

Establishment and impact of the lace bug *Gargaphia decoris* released against the invasive tree *Solanum mauritianum* in South Africa

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Biological control of *Solanum mauritianum* Scopoli, a major environmental weed in the high-rainfall regions of South Africa, was initiated in 1999 with the release and subsequent establishment of a leaf-sucking lace bug, *Gargaphia decoris* Drake (Tingidae). Post-release evaluations have focused on the seasonal population dynamics of *G. decoris* and the impact of feeding damage on the growth and reproduction of the weed. However, expectations that *G. decoris* would become a very successful agent and cause extensive damage in the field have so far not been realized. The lace bug has failed to establish at the majority of release sites, largely because of interference from generalist predators and possibly adverse climatic conditions. Also, in the colder, high-altitude regions of South Africa, where releases of *G. decoris* have been the most successful, there is a lack of synchrony between high insect population densities and the phenology of the weed. Populations of *G. decoris* decline drastically during the winter months, recover slowly during spring and reach high densities only at the end of summer and during autumn, ensuring that the weed suffers insufficient stress during the growing season. The moderate levels of damage recorded so far have thus been insufficient to adversely affect the considerable growth rate and reproductive output of *S. mauritianum* plants. New genetic stocks of *G. decoris*, recently imported from colder high-altitude areas in Brazil, may be better adapted to these climatic conditions than are the original stocks that were imported from warmer areas in Argentina and may thus prove more successful.

Effects of site characteristics on establishment of *Larinus minutus* (Coleoptera: Curculionidae), a capitulum-infesting weevil of diffuse knapweed, *Centaurea diffusa* (Asteraceae), in north-central and eastern Washington State, USA

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Programs for the biological control of weeds are generally based on redistributing insects from a nursery site to new sites within the same region, with the expectation that the natural enemies will establish. However, a variety of factors may play a role in whether or not an insect release will be successful in terms of establishment. Studies have shown that specific site factors and practices are important to consider, but studies must be conducted on an individual insect basis. The lesser knapweed weevil, *Larinus minutus* Gyllenhal, is generally known to thrive in hot areas with sandy, well-drained soils. This insect's plant host, diffuse knapweed (*Centaurea diffusa* Lamarck), is not limited in its distribution by these criteria, making it important to identify site factors and practices that result in increased success of establishment of the insect or determine if other bioagents may be more suitable for release. Weevil establishment was evaluated at multiple release sites in Washington in 2002. The factors evaluated included: 1) release size, 2) soil type, 3) slope aspect, 4) percentage slope, 5) percentage canopy, 6) annual precipitation, 7) elevation, 8) land use type, 9) disturbance, 10) forest structure, 11) site topography, and 12) infestation size and shape.