Prioritizing candidate biocontrol agents for garlic mustard based on their potential effect on weed demography

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To reduce the possibility for non-target effects, biological weed control programs should select and introduce the minimum number of host-specific natural enemies necessary to control an invasive non-indigenous plant. However, selection of the best agent or agent combination is no easy task and depends on the ability to forecast the anticipated impact of each herbivore species on host-plant demography. In a project on the biological control of garlic mustard [Alliaria petiolata (M. Bieb.) Cavara and Grande] in North America, we experimentally investigated the impact of candidate agents on survival and reproductive output of the target plant. Results were combined and fed into a demographic model to explore the potential impact of each agent at the plant population level. Using these a priori analyses, we propose potential release strategies for the candidate agents in North America.

The accidentally introduced Canada thistle mite Aceria anthocoptes in the western USA: utilization of native Cirsium thistles?

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Aceria anthocoptes (Acari: Eriophyidae) is a Eurasian mite that feeds on leaves and stems of Canada thistle, Cirsium arvense. A. anthocoptes was introduced in North America and now appears to be widely established, at least in the northern USA, where Canada thistle is a widespread exotic weed. A. anthocoptes is one of two Aceria mites recorded from C. arvense in Europe; no eriophyid mites had previously been collected from Canada thistle in the United States. In 2005 and 2006, we studied the biology of A. anthocoptes at several Canada thistle sites in northern Colorado, USA. We also sampled populations of four native thistles (Cirsium canescens, Cirsium scariosum, Cirsium scopulorum and Cirsium undulatum) to detect mite populations. These four thistles occur in grassland, foothills and montane habitats in Colorado and often grow in close proximity to Canada thistle. We collected eriophyid mites from all native plants; mite densities were similar to, or even exceeded, densities from adjacent Canada thistle populations. For now, we are presuming that collected mites are A. anthocoptes, though taxonomists are confirming identifications. If specimens are determined to be A. anthocoptes, our information should preclude the use of this mite as a C. arvense biocontrol agent in the United States.