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Interactions between two biological control agents and their target weed: a beetle, a bug and a cactus weed

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ABSTRACT

Pereskia aculeata Miller (Cactaceae) is an invasive alien shrub introduced into South Africa from Brazil. The leaf-feeding beetle, *Phenrica guerini* Bechyne (Chrysomelidae), was released as a biological control agent in South Africa in 1991 followed by the stem-wilting bug, *Catorhintha schaffneri* Brailovsky & Garcia (Coreidae), in 2014. This study investigated the interactions between the two agents under laboratory conditions. Potted plants were exposed to one of four treatments: control (no agents), *P. guerini* only, *C. schaffneri* only and both species together. Four densities, ranging from 2 to 12 insects per plant were used. *Cathorhitha schaffneri* alone at low to moderate densities resulted in the same reduction in number of leaves and shoot length as when combine with *P. guerini*. At the highest density, *C. schaffneri* reduced the number of leaves significantly more than any treatment. Mortality of *P. guerini* was significantly higher than *C. schaffneri* at the highest density when in combination. The antagonistic interaction between *P. guerini* and *C. schaffneri* suggests that these agents should not be released together because this would impact negatively on the overall biocontrol programme against *P. aculeata*. It is recommended that *C. schaffneri* should be released at sites where *P. guerini* is not present. Extrapolation of laboratory-based studies into the field is often challenging, so mass-rearing and releases of *P. guerini* should continue until there is convincing proof that *C. schaffneri* alone is more effective than *P. guerini* in the field.

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Introduction

Interactions between herbivorous insects may either be direct, involving pairwise interactions between two species, or indirect, including interactions mediated by a host plant (Kaplan & Denno, 2007; Petersen & Sandström, 2001). The interactions between insects and the plants they feed on have important ecological consequences in structuring insect and plant populations and are also the basis of biological control programmes against invasive alien plants (Milbrath & Nechols, 2014; Stout, Thaler, & Thomma, 2006). The way insects interact may have an impact on their population size, population growth rate, as well as individual fitness and the host plants' performance (Abrams, 1987).

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