

Agriculture

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Diamondback Moth

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Scientific name: *Plutella xylostella*

Hosts: Brassica vegetable and forage crops, cruciferous weeds and ornamental crucifers.

Introduction

The diamondback moth is the most destructive insect pest of brassica crops throughout the world. Reliance on chemicals as a control measure for the diamondback moth has resulted in the development of resistance to many insecticides. Resistance to synthetic pyrethroid insecticides has been detected in populations of diamondback moth in all Australian states. Since 1993, brassica growers in Victoria have had difficulty in controlling the caterpillars of diamondback moth and have experienced insecticide control failures. In extreme cases, damaged crops have been ploughed in and produce has been unmarketable (Figure 1).

Description

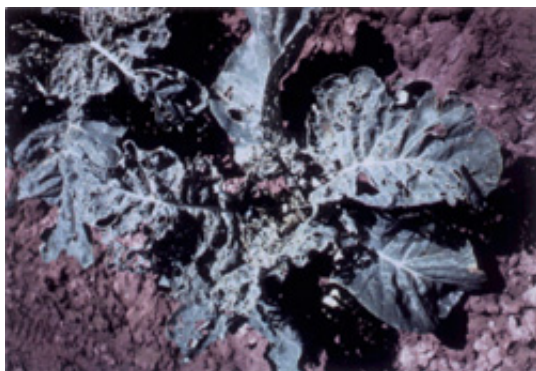


Figure 1. Cauliflower damaged by diamondback moth.

The adult is a small moth about 10 - 12 mm long (Figure 2). The male moth is dark brown with three white diamond-shaped patterns aligned on its back. The female moth is tan coloured and its diamond patterns are less distinct than those of the male.

Eggs are pale yellow and 0.5 mm long. There are four caterpillar growth stages. The caterpillars are grey-green with a dark head in the first three stages and green with a green-brown head in the last growth stage. Caterpillars grow to approximately 12 mm in length (Figure 3).

Biology



Figure 2. Female diamondback moth.

The adults are active at dusk and throughout the night. During the day, moths will fly from their resting places if plants are disturbed.

Female moths lay eggs singly or in small clusters on stems and both sides of the leaves. A female moth may lay more than 150 eggs during her lifetime.

The first and some second growth-stage caterpillars are leaf miners tunnelling inside the leaf. Subsequent growth stages feed on the underside of leaves or tunnel into the plant. Caterpillars which are disturbed from feeding will wriggle backwards rapidly across the leaf surface and may drop to the ground on silken threads. Pupation occurs in an open-mesh cocoon (Figure 4).

The time taken to complete the life cycle depends on temperature. In Victoria, the life cycle of the moth will be completed in about one month in summer. During winter, the pest develops much more slowly and causes little damage. As the temperature increases in spring and summer, the moth goes through its life cycle more quickly and pest numbers build up. In one year, the moth will complete six to seven life cycles. Generations overlap throughout the warmer months of the year.

Damage



Figure 3. Large caterpillars of diamondback moth

Caterpillars eat many small holes in the leaves of the host plants, often leaving the leaf epidermis (outermost layer of cells) intact, making a 'feeding window'. Most damage is caused by the caterpillars tunnelling into the heads of plants such as cabbage and Brussels sprouts. They also cause contamination of produce by pupating inside broccoli florets and cauliflower curds. Seedlings of cruciferous forage crops and rapeseed may be destroyed by this pest and severe defoliation or pod grazing may reduce rapeseed yield.

Control



Figure 4. Diamondback moth pupa.

Management of diamondback moth requires an integrated approach.

Biological control agents such as predators and wasp parasitoids of this pest are present in crops in low numbers and can provide some level of control.

It is difficult to get insecticide contact with the diamondback caterpillar because its feeding sites are under leaves and within the plant tissue. This inaccessibility, combined with the ability of the pest population to develop resistance to insecticides, means that a single chemical solution is not possible.

The following integrated pest management methods should be used to control the pest:

- Start off with clean-healthy transplants.
- Understand the life cycle of the moth and recognise the caterpillar stages.
- Check brassica crops at least once a week during the warmer months of the year. Small caterpillars (dark head stage) are easiest to control.
- Use the bacterial insecticide, *Bacillus thuringiensis* (Bt) on young plants and on mature plants when pest pressure is low. Unlike many synthetic insecticides, Bt is non-toxic to parasitoid wasps and this allows wasp populations to build up.
- Use chemicals wisely. Save effective synthetic insecticides for emergency clean-up operations and when pest pressure is high.
- Calibrate your spray equipment regularly.
- Ensure good spray application and use equipment (eg droppers) which gives good coverage of the plant, particularly on the undersides of the leaves.
- Use only recommended rates for all insecticides.
- Plough in crop residues or heavily infested crops promptly.

Correct diagnosis is essential for effective pest and disease control. A commercial diagnostic service is available at the Institute for Horticultural Development (IHD). For further information phone Crop Health Services on (03) 9032 7515.

For further information on registered chemicals, phone Chemical Information Service.

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