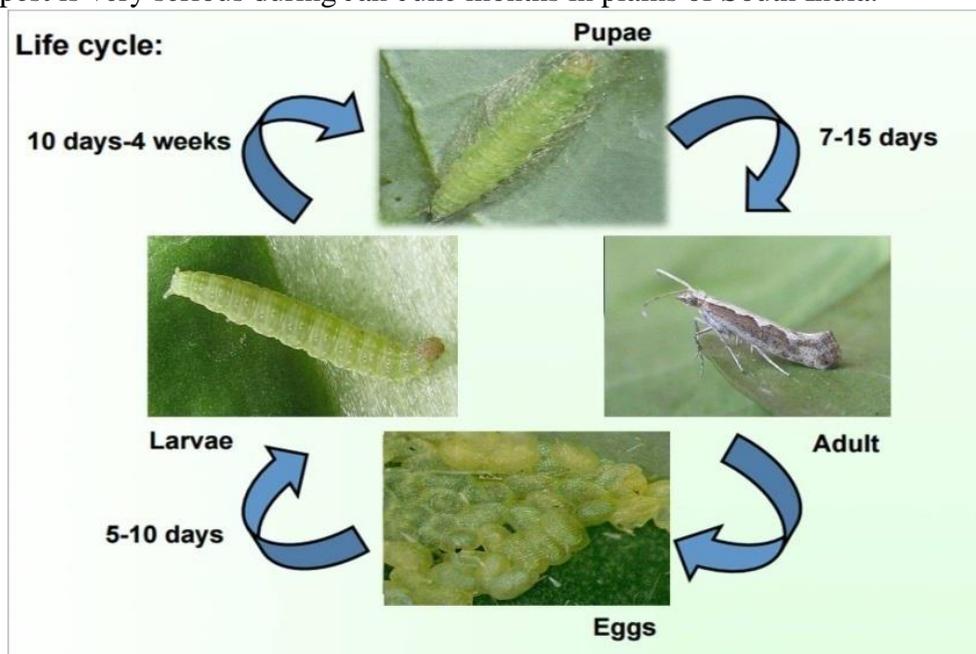


Distribution: Highly migratory and cosmopolitan species.

Host range: Cabbage, cauliflower, other crucifers and solanaceous plants.

International Common Names:

- Cabbage moth, European honeysuckle and leaf roller.
- The pest is very serious during Jan-June months in plains of South India.



Nature of damage

- Mining and skeletonization of cabbage leaves
- Scrapping of epidermal leaf tissues producing typical whitish patches on leaves.
- Full-grown larvae bite holes in the leaves and feeds on curd.

Symptoms

- Leaves are completely drilled with holes, resulting in under sized head.
- Withered appearance of affected leaves.

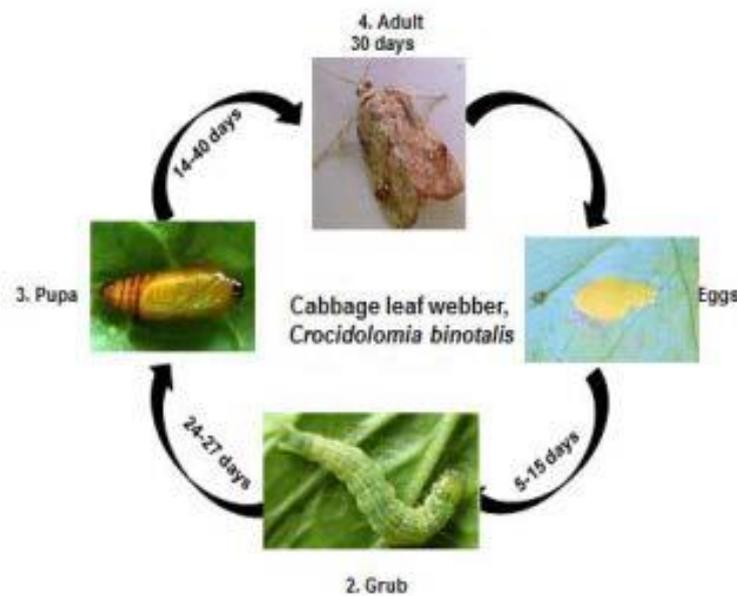


Damaged crop

2. LEAF WEBBER : *Crocidolomia binotalis* (Pyralidae:Lepidoptera)

- Regular pest of minor status but occasionally reach serious proportions
- Widely distributed in Indian subcontinent, South Asia and Australia.

Host range: Cabbage, radish, mustard and other cruciferous plants.



Nature of damage

- Young larvae on hatching feed gregariously on leaves and later web the leaves together and feed within the web accumulating faecal matter.

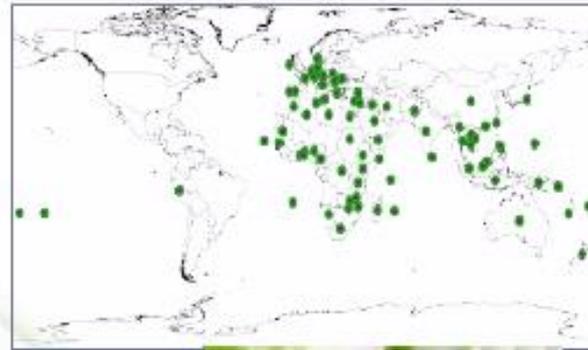
Symptoms

- Webbed leaves with fecal matter.
- Rotting of cabbage heads.



Damaged crop

3. Cabbage head borer: *Hellula undalis* Fabricius (Pyralidae :Lepidoptera)



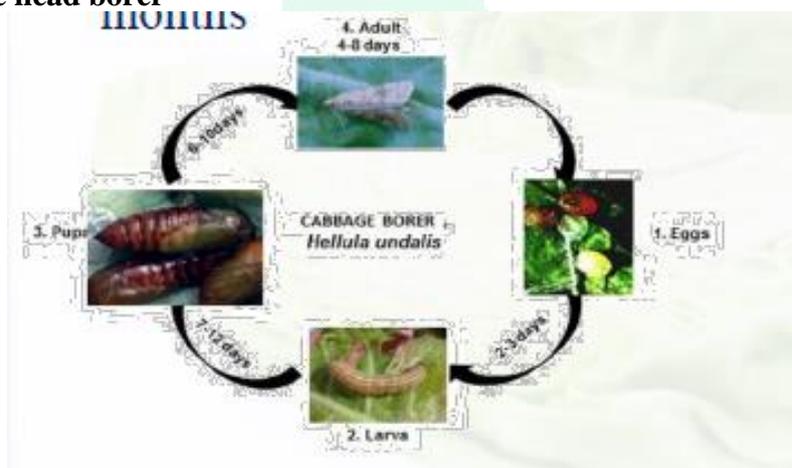
- Worldwide distributed, sporadic but occasionally serious pest.

Host range: Cabbage, cauliflower, radish, knoll-khol, beet root and the weed *Gynadropis pentaphylla*.

- Generally damage is serious during May-June months.



Larvae of cabbage head borer



Nature of damage

- Caterpillars web the leaves and bore into stem, stalk or leaf veins.
- They prevent head initiation causing multiple shoots or heads.
- Later stage bore into cabbage head.

Symptoms

- Webbed leaves.
- Holes in cabbage head with fecal matter.





Damaged crop

4. Aphids: *Brevicoryne brassicae*, *Lipaphis erysimi* (Aphididae: Homoptera)

- Most common species attacking cole crops with a very wide range of distribution.
- This pest infests crucifers in cold season.
- Humid, but rainless and cool weather favours multiplication.



B. brassicae

L. erysimi

Nature of damage

- The nymphs and adults suck sap from plant causing loss of vigour
- Sooty mould develops on excreted honeydew reducing photosynthesis.

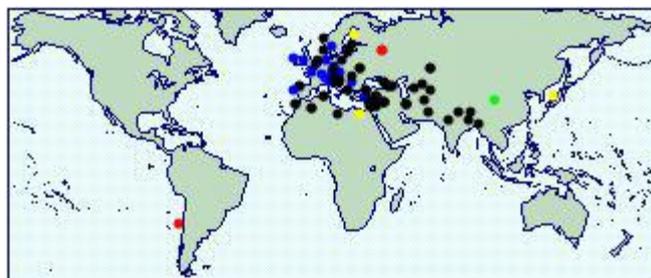
Symptoms

- Curling of infested leaves.
- Early stage plant wither and die.
- Plants remain stunted.



Damaged crop

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



- Also called cabbage butterfly, cabbage white, cabbage moth.
- Widely distributed in North America, Europe, China, Burma and India.

Damage symptoms

- In India it is found widely distributed along Himalayan region and parts of N. India.
- The pest passes winter in plains and migrates to hilly regions during summer.
- During Sept. to April. it breeds on mustard and rape seed.



Life cycle: Incubation Period=3, Larval Period=5, Pupal Period=7

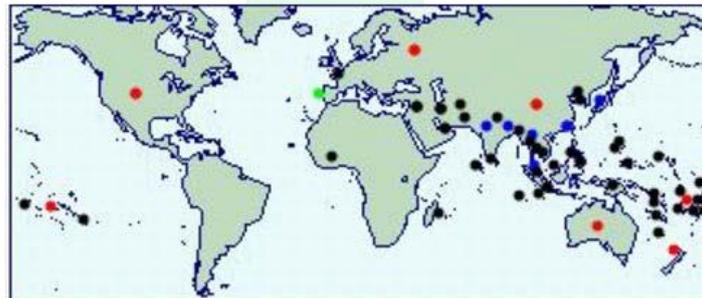
Damage symptoms

- Caterpillars scrape the leaves and eat up leaves leaving only the main veins.
- Defoliation.
- Bores into the heads of cabbage.



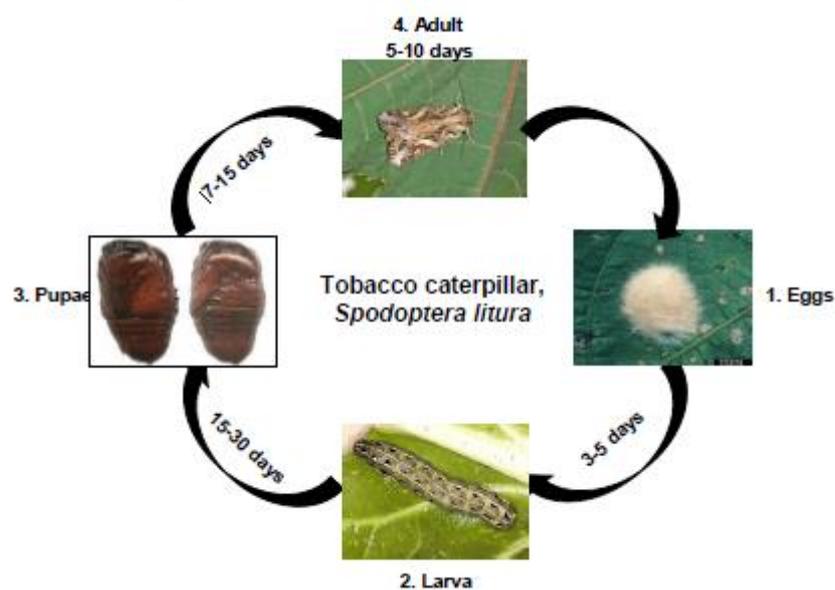
Damaged crop

6. Tobacco caterpillar: *Spodoptera litura* (Noctuidae: Lepidoptera)



- Found throughout the tropical and sub tropical parts of the world, wide spread in India.

Host: Tobacco, cotton, castor, groundnut, tomato, and various other cruciferous crops.





Nature of damage

- In early stages, the caterpillars are gregarious and scrape the chlorophyll content of leaf lamina.

Damage symptoms

- Papery white appearance.
- Irregular holes on the leaves.
- Skeletonization leaving only veins and petioles.
- Heavy defoliation.



Damaged crop

7. Cabbage looper: *Trichoplusia ni*, *Plusia spp.* (Noctuidae: Lepidoptera)



Larvae & adult

- Polyphagous and widely distributed.
- Caterpillars of *Plusia spp* and *Trichoplusia ni* look more or less alike.
- Semiloopers having body thin anteriorly green with light wavy white lines and a broad lateral stripe on either side.

Damage symptoms

- Scrapping and feeding on the leaves.
- Later defoliate the plant leaving only the midribs and main veins.



Damaged crop

8. Mustard sawfly: *Athalia lugens proxima* (Tenthredinidae: Hymenoptera)



Sawfly adult

- Minor, sporadically serious.
- Widely distributed in Indonesia, Formosa, Myanmar and the Indian Sub-continent.



- Peak activity is during Sept-Dec.

Host range: Mustard, toria (*Brassica campestris*), rapeseed, cabbage, cauliflower, knol-khol, turnip, radish, etc.

Damage symptoms

- Grubs on hatching nibble the margins of tender leaves, but later on bite holes in leaves.
- Dark brown or black caterpillars aggregating on the cut edges of leaves.



Larvae of sawfly

9. Painted bugs: *Bagrada hilaris* (Pentatomidae: Hemiptera)



Painted bug adult

Common names

- Harlequin bug, painted bug.

Habitat

- Cruciferous vegetables including mustard, cabbage, cauliflower, etc.

Pest status

- A major pest of cruciferous crops.

Nature of damage

- Nymphs and adults suck sap from leaves.

Damage symptoms

- Wilting and drying of leaves.

Economic threshold levels (ETLs)

Sl. No.	Pests	ETL
1.	Diamond back moth	4-7 larvae/ plant at head formation
2.	Leaf webber	1 larvae/ m length row
3.	Cabbage head borer	1 larvae/ plant
4.	Cabbage butterfly	1 larvae/ plant
5.	Mustard sawfly	1 larvae/ plant

Integrated pest management

I. Resistant or tolerant varieties

- Aphids All season, Red Drum Head..

II. Pre-sowing operations (to manage DBM)

- Summer ploughing.
- Removal and destruction of plant remnants, stubbles and debris.



- Sowing of two rows of bold seeded mustard after every 25 rows of cabbage as a trap crop. Plant the first row 12 days before transplanting and second row 25 days after transplanting.
- Intercropping with tomato, garlic, coriander and carrot in alternate rows.

III. Management in the main field.

Cultural methods (To manage Tobacco caterpillar)

- Field sanitation and roughing.
- Planting Ocimum/Basil (Repellent plants).
- Use of ovipositional trap crops such as castor @ 250 plants/acre.
- Intercropping cabbages with *Nasturtium* results in fewer eggs laid on cabbage by the butterflies (Cabbage butterfly).

A. Mechanical methods

Sl. No.	Operations	Target pest
1.	Collection and destruction of Caterpillars	Cabbage borer, leaf webber, Cabbage butterfly
2.	Install pheromone traps @ 4-5/acre for monitoring	DBM, Tobacco caterpillar
3.	Light traps @ 1/acre	Leaf webber, Tobacco caterpillar
4.	Install yellow sticky traps, yellow water pan traps @ 12/acre to monitor alates	Cabbage aphid
5.	Erecting bird perches for encouraging predatory birds such as mynah, drongo etc.	Tobacco caterpillar, Cabbage butterfly

B. Biological control

Sl. No.	Operations	Target pest
1.	Release egg parasitoid, <i>T. chilonis/pretiosum</i> @ 20,000/acre 4-6 times at weekly interval. Release larval parasitoids, <i>Diadegma semiclausm</i> @ 1,00,000/acre (Hills – below 25 –27°C) or <i>Cotesia plutellae</i> (plains) @ 20,000/acre from 20 days after planting	DBM
2.	Commercial Bt @ 1ml/l of water	
3.	Foliar spray with 5% NSKE or azadirachtin 0.03% (300 ppm) neem oil based WSP @ 1000-2000 ml in 200-400 l of water/acre	DBM, tobacco caterpillar
4.	Spray NPV @ 100LE/ac in combination with jaggery 1 kg, sandovit 100 ml or Robin Blue 50 g thrice at 10-15 days interval on observing the eggs or first instar larvae in the evening hours.	Tobacco caterpillar



C. Chemical control

Sl. No.	Operations	Target pest
1.	Spray flubendiamide 20% WG @ 0.1 g or lufenuron 5.4% EC @ 1.2 g or spinosad 2.5% SC @ 1.2 ml or indoxacarb 15.8% EC @ 0.2 ml/l or emamectin benzoate 5% SG @ 60- 80 g in 200 l of water/acre or fipronil 5% SC @ 320–400 ml in 200 l of water/acre. (last spray should be 15 days before harvesting).	DBM
2.	Foliar spray with dimethoate 30% EC @ 264 ml in 200-400 l of water/acre or phosalone 35% EC @ 571 ml in 200-400 l of water/acre or acetamiprid 20 % SP @ 300 ml in 200-240 l of water/acre.	Cabbage aphid
3.	Spray trichlorfon 5% GR @ 300 g/acre or thiodicarb 5% GR @ 300g/acre or chlorfluazuron 5.4% EC @ 600 ml in 200 l of water/acre	Tobacco caterpillar
4.	Malathion 50 EC @ 600 ml in 200-400 l of water/acre	Cabbage borer

Conclusion

Successful control of cabbage pests, particularly the leaf feeding caterpillars, depends on proper pest identification, timing of applications and insecticide coverage. Because the different species caterpillars may be susceptible to different insecticides, it is important to identify the species involved in an infestation. Most of the eggs of the foliage feeding caterpillars are laid on the undersurfaces of the leaves and the larvae, until mature, tend to feed on the underside of the foliage or in the bud.

References

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