

# A Wasp Parasitoid, *Diadegma insulare* (Cresson) (Insecta: Hymenoptera: Ichneumonidae)<sup>1</sup>

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## Distribution

*Diadegma insulare* is found in the United States and South America: New Hampshire west to southern British Columbia, south to Florida, Texas, and California; Hawaii, West Indies, and Mexico south to Venezuela.

These wasps are found in cruciferous crops, overwintering as a cocoon. The number of generations per year corresponds to the number of generations of its hosts: *Hellula undalis* (F.), *Plutella armoracia* Bsk., and *P. xylostella* (L.), the **diamondback moth**.

## Description

### Egg

The egg is clear and is hard to distinguish from the host's fat body when it is dissected. Unlike *Cotesia plutella*, another parasitoid of the diamondback moth, the egg is rounded rather than pointed and lacks a projection.



Figure 1. Male *Diadegma insulare* (Cresson), a parasitoid wasp, and mature larvae of the diamondback moth, *Plutella xylostella* (Linnaeus). Credits: Andrei Sourakov, Florida Museum of Natural History

### Larva

The larva of *Diadegma insulare* is white and can be noticed more easily in a dissected host due to its extensive movements. It looks strongly segmented and bears a short (¼ of the total length of the larva) narrow "tail".

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Figure 2. Egg of *Diadegma insulare* (Cresson), a parasitoid wasp.  
Credits: Guangye Hu, USDA



Figure 3. Mature larva of *Diadegma insulare* (Cresson), a parasitoid wasp.  
Credits: Guangye Hu, USDA

## Pupa

The larva of *Diadegma insulare* stays inside the diamond-back moth larva until the latter spins a cocoon and is ready to pupate. Once emerged, *Diadegma insulare*'s larva spins its own cocoon inside the cocoon of the moth.



Figure 4. Pre-pupa of diamondback moth, *Plutella xylostella* (Linnaeus), inside the cocoon.

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Figure 5. Larva of *Diadegma insulare* (Cresson), a parasitoid wasp, spinning its cocoon inside the cocoon of a diamondback moth.

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Figure 6. Cocoon of *Diadegma insulare* (Cresson), a parasitoid wasp.  
Credits: Guangye Hu, USDA

## Adult

The length of this wasp does not exceed 6 mm (¼ in). The female has a well defined ovipositor.





Figure 7. Male *Diadegma insulare* (Cresson), a parasitoid wasp.  
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Figure 8. Female *Diadegma insulare* (Cresson), a parasitoid wasp, laying an egg into a larva of the diamondback moth through the hole in a cabbage leaf.

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## Importance

*Diadegma insulare* is the most important naturally occurring enemy of the diamondback moth as it can parasitize up to 90% of its larvae. Not only the parasitized larvae die, but they also do less damage, consuming 80% less food than the non-parasitized individuals. *Diadegma insulare* can be reared in captivity, but mass rearing presents many challenges. For instance, the wasps rarely parasitize larvae that are reared on artificial diet. Hence, the larvae have to be presented to the wasps while feeding on a cruciferous plant (e. g., cabbage).



Figure 9. Rearing containers for *Diadegma insulare* (Cresson), a parasitoid wasp. Inside a walk-in rearing chamber, the leaves of collards infested with diamondback moth larvae are presented to the free-flying wasps.

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## Conservation

*Diadegma insulare* is highly susceptible to pesticides, which kill adult wasps through direct contact. The larvae inside the host also die when pesticides kill their hosts. Thus, major outbreaks of the diamondback moth are more likely in fields that are sprayed heavily, and to avoid such outbreaks one needs to conserve the *Diadegma* populations by planting its nectar sources and limiting the use of pesticides.

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