

Samurai Wasp *Trissolcus japonicus* (Ashmead) (Insecta: Hymenoptera: Scelionidae: Telenominae)¹

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Introduction

The Samurai wasp, *Trissolcus japonicus* (Ashmead), is an egg parasitoid of the brown marmorated stink bug, *Halyomorpha halys* Stål (Hemiptera: Pentatomidae) (McKellar and Engel 2012). The brown marmorated stink bug was first confirmed on Adams Island in Allentown, Pennsylvania in 1996 (Hoebeke and Carter 2003) and has since been detected in 43 states and two Canadian Provinces (Leskey 2016). This stink bug, native to eastern Asia, is a polyphagous pest of ornamental plants, fruit trees, and vegetable crops. The brown marmorated stink bug has become a significant agricultural pest causing economic losses (Rice et al. 2014). The pest usually has one to two generations per year, but may have more in warmer southern areas. A female brown marmorated stink bug may lay as many as 400 eggs in her lifetime. A *Trissolcus japonicus* female will oviposit her eggs inside the eggs of the brown marmorated stink bug, and the wasp larva develops inside the stink bug egg.

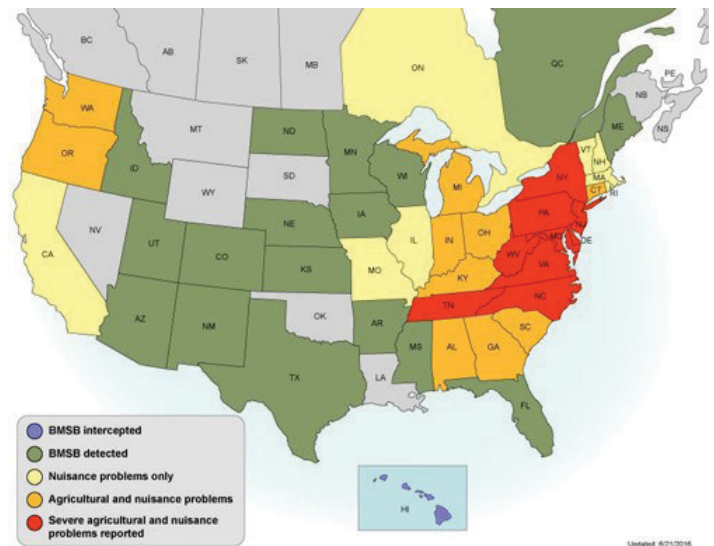


Figure 1. Distribution of the brown marmorated stink bug *Halyomorpha halys* (Stål) in the United States and Canada. Map generated June 21, 2016.

Credits: Tracy Leskey, USDA ARS

Synonymy

According to Talamas et al. (2013), *Trissolcus halyomorphae* Yang is a junior synonym of *Trissolcus japonicus* (Ashmead).

Distribution

Trissolcus japonicus is native to China, Japan, and South Korea, where the brown marmorated stink bug is native. Researchers began searching in these areas in 2005 to

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identify candidate biological control agents for the brown marmorated stink bug (Dieckhoff and Hoelmer 2014). Several species were identified as egg parasitoids of the brown marmorated stink bug. The most abundant and widespread of the species collected were *Trissolcus japonicus* and *Trissolcus cultratus* (Mayr) (Dieckhoff and Hoelmer 2014). Both have been under study in US quarantine facilities since 2007 to evaluate their efficacy as possible classical biological control agents for the brown marmorated stink bug and host specificity with regard to native stink bugs (Suszkiw 2014). Adventive, wild populations of *Trissolcus japonicus* were discovered in Beltsville, Maryland in 2014 (Talamas et al. 2015b), at several additional nearby sites in Maryland, Washington D.C., and in Winchester, Virginia, during 2015 (Jentsch 2015: unpublished survey data) and in Vancouver, Washington, in August 2015 (Milnes et al. 2016). It is speculated that these wild populations of *Trissolcus japonicus* may have arrived within stink bug egg masses on plant cargo shipped from Asia.

Description

Adults

Trissolcus japonicus adults are small black wasps (1.0–2.0 mm long) (Dieckhoff and Hoelmer 2014). The size of the wasp depends on the size of the host egg from which it emerged (Medal and Smith 2015). The female is slightly larger than the male by 0.1–0.2 mm. The head is large, broader than the thorax, and glossy with a few punctures. The 11-segmented antennae are brown-black, the scape and pedicel yellow-brown. The mandibles are reddish brown. The legs are mostly black with the tibia and tarsi yellow-brown to pale yellow (Hirashima et al. 1981). The wings are transparent with pale yellow veins. The abdomen is broadly oval and longer than the thorax (Ashmead 1904). The ovipositor is barely protruding. For a description that will separate *Trissolcus japonicus* from other *Trissolcus* species, review the diagnosis by Talamas et al. (2015a).

Eggs

Trissolcus japonicus deposits eggs singly within eggs of the brown marmorated stink bug. An average female *Trissolcus japonicus* contains 42 eggs in her ovaries at any one time, enabling her to parasitize an entire brown marmorated stink bug egg mass (Yang et al. 2009). Females chemically mark the egg in which they oviposit and will defend the egg clutch against other rival parasitoids. Males will commonly emerge first, wait atop the egg mass for the female to emerge, and then mate with females as they emerge. The female to male ratio is approximately 5.5:1.0 (Yang et al. 2009). The parasitoid can have up to ten generations per

year, whereas their host generally has one to two generations a year.

[Click here to view a video of the life cycle of *Trissolcus japonicus* inside BMSB](#) (video by Chris Hedstrom, published by Entomology Society of America, 2012).



Figure 2. Female *Trissolcus japonicus* (Ashmead), dorsal view. Credits: Elijah J. Talamas, ARS USDA



Figure 3. Female *Trissolcus japonicus* (Ashmead), lateral view. Credits: Elijah J. Talamas, ARS USDA



Figure 4. Female *Trissolcus japonicus* (Ashmead) head. Credits: Elijah J. Talamas, ARS USDA

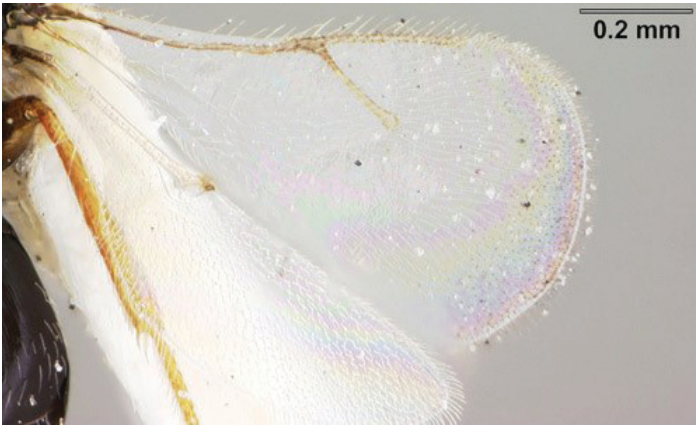


Figure 5. Female *Trissolcus japonicus* (Ashmead) wing.
Credits: Elijah J. Talamas, ARS USDA



Figure 6. Adult emerging from a brown marmorated stink bug *Halyomorpha halys* (Stål) egg.
Credits: Elijah J. Talamas, ARS USDA

Hosts

Trissolcus japonicus is known to attack the brown marmorated stink bug, *Halyomorpha halys*, and a native species, *Podisus maculiventris* (Say), and is under study to determine if it will parasitize other native stink bugs in the US. Non-target species evaluated in China in laboratory choice tests and field surveys concluded that the ecological host range of *Trissolcus japonicus* contains several other Pentatomidae species, including *Plautia fimbriata* (Fabr.), *Erthesina fullo* (Thunberg), and *Dolycoris baccarum* (L.) (Haye 2014). The parasitoid has also been recorded from *Glaucias subpunctatus* (Walker) (Matsuo et al. 2016).

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