Impact evaluation of bridal creeper biological control in southern NSW

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Summary The environmental weed bridal creeper (*Asparagus asparagoides* (L.) Druce) is a dense scrambling vine that smothers large areas of vegetation and threatens native biodiversity (Morin *et al.* 2006a). It is listed as a Weed of National Significance (Thorp and Lynch 2000) and has been the target of a biological control program since the 1990s. Three agents of South African origin have since been released: the leafhopper *Zygina* sp. in 1999, the rust fungus *Puccinia myrsiphylli* (Thuem.) Wint. in 2000 and the leaf beetle *Crioceris* sp. in 2002 (Morin *et al.* 2006b). Both the leafhopper and rust fungus have established widely on bridal creeper populations across temperate Australia. The rust fungus however, is the most effective agent, due to its indirect impact on the plant's below-ground biomass (Morin *et al.* 2006c). In contrast, the leaf beetle has only established at a few sites and its impact in the field has not been measured.

Two different approaches have been used to evaluate the impact of biological control agents on bridal creeper in southern NSW. In the first study, the impact of the rust fungus and leafhopper on bridal creeper populations was monitored annually over several years within permanent 3 m^2 quadrats and trellises at one inland and two coastal sites. Bridal creeper populations were also monitored at these sites 2–3 years prior to the release of the agents to gather baseline data for comparison. Substantial reductions in bridal creeper cover, above-ground biomass, stem and fruit production was observed at the two coastal sites, with the rust fungus being the dominant agent. Although the leafhopper population fluctuated greatly between years at one site, it is likely to have contributed to the impact measured on bridal creeper. Both biocontrol agents were less effective at the inland site, possibly due to the drier climate.

In the second study, a fully controlled, three year fungicide exclusion experiment was carried out at three other coastal sites in NSW, to test the direct impact of the rust fungus on bridal creeper growth and reproduction. We also monitored changes in other plant species cover over the same period, to determine whether reductions in bridal creeper leads to the recovery of native vegetation or invasion by other weed species. We found bridal creeper cover, above-ground biomass, fruit and seedling production were substantially reduced in rust-infected plots compared to rust-free plots across all sites. The extent of native vegetation recovery was site dependant, with bridal creeper being replaced by other weeds at more disturbed sites. These studies demonstrate that the rust fungus has major negative impacts on bridal creeper populations, although some sites may need to be carefully managed to facilitate native species restoration.

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