Who is Controlling Knapweed? A Genetic Investigation of *Larinus* spp. in a Successful Biological Control Program for Knapweed in Canada

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Abstract

Two species of seed feeding weevils, *Larinus minutus* Gyllenhal and *L. obtusus* Gyllenhal, were introduced to Canada in the early 1990s for the biological control of diffuse, *Centaurea diffusa* Lam., and spotted, *Centaurea stoebe* L. ssp. *micranthos*, knapweeds. These two weevil species are very similar morphologically, and this has made their identifications in the field difficult. The original introductions of *L. minutus* were made from 3 collections from *Centaurea arenaria* M. Bieb. ex Willd. at one site in Romania in 1991. *Larinus obtusus* for introduction were collected from *Centaurea phyrgia* L. at one site in Romania and from *Centaurea jacea* L. at a second site in Serbia. *Larinus minutus* has successfully controlled diffuse knapweed in many areas of North America and *L. obtusus* has reduced densities of spotted knapweed in some locations. We sequenced the mitochondrial CO1 locus for individuals in British Columbia and Romania, and have genotyped these individuals at a suite of polymorphic microsatellite loci. We identify the distributions of the *Larinus* lineages in British Columbia, Canada and explore their levels of genetic variation since introduction. The genetic structure of current populations is compared to that of source populations in Romania and Serbia and type specimens preserved at the time of the original introductions. Genetic typing of biological control agents is recommended for all programs to provide a baseline of information on biotypes and genetic evolution of introduced populations.