



The effect of different natural enemies on the performance of *Cirsium arvense* in its native range

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Summary

Understanding the effects of herbivores on weedy plant performance under different habitat conditions may provide useful information for limiting the spread of these plant species in their native and invaded ranges. A critical drawback to using herbivores to limit the spread of weedy plant species is the limited knowledge regarding the effects of different natural enemies on plant performance under natural conditions and in different habitat types. The aim of this study was to collect information on the degree and types of damage caused by natural enemies and their effects on the performance of the weed species *Cirsium arvense*, under different abiotic conditions in its native range in the Czech Republic. Damage induced by different natural enemies of *C. arvense* in four different populations in wet and

dry sites was studied. The most common types of damage found in *C. arvense* were folivory (eaten foliage), external stem damage and leaf necrosis, and their occurrence varied strongly in space and time. Different plant damage types tended to be significantly associated with each other. It was therefore difficult to separate the effects of individual damage types and to study their interactions. Overall, the results indicate that in its native range, *C. arvense* experiences high levels of herbivory, with stem damage, flower herbivory and folivory having the strongest effects on plant performance. Experimental studies that would separate the effect of single herbivores are, however, needed to confirm this.

Keywords: creeping thistle, Canada thistle, herbivory, noxious species, plant damage, water, plant growth.

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Introduction

Understanding the effects of herbivores on weedy plant performance under different habitat conditions can provide useful information for limiting the spread of these plant species in their native and invasive ranges (e.g. Delfosse, 2000; Louda & O'Brien, 2002; Coombs *et al.*, 2004). Interactions between plants and their insect herbivores have been the subject of many previous studies (e.g. Rhoades, 1985; Price, 1991; Münzbergová,

2006). Most of these studies, however, only examined a single insect species or a set of species causing the same type of damage (e.g. Hatcher *et al.*, 1995; Bacher & Schwab, 2000; Friedli & Bacher, 2001). Only a few studies have investigated how damage from multiple insect species that typically occur in the field under natural conditions can affect plant growth (e.g. Hufbauer & Root, 2002).

When studying the effects of herbivores under natural conditions, it is also important to evaluate the effect of