Biological Control of Brown Marmorated Stink Bug

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Brown marmorated stink bug (BMSB) is an invasive pest of agriculture. First identified within the US in 2001, BMSB has spread to over 40 states and has become a major pest of dozens of fruit, vegetable and ornamental crops.

When it first arrived in America, BMSB was not imported with the **natural enemies** that helped keep its population in check in Asia, its native range. As a result, BMSB populations have expanded without these important sources of natural mortality. However, natural enemies native to the US may be able to help curb the growth of this devastating pest.

A young spined soldier bug eats a BMSB nymph during a lab experiment.

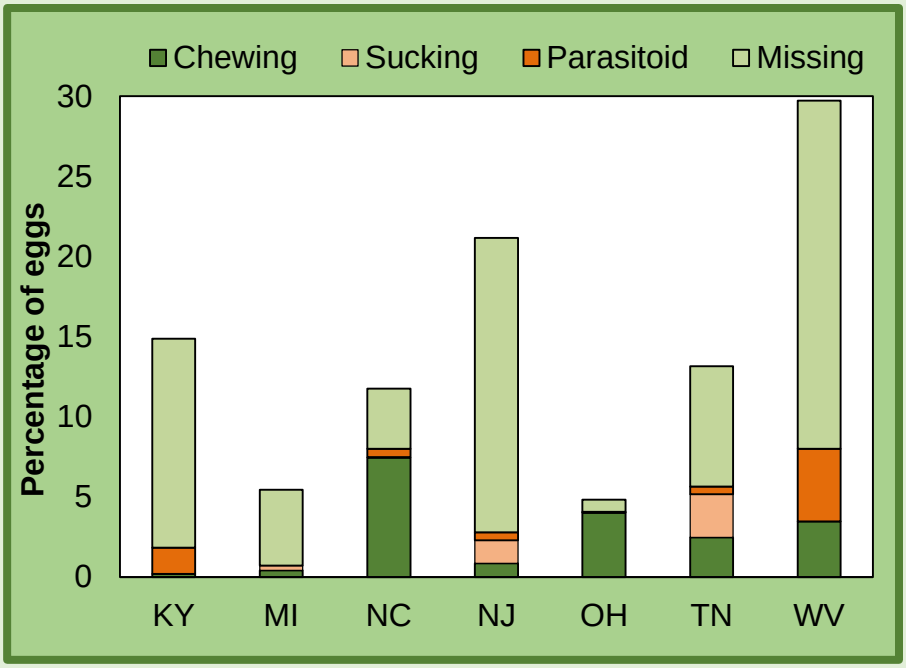
Photo credit: Rob Morrison

Parasitoids: Picky Eaters!

Parasitoids are small non-stinging wasps that lay their eggs within a living host. Unlike traditional parasites, parasitoids develop on a single host which is killed in the process. Many parasitoids have a **narrow host range**, meaning they only attack a small number of closely related species. Due to their highly specific tastes, parasitoids can be extremely effective biogical control agents.

Hunting the Hunters

Researchers deployed BMSB eggs (sentinel eggs) at agricultural research stations and working organic farms in 7 states. After spending two days on known BMSB host plants, the eggs were assessed for signs of predation or parasitism. Chewing predators often shredded the eggs, while predators with needle-like mouth parts (like the predator pictured above) left small white tubes on the eggs. Parasitoid attack was identified by the small hole chewed into the egg shell by the hatching adult parasitoid.



Sentinel eggs were affected by biological control at rates ranging from 0-10% depending on the location. At all sites, **rates of parasitoid attack were fairly low**. At all locations, a proportion of the eggs used were simply missing after two days in the field. This has been attributed to wind and rain removing the eggs or possibly predation that resulted in total removal of the egg mass.

Lights! Camera! Predators!

Researchers used state-of-the-art cameras to record a group of the sentinel eggs in Michigan and New Jersey. By combining information learned from these recordings, as well as data from lab feeding trials and eye-witness accounts, the list of **confirmed BMSB predators** is steadily growing. So far **spined-soldier bugs, assassin bugs, damsel bugs, minute pirate bugs, mantids,** and **grasshoppers** are known to eat BMSB. Other arthropods, including earwigs, green lacewing larvae, jumping spiders and ground beetles, have been spotted eating BMSB. Parasitoids were not commonly observed visiting BMSB egg masses in the video recordings, which may help to explain the low rates of parasitism seen across the US.

As of 2014, predation and parasitism of BMSB averages 5-10% on organic farms and will not provide enough control if BMSB populations are high. Providing floral resources within the farm will support natural enemy populations, but it is not currently known if this will enhance predation of BMSB.

Clockwise from bottom left: The result of a chewing predator feeding on BMSB eggs. A wheel bug adult eats a late-stage nymph in the lab. A marked BMSB nymph was eaten by a damsel bug adult on a sorghum plant during a field experiment.