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Comparative Impact of Scymnus ningshanensis and Pseudoscymnus tsugae (Coleoptera: Coccinellidae) on the Hemlock Woolly Adelgid

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Abstract

The hemlock woolly adelgid (Adelges tsugae Annand) is an introduced pest thought to be native to Asia. Damage to eastern hemlock and Carolina hemlock can be serious (Salom et al. 1996), but western and Asian hemlocks are seldom damaged. Potential biological control agents have been observed in Japan and China (Sasaji and McClure 1997, Yu et al. 2000). We compared two of these which have been previously imported, Scymnus ningshanensis Yu et Yao, a coccinellid from China (Yu et al. 2000) and Pseudoscymnus tsugae Sasaji & McClure a coccinellid from Japan (Sasaji and McClure 1997).

For each lady beetle, we examined the host range and the numerical response to prey density (adelgid egg masses) in the laboratory, and in field studies, their ability to reduce hemlock woolly adelgid population growth. When given a choice between two prey species in the laboratory, S. ningshanensis preferred A. tsugae to Adelges laricis and Prociphilus tesselatus (p<0.05, 2 sample t-test) but preferences between A. tsugae and Adelges cooleyi or Pineus strobi were not different (p>0.05, 2 sample t-test). The host range results for P. tsugae were inconclusive because the beetles fed very little on all prey species provided, including the hemlock woolly adelgid. S. ningshanensis showed a positive numerical response (p<0.05, linear regression), and P. tsugae showed a density independent response (p>0.05, linear regression) to an increasing density of hemlock woolly adelgid egg masses. In the field, caged branches with a pair of S. ningshanensis resulted in a negative population growth of A. tsugae, while cages with a pair of P. tsugae adults and the control without lady beetles resulted in an increase in the population growth of A. tsugae (p<0.05, ANOVA).

Literature Cited

