agMOOCs

INTEGRATED PEST MANAGEMENT IN CABBAGE

Course teacher

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❖ IMPORTANCE

- **Major winter vegetable , rich in vitamin A ,B & C.**
- **401 000 ha area, 9086 000 meteric tonnes production**
- **Major cabbage growing states are Uttar Pradesh, Orissa, Bihar, West Bengal, Assam, Karnataka, Maharashtra, Gujarat and Jharkhand**

❖ VARIETIES

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

❖ Yield

- **Early : 20-25 tonns/ha**
- **late : 25-30 tons/ha**

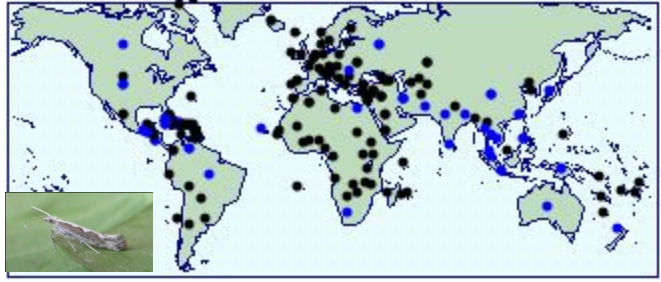
❖ PESTS OF NATIONAL SIGNIFICANCE

1. **Diamond back moth**
2. **Head borer**
3. **Leaf webber**
4. **Cabbage aphid**
5. **Cabbage butterfly**
6. **Tobacco caterpillar**

❖ PESTS OF REGIONAL SIGNIFICANCE

1. **Gram caterpillar**
2. **Leaf eating caterpillar**
3. **Mustard aphid**
4. **Painted bug**
5. **Mustard sawfly**
6. **Cabbage semilooper**

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

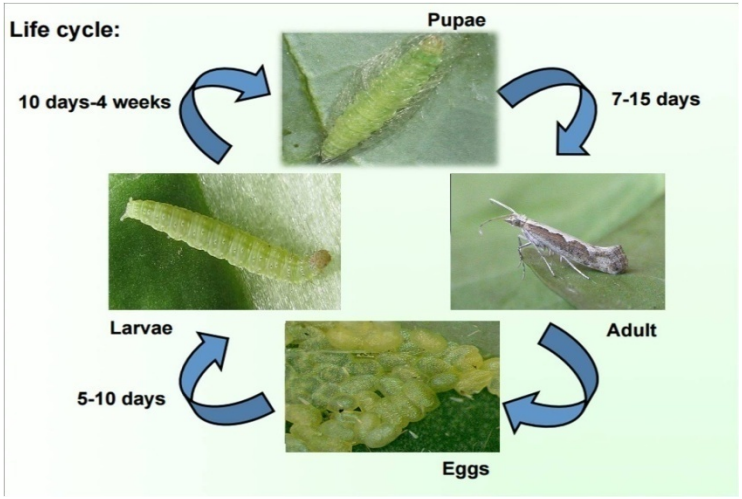


Distribution :Highly migratory and cosmopolitan species

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

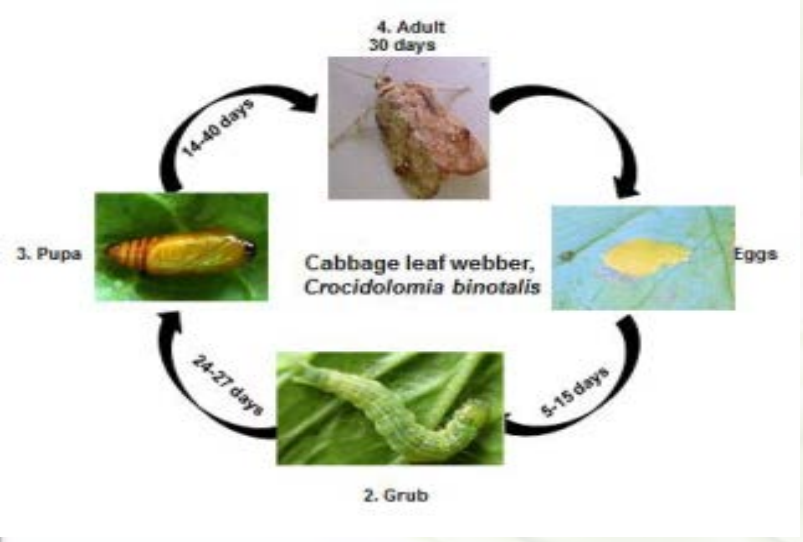
I	Mining and skeletanization of cabbage leaves
2	Scrapping of epidermal leaf tissues producing typical whitish patches on leaves
3	Full-grown larvae bite holes in the leaves and feeds on curd

Symptoms

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

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.**



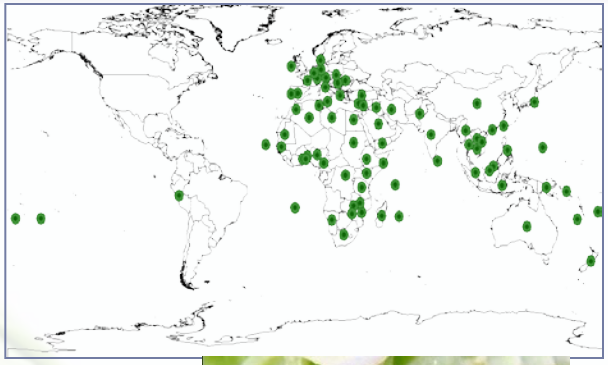
Nature of damage

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

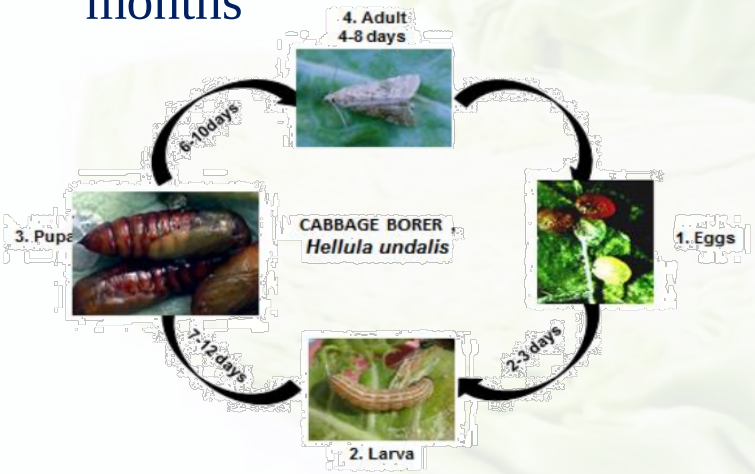
Symptoms

1	Webbed leaves with fecal matter
2	Rotting of cabbage heads

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



Nature of damage

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

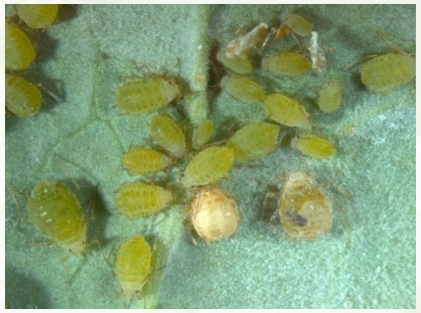
Symptoms

I	**Webbed leaves**
2	Holes in cabbage head with fecal matter

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.

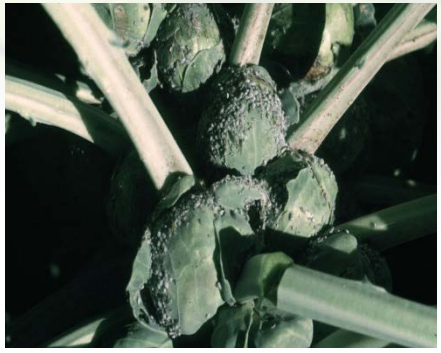
B. brassicae



L. erysimi

Nature of damage

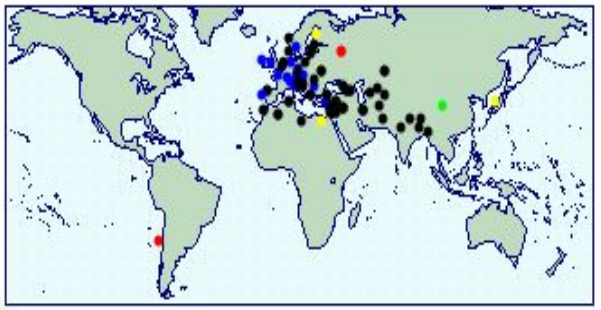
1	The nymphs and adults suck sap from plant causing loss of vigour
2	Sooty mould develops on excreted honeydew reducing photosynthesis



Symptoms

1	Curling of infested leaves
2	Early stage plant wither and die
3	Plants remain stunted

Cabbage butterfly : *Pieris brassicae* Linneaus (Pieridae : Lepidoptera)



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

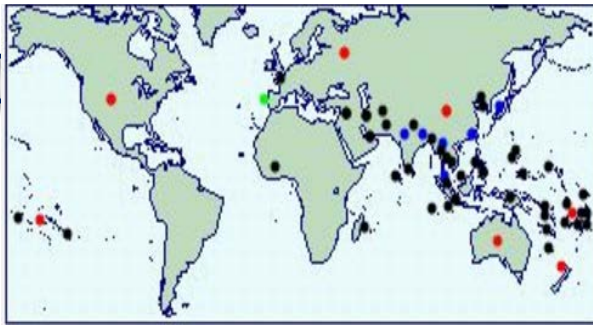



Life cycle : IP=3, LP=5, PP=7

Damage symptoms

1	Caterpillars scrape the leaves and eat up leaves leaving only the main veins
2	Defoliation
3	Bores into the heads of cabbage

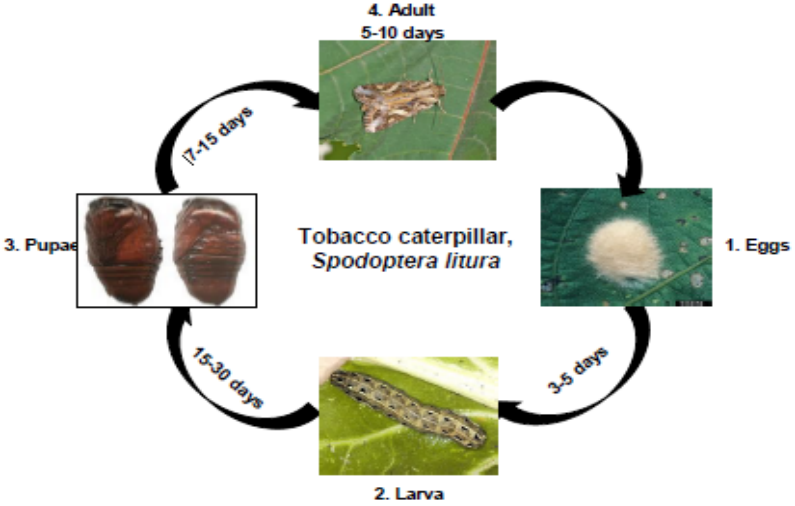
Tobacco caterpillar : *Spodoptera litura* (Noctuidae: Lepidoptera)



- 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

I	**Papery white appearance**
2	Irregular holes on the leaves.
3	Skeletonization leaving only veins and petioles
4	Heavy defoliation

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

- 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

1	**Scrapping and feeding on the leaves**
2	Later defoliate the plant leaving only the midribs and main veins

Mustard sawfly : *Athalia lugens proxima* (Tenthridinidae : Hymenoptera)

- Minor, sporadically serious
- Widely distributed in Indonesia, Formosa, Myanmar and the Indian Sub-continent.
- Host range : Mustard, toria (*Brassica campestris*), rapeseed, cabbage, cauliflower, knol-khol, turnip, radish, etc
- Peak activity is during Sept-Dec.

Damage symptoms

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

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

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)

Pests	ETL
Diamond back moth	4-7 larvae/ plant at head formation
Leaf webber	1 larvae/ m length row
Cabbage head borer	1 larvae/ plant
Cabbage butterfly	1 larvae/ plant
Mustard sawfly	1 larvae/ plant

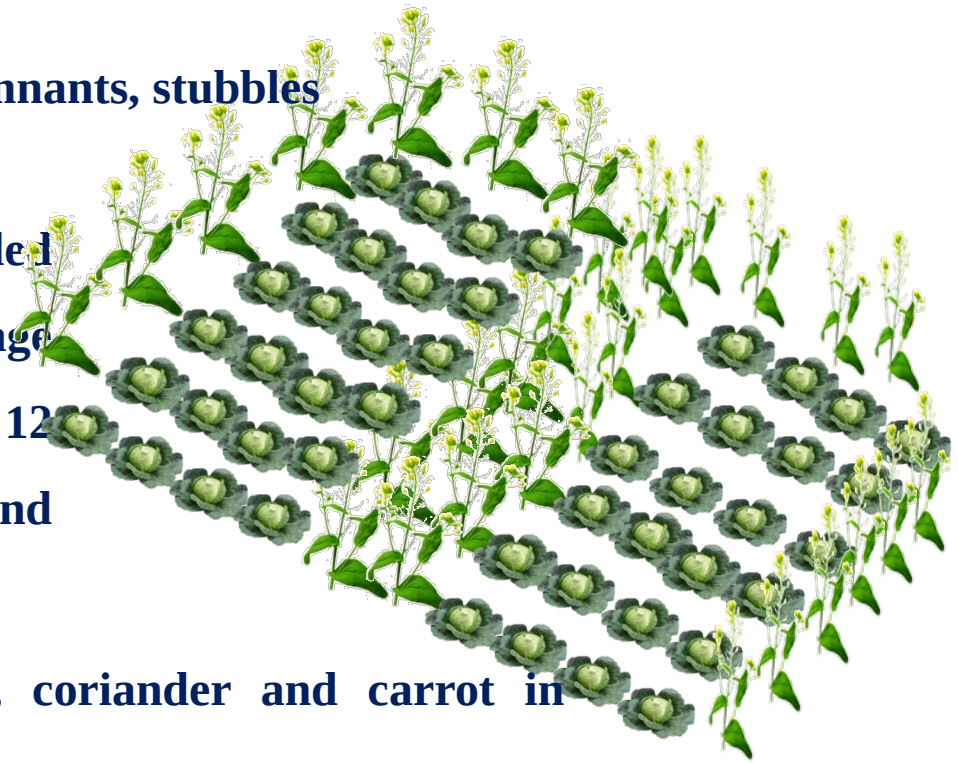
Integrated pest management

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

A. 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).

B. 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

C. Biological control

Sl. No.	Operations	Target pest
1	Release egg parasitoid, *T. chilonis/pretiosum* @ 20,000/acre 4-6 times at weekly interval. Release larval parasitoids, *Diadegma semiclausm* @ 1,00,000/acre (Hills – below 25 –27ºC) or *Cotesia plutellae* (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	Malathion 50 EC @ 600 ml in 200-400 l of water/acre	Cabbage borer
3	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
4	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

THANK YOU