

Enhancement of biological control of bridal creeper by using community as a resource

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Summary A new project, partially funded by NHT, has been initiated to transfer on a national basis outcomes from research conducted by CSIRO/Weeds CRC to the community by establishing a national program for the mass rearing, release, monitoring of two biological control agents of bridal creeper *Asparagus asparagoides* (L.) W.Wight.: the bridal creeper leafhopper (*Zygina* sp.), and the rust fungus, *Puccinia myrsiphylli* (Thuem.) Wint. The releases are being made in collaboration with community groups, professional land managers and schools. To enhance transfer of knowledge, the project has been running a number of workshops to train collaborators in agent biology, release, redistribution, monitoring and impact assessment techniques. A simple monitoring protocol has been developed to allow collaborators to collect insect, rust and plant performance parameters to assess impact of the agents on the weed populations.

Keywords Biological control, insects, fungi, community, redistribution.

INTRODUCTION

Bridal creeper, *Asparagus asparagoides*, is an environmental weed that was deliberately introduced into Australia in the middle of the 19th century as a plant of horticultural merit. It has now been declared a Weed of National Significance (WONS). It has become naturalised in many temperate Australian ecosystems, ranging from wet and dry sclerophyll forests to riparian and coastal vegetation systems. It is increasingly becoming a problem in irrigated orchards in New South Wales and Victoria. In many instances it forms dense monocultures, and is regarded as a very serious threat to biodiversity. Studies on causes of decline of endangered species are rare, but bridal creeper has been associated with the decline of two endangered species, an orchid and a rice flower (see Groves and Willis 1999).

Bridal creeper generally senesces in early summer, and re-shoots from its dense system of underground tubers in autumn, when the shoots grow rapidly and either scramble on themselves or climb up and over existing vegetation. Columns of vegetation can extend 3–4 metres. The plant flowers in late winter, producing

numerous red berries in late spring that are attractive to frugivorous birds that spread the seeds. Unlike many weeds, bridal creeper is capable of colonising undisturbed ecosystems. Due to the habitats that this weed invades, the use of herbicides can be problematic, in that non-target species are affected and infestations can be difficult to access.

Biological control of weeds is based on the premise that the weed's natural enemies will reduce damaging populations to levels where they no longer cause economic and/or environmental damage. This involves the introduction and establishment of these natural enemies into the new environment. Practitioners of biocontrol are increasingly becoming aware that redistribution of these beneficial organisms can be an integral part of a biocontrol project. CSIRO and latterly, the Weeds CRC have demonstrated that two agents for bridal creeper, the rust *Puccinia myrsiphylli* (Morin and Auld 1999), and the leafhopper *Zygina* sp. (Witt and Edwards 2000), are safe to be released into the Australian environment (see Morin *et al.* 2002 and Batchelor and Woodburn 2002a). Although both of these agents have many generations in a season, early experience has shown that neither was a particularly strong disperser. Without active redistribution, many years would be required to see them spread naturally to all infested areas in southern Australia.

Community interest in environmental issues is very widespread, both in city and country Australia, and this resource has already been tapped to help establish the bridal creeper biocontrol agents in many new areas. Researchers in Western Australia (WA) soon found that local schools were also most willing to be involved.

This paper outlines a Natural Heritage Trust (NHT) funded national project that aims to utilise community groups in redistributing biological control agents for bridal creeper, which should allow for wide establishment of the two currently available biocontrol agents for bridal creeper.

PROJECT STRUCTURE

The NHT has agreed to fund a twelve month project, with expectation that a further year's funding will be

required. Two full time Officers have been appointed, one based in Canberra, and the other in Perth. The primary purpose of the project is to redistribute biological control agents by utilising community resources.

COMMUNITY EMPOWERMENT

Experience with other redistribution projects has shown that success of these projects depended to a large extent on the degree of ownership of the process that the community members have (Briese and McLaren 1997). Hence it was realised early in the planning stages of this project that effective knowledge transfer was to play a key role to ensure successful outcomes. To accomplish this, the project has produced written material, and conducted on-site training for key community group leaders across southern Australia.

Brochures and website Because our target audience ranges from school children through to adults, the printed material had to be expressed simply, yet be comprehensive. It relies heavily on illustrations to emphasise the points being made. A brochure has been produced that outlines, in different sections, the life cycle of the plant, insect and rust. It also documents each step in introducing both agents into the field, and has details of how the community members can do their own redistribution from their release sites. More detailed descriptions are available on line at: www.ento.csiro.au/bridalcreeper.

Workshops The project has been conducting short workshops in southern States where bridal creeper infestations are severe (Victoria is organising its own redistribution program). These workshops are seen as 'train the trainer' events where key personnel from state and local government, teachers and community leaders are given data on life cycles of the plant and the biological control agents, trained to rear these agents where necessary, participate in release procedures, identify agent's and their symptoms in the field and assess establishment and spread. The emphasis has been very much focused on a hands-on approach.

School participation Currently 102 schools, mostly in WA, are rearing and releasing the leafhopper (Batchelor and Woodburn 2002b). The leafhopper is an ideal insect for even small children to rear, since the damage to the plant is immediately evident, and the adults are very visible, especially if the foliage is disturbed. Teachers are very enthusiastic, hence the large number of schools rearing, since this insect/plant system allows discussions to occur about beneficial insects, weeds, biodiversity and environmental matters. The NHT project has a target of a further 50 schools,

drawn from all co-operating states, to become actively involved. The rust was made available for schools for the first time.

The biological control agents Leafhopper redistribution has been mostly based in Perth. There are many sites close to Perth where the leafhopper is well established, and most redistribution has been done using field collected material. However, as it took some time for field numbers to build at the beginning of the season, the insects were reared on site in Floreat during this time. Dry-rooted leafhopper-infested plants, washed of all soil to minimise the spread of soil-borne pathogens, have been packaged securely and posted to participants in the redistribution program. The plants are unpacked and their foliage entwined with bridal creeper foliage at the selected release site. Experience has shown that by leaving the tubers attached the plants can survive for several weeks, utilising the tubers' reserves. Entwining the foliage means that leafhopper nymphs are able to crawl off the starter foliage onto the field plants. Heavily infested field collected material has been similarly posted, but without any tubers. This material dries out very rapidly, but the nymphs still have time to migrate to the fresh foliage as above.

The mass-culturing of the rust has been based in Canberra and dry rooted infected plants have been posted to collaborators. The release process for the rust is more complicated than for the leafhoppers. It involves transferring spores from the posted material onto the underside of the plant foliage in the field, and maintaining a high humidity atmosphere for up to a day to facilitate spore germination and hence fungal infection of the plant. The project initially relied on rust-infected material mass-cultured in Canberra to supply rust to WA and SA participants. As with the leafhopper, there are several sites with well established rust populations in suburban Perth from which local field collections can be made, once the rust reaches the asexual phase of its life cycle. The timing of the asexual cycle differs from state to state. For example last season at Narooma, New South Wales (NSW), the asexual cycle commenced in early April, but didn't start until mid June in Perth.

Publicity The project calls for general community awareness to be raised. In the past, national, state and regional press and radio have been supportive of bio-control of bridal creeper, and we expect that this will continue. We would expect at least one report in *The Australian* newspaper and several in the state papers. Local papers are always interested in stories about community groups doing public good activities, and this will be tapped into during the course of the project.

Major media events will be organised at release sites when the agents are most active.

Evaluation In designing this project we have been mindful of the need for feedback on the outcomes of the biocontrol agents. It would be very costly, and beyond the capabilities of the two officers employed by the project, to visit every release site to assess success or failure. Realistically, the most we can expect is a report from recipients at the end of the bridal creeper growing season on, firstly, whether the agent has established and, if so, how far it has spread. Recipients have been made aware of this requirement at the time of agreeing to be participants. The two officers will post reminder notices during late spring reminding people that the assessment time is approaching.

There will however be detailed assessment made at four sites in SA, WA and NSW on severity of attack and impact on the weed performance.

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