



AGRONOMIC SPOTLIGHT



CATERPILLAR PESTS OF BROCCOLI AND CAULIFLOWER

- » Caterpillar pests feed on leaves and damage heads of broccoli and cauliflower, reducing yield and market quality.
- » Cabbage looper, diamondback moth, imported cabbageworm, and cabbage webworm are damaging pests of broccoli and cauliflower in many production areas.
- » The use of natural-enemies and insecticide applications based on pest population monitoring are used to manage caterpillar pests of broccoli and cabbage.

CABBAGE LOOPER

The cabbage looper (*Trichoplusia ni*) can be distinguished from other crucifer caterpillar pests by their looping or “inchworm” movement in which they bring their fore and hind-ends together and arch their back in the middle of the body (Figure 1a). The larvae are smooth-skinned, green with narrow white stripes along the sides of the body, thin lines down the back, and are up to 1.5 inches long. The adult moths are brownish with silvery figure-eight-shaped spots on the forewings and have a wingspan of 1.25 to 1.5 inches (Figure 1b). The female moths lay greenish-white eggs, mostly on the lower leaf surface on the outer leaves. The moths are active mostly at night. Several generations can be produced each year.^{1,2}

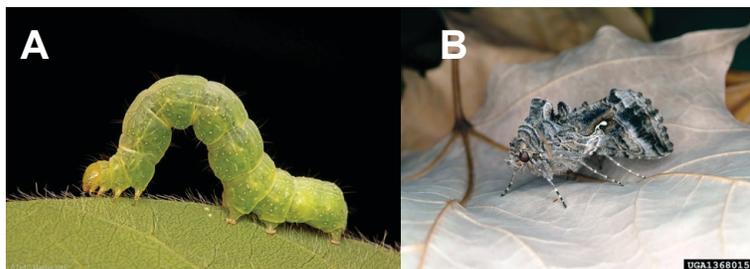


Figure 1. Cabbage looper; (A) larval caterpillar stage, Ted MacRae, (B) adult moth stage, Joseph Berger, Bugwood.org.

The larvae eat out small patches on the undersides of leaves between the veins, leaving ragged holes. The bodies of larvae and the frass they produce also contaminate the harvested products. Young plants (pre-heading) can tolerate substantial amounts of feeding damage without noticeable loss of yield. The most damaging injury occurs after heading.¹

Monitor plantings for cabbage looper by scouting 25 randomly selected plants in the field, looking for eggs and small larvae on the undersides of leaves. When plants are small, treat if an average of more than nine small to medium-sized larvae are found per plant. Just prior to heading, treat if more than one looper is found per 25 inspected plants.^{1,2}

DIAMONDBACK MOTH

Larvae of the diamondback moth (*Plutella xylostella*) are small (1/3-inch long), light green, and tapered at both ends (Figure

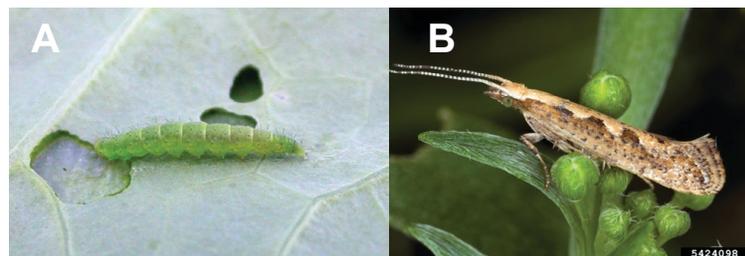


Figure 2. Diamondback moth; (A) larval stage and feeding damage, Roberto Cordero; (B) adult moth stage, David Cappaert, Bugwood.org.

2a). The larvae wiggle rapidly and drop from plants when disturbed, hanging by a silk-like thread.^{1,2,3} The bodies of adult moths are 1/3-inch long with wingspans of 1-inch. When at rest, the wings flare outward and upward near the hind-end of the body. Male moths have three light-yellow diamond-shaped marks on their folded wings (Figure 2b). The moths fly during daylight hours and move rapidly when disturbed.^{2,3}

The host range of the diamondback moth includes broccoli, Brussels sprouts, cabbage, cauliflower, kale, rape, turnip, and a range of other brassicas. Young larvae feed by burrowing into the leaf and mining the internal leaf tissue. Older larvae feed primarily on the undersides of leaves, creating irregular holes or windows, leaving the upper epidermis of the leaf intact. Larvae also feed on flower buds and floral stocks.^{2,3}

Monitoring for diamondback moths should be done in the seedling, thinning, and pre-heading crop stages. Twenty randomly selected plants should be examined for larvae and signs of feeding. Adult moths can be monitored using pheromone traps to determine times of peak flight activity. However, management decisions should be based on larval counts and evidence of feeding damage. Insecticide applications should begin when an average of one larva or one feeding hole is found per ten plants. Heavy rainfall can reduce populations of young (early instar) larvae.^{1,3}

IMPORTED CABBAGEWORM

The adult imported cabbageworm (*Pieris rapae*) is a yellowish-white butterfly with one to four black spots on the wings (Figure 3a). The wingspan is about one-inch. The butterflies are

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active during the day, and females lay eggs on the undersides of leaves. Cabbageworm larvae are velvety-green with a narrow orange stripe down the middle of the back and yellowish stripes along the sides of the body (Figure 3b). Mature larvae are about one-inch long and sluggish when disturbed.^{1,2}



Figure 3. Imported cabbage worm (A) adult moth stage, Whitney Cranshaw, Colorado State University, Bugwood.org and (B) larval stage.

Cabbageworm larvae feed voraciously on both inner and outer leaves. Feeding results in large, irregular-shaped holes in the leaves, and the larvae deposit brown fecal pellets that contaminate the harvested product. Feeding damage looks somewhat similar to that caused by cabbage looper feeding.^{1,2}

Monitoring for cabbageworm should be done at the same time as monitoring for loopers. In fact, counts of the two insects from 25 plants can be combined, counting the larvae and eggs on the undersides of leaves. Treat plants if an average of more than nine small to medium larvae are found per plant when plants are young (pre-heading). Just before heading, treat if more than one larva is found per 25 plants.¹

CABBAGE WEBWORM

Adult moths of the cabbage webworm (*Hellula rogatalis*) have brownish-yellow forewings mottled with darker brown and pale gray rear-wings (Figure 4a). The wingspan of the moth is approximately 1/2-inch. Cabbage webworm larvae have black heads with a V-shaped mark. Their bodies are approximately 1/2-inch long and a dull grayish-yellow with five brown-purple stripes along the body (Figure 4b).²

The larvae initially feed on both the upper and lower surfaces of partially folded leaves of plant buds. Later, the larvae feed under the covering of a protective web of silk-like threads. Feeding can result in disfigured heads, and the larvae can tunnel into and kill buds on younger plants.²



Figure 4. Cabbage webworm (A) adult moth stage Natasha Wright, Braman Termite & Pest Elimination, Bugwood.org; (B) larval stage, Alton N. Sparks, Jr., University of Georgia, Bugwood.org.

MANAGING CATERPILLAR PESTS

Caterpillar pests of broccoli and cauliflower are often controlled with applications of *Bacillus thuringiensis* (*B.t.*), spinosad, or pyrethroid products, but new products with different modes of action, including botanicals, insect growth regulators, and mating disruption chemicals, are also available. These products can help reduce the development of resistant pests. The products that are specific for lepidopteran pests also help reduce the impact on natural enemies. Most products are applied as foliar sprays, but some can be applied to the soil at planting.^{2,4,5} *B.t.* applications are usually most effective when the larvae are small. Different strains of *B.t.* vary in their ability to control particular insect species. Therefore, growers should check the product label to understand the insect pests that the products are effective against.^{2,4}

Natural enemies also can play a role in managing caterpillar pests of Brassica crops. Ground beetles, ladybugs, syrphid fly larvae, lacewing larvae, and spiders are predators of Lepidopteran pests, including diamondback moth and imported cabbageworm. *Diadegma insulare* is a parasitic wasp that can help keep diamondback moths in check. *Diadegma insulare* is sensitive to insecticides, and heavy insecticide applications can lower the wasp populations, increasing the likelihood of outbreaks of diamondback moths.⁶ Entomopathogenic fungi, such as *Beauveria bassiana*, can also be used to affect some late larval stages of these caterpillars.⁷ Conservation efforts to protect and enhance populations of natural enemies can reduce the need for insecticide applications.^{3,8}

Sources

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For additional agronomic information, please contact your local seed representative.

Performance may vary from location to location and from year to year, as local growing, soil and weather conditions may vary. Growers should evaluate data from multiple locations and years whenever possible and should consider the impacts of these conditions on the grower's fields. The recommendations in this article are based upon information obtained from the cited sources and should be used as a quick reference for information about broccoli production. The content of this article should not be substituted for the professional opinion of a producer, grower, agronomist, pathologist and similar professional dealing with this specific crop.

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