



## INTEGRATED MANAGEMENT AGAINST DIAMONDBACK MOTH (*Plutella xylostella* Linnaeus) ON CABBAGE: REVIEW

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**Abstract:** Cabbage crop is very nutritive crop which is affected by various insect pests out of which Diamondback moth is most devastating pest that causes severe damage in cabbage crop production. DBM is resistant to many insecticides and for proper management various cultural, mechanical, biological and chemical management practices are followed which are helpful in reducing the damage caused by DBM.

**Key words:** Cabbage, Diamondback moth, Integrated management.

**Introduction:** Growing demand for vegetables is considered to have a favourable economic effect on smallholders who dominate the Indian agriculture. Smallholdings comprising 78 per cent of the total holdings with an area share of 33 per cent, contribute more than half of the production of fruits and vegetables [1]. Notwithstanding these advantages, smallholders confront a number of constraints in vegetable production. The production risks are high, primarily because of considerable production losses caused by pests. These are estimated to be about 30 per cent of the total vegetable output [2]. Most of the vegetables produced in India are sold afresh [3]. Cabbage is a cool season vegetable crop with a high cold tolerance. Cabbage is suitable for both fresh and processed products. Cabbage is mainly grown for fresh market sales, although occasionally growers will plant significant acreage for the processing market when contracts are available. It has been estimated that only about 1 per cent of the vegetable output was being processed commercially [4]. Cabbage has high nutritive value and it is used in the preparation of various kinds of dishes. It is used in stews, eaten raw in salads or boiled and eaten [5]. Contents per 100 g are: 93 g water, 1.6 g protein, 6.0 g carbohydrates, 55 mg calcium, 0.8 mg iron, 0.3 mg carotene, 0.06 mg thiamine, 0.06 mg riboflavin, 0.3 mg niacin, 46 mg vitamin C and

92 kJ energy [6]. The most devastating pest that causes severe damage in cabbage production is the diamondback moth [7]. However, this insect pest is resistant to many conventional pesticides and so spraying DBM-infested cabbage cause little effect on the pest [8]. To achieve the required increase in yield, use of integrated nutrient and pest management along with good quality seed/planting material is necessary. There are reports about high use of fertilizers in vegetable production it not only affects the quality but also the taste. In addition, it promotes pest infestation. The recommendations for fertilizer-use need to be made based on the requirement. The vegetable productivity is also affected by the infestation of pests and diseases.

### Various Practices to Grow a Healthy Crop

- Select a variety resistant/tolerant to major pests.
- Treat the seed with recommended pesticides.
- Select healthy seeds and seedlings cabbage cultivation.
- Follow proper recommended spacing.
- Follow various Soil health improvement like mulching and green manuring.
- Nutrient management is very important, if the dosage of nitrogenous fertilizers is too high the crop becomes too succulent and therefore susceptible to insects and diseases. If the dosage is too low, the crop growth is

retarded. So, apply proper dose for best results.

- Proper irrigation at proper time
- Crop rotation according to condition

#### **Diamondback moth, *Plutella xylostella* Linnaeus (Lepidoptera: Plutellidae)**

It is important insect which affect cabbage quality and yield. It is found in major cabbage growing area of India viz. Andhra Pradesh, Bihar, Delhi, Haryana, Himachal Pradesh, Karnataka, Jammu and Kashmir, Maharashtra, Manipur, Orissa, Punjab, Rajasthan, Tamil Nadu, Uttar Pradesh, West Bengal etc.

#### **Life Cycle**

**Egg:** Each female lays 50-60 small whitish eggs singly along the veins on underside of leaves at night times. Egg hatches in about 7 days.

**Larva:** Larva is greenish with short thin hairs on the body. Full grown caterpillar measures 1-1.5 cm and its body tapers towards both ends. Larval period is 14 days.

**Pupa:** Pupation takes place inside a thin loose mesh of silken cocoon. Pupal period is about 7 days.

**Adult:** The moth is greyish brown with narrow wings having pale white triangular markings on inner margin of each forewing which form three diamond shaped white patches dorsally when wings are folded over back at rest. Hence the name, diamondback moth. The pest is active throughout the year.

**Damage Symptoms:** Damage is caused by the caterpillars which, in the earlier stages, feed in mines on the lower side of cabbage leaves and, in the later stages, feed exposed on the leaves and affected cabbage is unfit for human consumption.

#### **Integrated Management of Diamondback Moth**

##### **Cultural Control**

- Removal and destruction of plant stubbles, debris after harvest and ploughing the field.
- Sowing mustard as a trap crop.
- Grow intercrops such as tomato, garlic, coriander and carrot in alternate rows with cabbage

##### **Mechanical Control**

- Install pheromone traps @ 4-5/acre for monitoring.

##### **Biological Control**

- Release egg parasitoid, *T. Chilonis* @ 20,000/acre 4-6 times at weekly interval.
- Release larval parasitoids, *Diadegmasemiclausm* @ 1,00,000/acre or

*Cotesiaplutellae* @ 20,000/acre from 20 days after planting

- Conserve other usefull parasitoids such as *Brachymeria* spp., *Eriborus* spp. etc.
- Fungal pathogens, *Paecilomyces* spp. and *Zoophthoraradican* are found very effective.
- Foliar spray with 5% NSKE or Azadirachtin 0.03% (300 ppm) Neem oil based WSP @ 1000-2000 ml in 200-400 lit. of water/acre.

**Chemical Control:** Following insecticides are used for DBM management.

- Cartap hydrochloride 0.5% at 10, 20 and 30 DAS (nursery) and primordial stage.
- Lufenuron 5.4% EC @ 240 g in 200 lit. of water/acre.
- Spinosad 2.5% SC @ 240-280 in 200 lit. of water/acre.
- Indoxacarb 15.8% EC @ 106.4 ml in 200-400 lit. of water/acre.
- Emamectin benzoate 5% SG @ 60- 80 g in 200 lit. of water/acre.
- Flubendiamide 20% WG @ 15 g in 150 lit. of water/acre.
- Fipronil 5% SC @ 320-400 ml in 200 lit of water/acre.

**Conclusion:** Diamondback moth, *Plutella xylostella* Linnaeus (Lepidoptera: Plutellidae) is important insect in cabbage, which causes extreme loss in cabbage production. Diamond back moth management for reducing qualitative and quantitative loss is must to fulfil the growing demand of population for consumption. The use of various cultural, mechanical, biological, and chemical management practices results in the proper integrated management of DBM, and increase in the quantitative as well as qualitative crop yield respectively.

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