

Diamondback moth control in Asian leafy brassica crops 小菜蛾的防治

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The **Key Pest** of brassica crops is **Diamondback moth** (Cabbage moth), *Plutella xylostella* (Linnaeus). Feeding by the caterpillar stage of this insect can cause holes in leaves all over the plant making most of the leaves unmarketable.

小菜蛾 *Plutella xylostella* (Linnaeus) 又名吊絲蟲，是十字花科作物的主要害蟲。

小菜蛾的幼蟲會直接侵食作物，做成許多蟲孔和特別的網狀，令到作物不能銷售。

The current practice of weekly spraying of insecticide is unnecessary and can contribute to the build up of resistance to insecticides in this pest, resulting in control failures. Asian leafy brassica growers need to adopt the 'Two Window' strategy developed by Avicare Insecticide Resistance Action Committee in order to prevent the build up of resistance.

現時一般每星期噴射殺蟲劑的方式是不必要的，並會加速害蟲的抗藥性，導致防治失效。農友應該採納 Avicare 殺蟲劑抗藥性行動委員會推出的『雙窗口』策略去施用殺蟲劑，以便減低害蟲的抗藥性。

Life history of the insect and damage caused

生命週期及為害

The adults are greyish brown moths about 9 millimetres long. When the wings are folded at rest, on the ridge formed by the folded wings a row of diamond-shaped yellow markings appear. The hind wings are fringed with long grey hairs. When the infestation is heavy, moths can be seen flying on slight disturbance of the leaves.

成蟲約 9 毫米長，灰棕色，休息或靜止時背部會展示由摺疊的翼產生的一系列鑽石斑紋。後翼邊緣有長灰毛。如蟲害嚴重，只要輕拍田上的作物，就會見到小菜蛾在飛揚。

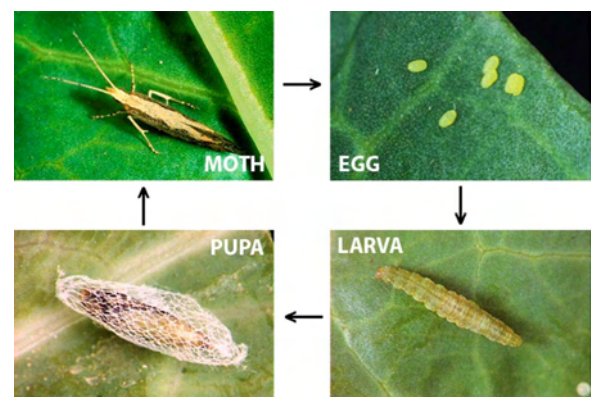
Adult females lay tiny yellow eggs on the undersides of leaves. Eggs hatch in a few days into colourless slender caterpillars. These caterpillars either feed on the surface tissues of the leaves or mine between the two surfaces of the leaf and leave clear window-like patches. As the caterpillars grow rapidly, they become green and at this stage they can perforate the older leaves by chewing large pieces out of them.

成長的雌蛾會產下淡黃色的卵，通常在葉的背面。蟲卵約在三數天內孵化為細長和無色的幼蟲。初生的幼蟲潛食葉內的組織，導致大量網狀紋，產生「玻璃窗」效果。

幼蟲迅速成長，身體轉變為青綠色，並繼續侵食菜葉，留下大量蟲孔。

The larvae, if present in large numbers, eat holes in leaves all over the plant, giving the plant a lacy pattern and render it unmarketable.

當幼蟲數目眾多時，整株作物都滿佈蟲孔，菜葉呈花邊狀，不能銷售。



Life cycle

生命週期





Damage due to larval feeding

幼蟲潛食為害狀

Larvae when disturbed drop and hang by a silken thread. They feed for ten days to a month depending on the temperature. When fully grown they can reach up to 12 millimetres in length. When fully grown they stop feeding, spin flimsy, spindle shaped net-like cocoons on the under surface of the leaves and pupate in them. A brown pupa can be seen inside the cocoon. The adult moth emerges from this pupa after one to two weeks. The life cycle may be as short as sixteen days at warmer temperatures and therefore there are multiple generations per year on farms with brassicas present.

當幼蟲被干擾時，它們會以一條幼絲把自己從葉背掛下來。幼蟲會進食 10 日至 1 個月，視乎天氣溫度，才成長變為蛹。

成長的幼蟲長 12 毫米，停止進食，並吐絲做繭，成蟲約於 1 至 2 星期破繭而出。

小菜蛾的生命週期在合適環境下可短至 16 天。所以在有種植十字花科作物的菜園，小菜蛾在 1 年內是會有多個世代。

Preferred crop hosts and alternative weed hosts

優先作物寄主及交替雜草寄主

Kai lan and Choy Sum are preferred hosts while Buk Choy, Pak Choy, watercress and Chinese radish are also attacked.

芥蘭及菜心是小菜蛾的優先作物寄主。但其他十字花科作物如白菜、西洋菜及蘿蔔等亦會被侵害。

The pest can also survive on alternative weed hosts such as wild radish, wild turnip and turnip weed.

害蟲同時將會殘存在交替宿主雜草上，即如野生蘿蔔、野蕪菁及蕪菁草。

Management of the pest

害蟲管理

Crop monitoring

作物監察

Presence of Diamondback moth can be detected by the moths flying away when the plants are disturbed in the field. If flying moths are seen, the crops should be examined carefully. Small green caterpillars could be seen feeding on the under surface of the leaves. When the caterpillars are disturbed, they will drop from the leaf and try to hang by a silken thread.

小菜蛾的踪影很容易被察覺。如果您在菜田上輕拍作物，見到小菜蛾在飛揚，您就要進一步檢查您的作物，留意小菜蛾幼蟲的踪影。這些幼蟲通常會躲在葉背進食，當被干擾時，它們會以一條幼絲把自己從葉背掛下來。

When to spray

噴射殺蟲劑的時機

To facilitate timely insecticide applications check randomly twenty plants for caterpillars and if caterpillars are found in 5 or more plants an insecticide should be sprayed by directing the spray to the under surface of the leaves.

定期檢查作物有利及時防治。方法是在整片田隨機檢查 20 株菜，如果有 5 株或以上的菜有幼蟲，就需要噴射殺蟲劑。殺蟲劑必須均衡地施放在葉面及葉背上。

Choice of insecticides

選擇殺蟲劑

A *Bt* (*Bacillus thuringiensis*) based product (e.g. Xentari®) should be tried first. This will allow the parasites and predators to attack the pest and reduce the number of sprays needed later. A week after the first spray, twenty plants should be randomly checked to decide whether to spray again or not. Our work in 2006–2007 season showed that 1–3 sprays of Xentari® based on crop monitoring kept the Diamondback moth under control better than weekly sprays with other insecticides.

首先選擇藥性溫和的殺蟲劑，如細菌性的產品，Xentari® (a *Bt* (*Bacillus thuringiensis*) based product)。這樣有助維護害蟲的天敵及減少噴藥的次數。

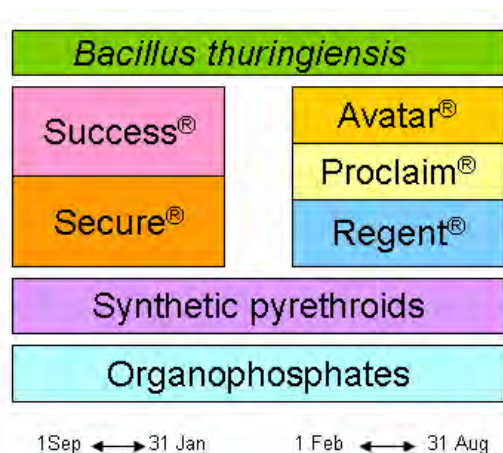
在噴藥一星期後，應重覆檢查作物確定是否需要再噴射殺蟲劑。本署在 2006 年至 2007 年的田間試驗顯示，若根據虫情使用 Xentari®，每季菜只需噴射 1 至 3 次，足以有效防治小菜蛾。而且效果比每星期噴射其他殺蟲劑更好。

Insecticide Resistance Management Strategy

殺蟲劑抗藥性管理策略

DBM is a key pest because it readily develops resistance to insecticides used against it. To reduce the speed in developing resistance to new insecticide groups a two window Insecticide Resistance Management Strategy was developed. Avcare's Insecticide Resistance Action Committee (AIRAC) has laid out a 'Two Window' strategy to delay the development of resistance to new insecticide groups. Under this strategy the whole year is divided into two windows; the first one is from 1 Sept – 31 Jan and the second is 1 Feb – 31 Aug. No insecticide used in the first window from the new insecticide groups should be used in the second window. The newer insecticides are divided between the two windows and should not be used in the window they are not listed.

小菜蛾是主要的害蟲的另一个原因是因為它很容易對殺蟲劑產生抗藥性。Avcare 殺蟲劑抗藥性行動委員會已經推出一個『雙窗口』式策略去延遲害蟲對新型殺蟲劑產生抗藥性。根據這策略將 1 年 12 個月分為兩個窗口，第 1 個是由 9 月至 1 月，第 2 個由 2 月至 8 月。在第 1 個窗口選用的新型殺蟲劑不能在第 2 個窗口重用。



Two Window Strategy

『雙窗口』策略

If Bt products alone cannot keep the pest under control, insecticides from new groups should be used.

如果只用 Bt 產品未能有效防治害蟲，可選擇新型殺蟲劑。

If more spraying is required in one crop, different groups within the same window should be rotated.

如果在同一季菜需要噴射多次殺蟲劑，同一窗口的不同殺蟲劑應輪流使用。

Synthetic Pyrethroids and Organophosphates can be used alternating between members of these two groups.

合成除蟲菊脂及有機磷殺蟲劑產品可與窗口內的殺蟲劑輪流使用。

Never mix insecticides to use against this pest.

絕對不要混合使用殺蟲劑去防治這害蟲。

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