

Diadegma species (285)

Common Name

Parasitic wasp

Scientific Name

Diadegma semiclausum, an ichneumonid (previously known as *Diadegma euerophaga*, *Diadegma xylostellae*, *Angita cerophaga*). The wasps belong to the family Ichneumonidae.

Distribution

Diadegma semiclausum is native to Europe, but has been introduced into many countries in Asia, Africa, Oceania. It is established in Australia and New Zealand, but it has not established in other Pacific islands except Papua New Guinea where it is established in the highlands. The wasp has also been introduced into the highlands of India, Indonesia, Laos, Malaysia, the Philippines, Taiwan, Thailand, and Vietnam. In tropical countries, it does not survive below about 800 m.

Prey

Diamondback moth, *Plutella xylostella*.

Description & Life Cycle

Diadegma is most commonly found parasitising diamondback moth, although it has been reared from other species. It is a larval parasitoid, preferring to lay its eggs in small larvae, those that have just left their egg masses on *Brassica* leaves.

When the wasp approaches (Photos 1&2), the moth larvae may react with jerky movements, or drop from the leaf on silken threads to escape attack. Those that remain become the target of the wasp which quickly inserts a single egg into each larva (Photos 3&4). The larvae are parasitised once only as the wasp can tell if the diamondback moth larvae have already been attacked.

Parasitised moth larvae develop normally, and outwardly look the same as those that are unparasitised. However, when the moth develops a cocoon (Photo 5), the larva of the wasp makes its own cocoon inside and then develops into a pupa (Photo 6). After 8-10 days the adult emerges.

The life cycle of *Diadegma* is 18-20 days. The female wasp can live for about 25 days if a suitable sugar food is available. During that time it can lay many hundreds of eggs.

The parasitoid prefers temperatures in the range 15-25°C. Therefore, in tropical countries it is most abundant in the cooler highlands.

Impact

Diadegma is a very effective natural enemy of diamondback moth, and very high rates of parasitism (>90%) often occur, provided that broad-spectrum insecticides are not used.

Detection & inspection

Look for the small black wasps flying between brassica plants, often hovering near leaves damaged by diamondback moth larvae. Chemicals from the damage attract them. Look for the wasps searching for diamondback moth larvae on the leaves. Look for *Diadegma* pupae which are formed inside the silken nets spun by the diamondback moths when they pupate. *Diadegma* pupae are oval-shaped, whereas those of diamondback moth are tapered at one end.

Management of Biocontrol Agents

DANGERS FROM USING PESTICIDES

Diadegma is very sensitive to broad-spectrum insecticides, such as pyrethroids and organophosphates. They should not be used if the wasp is active in the crop, otherwise they will kill the wasp and make control of diamondback moth difficult. Instead, if an insecticide is required, use Bt, *Bacillus thuringiensis*, or another selective insecticide. Together, *Diadegma* and Bt can form the basis of an effective IPM program for diamondback moth.



Photo 1. *Diadegma* seeking its host.



Photo 2. *Diadegma* has located a second stage diamondback moth caterpillar.



Photo 3. *Diadegma* laying an egg in a second stage diamondback moth caterpillar.



Photo 4. *Diadegma* wasp preening or cleaning its body after egg laying.



Photo 5. The pupa of diamondback moth, yellowish and about 8 mm long. It is blunt at one end and tapered at the other.



Photo 6. Pupa of *Diadegma*. The pupa of the diamondback moth is destroyed by *Diadegma*, except for the silken cocoon. The *Diadegma* cocoon is about the same size as that of the diamondback moth. They are pink/cream, then dark brown.



Photo 7. Pupa of *Diadegma* becomes dark before emergence of the adult. It is elliptical (egg-shaped) not tapered, and the diamondback moth skin is at one end.

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Information from Biological Services, Loxton, Australia. (<https://biologicalservices.com.au/products/diadegma-20.html>); and CABI (2019) *Diadegma*. Crop Protection Compendium. (<https://www.cabi.org/cpc/datasheet/18644>); and from CABI (2019) *Diadegma semiclausum*. Crop Protection Compendium. (<https://www.cabi.org/cpc/datasheet/18678>).

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