

Biological Control

Egg Parasites of Pentatomidae in Central Washington Fruit Producing Regions

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Eggs of stink bugs are attacked by hymenopterous parasitoids in the genera *Telenomus*, *Trissolcus*, and *Ooencyrtus*. Parasitoids have been reported attacking *Nezara viridula* (Linnaeus), *Acrosternum hilare* (Say), *Euschistus servus* (Say), and *Euschistus variolarius* (Palisot) in soybean and alfalfa. Parasitoids of stink bug eggs occur in fruit orchards in the eastern United States and California; however, they have not been reported in Washington. Uncultivated vegetation outside of fruit orchards may play a role in managing populations of stink bug pest species because overwintering adults lay eggs in these habitats.

Five species of parasitoids were reared from *E. conspersus* eggs. This represents the first report of parasitoids attacking eggs of Pentatomidae in Washington. Four of the species are in the family Scelionidae. These species, *Telenomus podisi* Ashmead, *Trissolcus cosmopeplae* (Gahan), *Trissolcus euschisti* (Ashmead), and *Trissolcus utahensis* (Ashmead), were reported attacking the eggs of stink bugs in other regions of North America. The fifth species, an encyrtid, has also been reported attacking the eggs of stink bugs. These parasitoids appear to attack a wide range of stink bug species. There is some evidence indicating that parasitoids partition habitat in which stink bug egg masses are found and that biological control efforts should be concentrated on parasitoid species found in the habitat of preference.

There were differences in the mean number of eggs parasitized according to the date they were placed in the field. In 1996, mean egg parasitism ranged from 63.25% in early July to 12.7% in late August. High rates of parasitism in July corresponded with the highest level of oviposition activity by *E. conspersus*. Parasitoids were active on the first date sentinel egg masses were placed in the field in both years. There was an increase in the percent of eggs parasitized from 14 June through 12 July 1996. Beginning in midsummer through late August, there was a gradual decline in the percentage of eggs parasitized. In 1997 this pattern was repeated. Parasitism increased from 42% in early June and increased to 62% in early July. The percent parasitism gradually declined to 0.0% in October. The period of peak parasitoid activity was well synchronized to stink bug development. Stink bug oviposition, especially that of *E. conspersus*, primarily occurs during June and July in Washington and coincided with periods that had the highest incidence of parasitism in this study.

Surveys conducted during 1996 and 1997 showed that egg parasitoids were active on many different plants used as hosts by stink bugs and that their activity on these plants was similar. High rates of parasitism occurred on bitterbrush, red-osier dogwood, poplar, apple, and mullein. Phenology studies indicate that mullein was one of the primary plants used by *E. conspersus* for oviposition. This may be a reflection of the high percentage of parasitism on this plant, but it does not explain the high rates of parasitism on other vegetation. The parasitoids

may just be very active searchers of potential habitats where stink bug eggs are found, or other factors such as volatiles given off by egg masses or stink bug pheromones might provide cues directing the parasitoids where to search. Tachinid flies use heteropteran pheromones as host-finding kairomones. The stink bugs *E. conspersus* and *C. ligata* frequently occur on other plant types in Washington associated with high rates of egg parasitism and, while egg masses are occasionally found on these plants, the incidence is low when compared to mullein.

Although parasitoids have been reported attacking the eggs of stink bugs known to cause injury in tree fruits, little is known about wasp biology or their potential to limit populations of their hosts. Most studies on the population dynamics of stink bugs and natural enemies have been conducted in alfalfa and soybean. In these studies, even when parasite activity resulted in high mortality levels, ~50%, they were unable to maintain stink bug populations below economic thresholds in soybean. In Washington, all of the sites where high levels of parasitism were observed have suffered high levels of fruit injury. While egg parasitoids obviously have some effect on stink bug populations, it seems doubtful that natural enemies can be relied upon to provide the primary control of stink bug populations in Washington fruit growing regions. It may be possible to enhance the biological control of stink bugs in native habitats with augmentation of parasitoids; however, difficulties in rearing host eggs to mass produce parasitoids would be a major detriment to this approach. Host plants associated with stink bug oviposition may have the potential to be used in a trap cropping strategy to increase the effectiveness of egg parasitoids within a region.