

NEW ZEALAND PLANT PROTECTION SOCIETY RESEARCH SCHOLARSHIP



Sizing up the samurai wasp for control of brown marmorated stink bug in New Zealand

Classical biocontrol is a key component of integrated pest management. However, the risks to non-target species need to be understood before importing and releasing a natural enemy. **Tom Saunders**, recipient of the 2018/2019 New Zealand Plant Protection Society Research Scholarship is undertaking research for his PhD that focuses on testing

the host-specificity of the samurai wasp (*Trissolcus japonicus* Ashmead). This tiny egg parasitoid is the most dominant natural enemy of the brown marmorated stink bug (*Halyomorpha halys* Stål; BMSB). The broader aim of this collaborative project between the University of Auckland and The New Zealand Institute for Plant and Food Research Ltd is to improve screening for risks to non-target species before releasing classical biocontrol agents. The first step is to characterise the samurai wasp's physiological host range, or the list of species it is able to successfully attack and reproduce in. Tom will expose the wasp to the eggs of an endemic alpine shield bug, whose basic biology is still relatively unknown.

Further tests are designed to predict the samurai wasp's ecological host range, i.e. the smaller subset of physiological hosts that are actually attacked in the field. One way to do this is to use gas chromatography coupled with electroantennographic detection (GC-EAD). This technique separates and detects which individual compounds on the bodies of stink bugs cause sensory neurons on the wasp antenna to fire. Results from this analysis can be followed up with olfactory tests to confirm whether or not these responses are attractive or repulsive. Access to BMSB is difficult in New Zealand as this pest has not established here to date. However, it is hoped that the project team will gain access to infertile BMSB egg masses to test alongside New Zealand stink bug egg masses in cage trials conducted in containment facilities. This approach would allow wasp behaviour in the presence of both target and non-target species to be observed directly.

Another important dimension to consider is how competition from a closely related species of parasitoid wasp may modify non-target interactions. *Trissolcus basalis* (Wollaston) was introduced to New Zealand 70 years ago to control green vegetable bug (*Nezara viridula* L.), and is known to attack other pentatomids. Tom will conduct competition trials to observe what happens when both *Trissolcus* species have access to non-target egg masses. Finally, he will rear a population of samurai wasps on a non-target pentatomid for as many generations as possible, and then examine whether or not its host preferences have switched. The results of these two tests have important implications for non-target risks and biocontrol agent performance.

Ultimately Tom is aiming to compare behavioural, olfactory, electrophysiological, and rearing experiments to better understand the risk of non-target attack in a classical biocontrol agent. This information will provide more certainty for decision makers around potential non-target risks posed by natural enemies before they are released.