

Progress against the national bridal creeper strategic plan and future priorities for *Asparagus* weed management in Australia

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Summary

Bridal creeper, *Asparagus asparagoides* (L.) Druce, is a declared Weed of National Significance (WoNS) in Australia and a national strategic plan has been in place since 2001 to advance its management. Whilst the plan is largely focused on bridal creeper, its scope includes other *Asparagus* weeds in Australia. A national workshop was held in November 2005 to document progress against the plan and determine future priorities in *Asparagus* weed management. Key achievements to date include (i) the establishment of active national, state and regional committees, managing strategic and on-ground projects, (ii) national distribution of biological control agents for bridal creeper, (iii) production of best-practice management guides and (iv) strategic containment of other, emerging *Asparagus* weeds. Key future priorities for the National *Asparagus* Weeds Management Committee are the post-biocontrol recovery of native vegetation, early intervention against the newly discovered Western Cape form of bridal creeper and strategic investment into national management of other *Asparagus* species.

Introduction

The national strategic plan for the management of bridal creeper, *Asparagus asparagoides* (L.) Druce, was launched in 2001 (Agriculture and Resource Management Council of Australia and New Zealand (ARMCANZ) *et al.* 2001), following the weed's declaration as a Weed of National Significance (Thorp and Lynch 2000). Over the past four years, a number of the objectives within the strategic plan have been met. These include the distribution of biological control agents, the formation of a National *Asparagus* Weeds Management Committee (NAWMC) and the employment of a national coordinator (lead author) to facilitate the on-ground implementation of the objectives. Challenges still remain. Objectives pertaining to containment lines, protection of high value biodiversity areas and the control of other *Asparagus* weeds require further work. The first part of this paper documents key achievements against the set objectives in the national strategic plan as at December 2005.

NAWMC convened the inaugural National *Asparagus* Weeds Management Workshop, which was held in Adelaide, South Australia in November 2005. This provided an opportunity to present the progress in understanding and managing *Asparagus* weeds, as documented in this special issue of Plant Protection Quarterly. The workshop also enabled discussion of the ongoing and new challenges we face. The second part of this paper gives the outcomes of the workshop in terms of future priorities for improving the management of *Asparagus* weeds in Australia.

Achievements against the national strategic plan

The vision for the national bridal creeper strategic plan (ARMCANZ *et al.* 2001) is that 'Bridal creeper is managed effectively to stop further spread and to reduce its impacts on Australia's natural assets'. Three key outcomes support this vision:

- '2.1 Commit and coordinate – The community and governments recognize bridal creeper as a major environmental threat and are committed to its management';
- '2.2 Eradicate and prevent spread – High value natural assets are protected from invasion by bridal creeper'; and
- '2.3 Reduce existing impact – Bridal creeper is managed to reduce its density and occurrence''.

Each outcome has a series of objectives (with underlying strategies and actions). A comprehensive report on achievements is written annually by the National *Asparagus* Weeds Management Committee, for the Australian Weeds Committee. Major achievements to date against these objectives are summarized below.

Outcome 2.1 Commit and coordinate

Objective 2.1.1 Coordinate bridal creeper management at national, state and regional levels.

The National Bridal Creeper Steering Committee was formed in 2001, changing its name to the National *Asparagus* Weeds Management Committee (NAWMC) in 2005. A National Bridal Creeper Management Coordinator was employed

in February 2005, with a recent contract extension to December 2008. A statewide eradication program for bridal creeper in Tasmania was initiated in 2001. Regional and local *Asparagus* working groups have been formed in Western Australia, South Australia and Victoria.

Objective 2.1.2 Enable the community to recognize bridal creeper and the threats it poses to natural assets.

A quarterly newsletter, 'The Bridal Creeper', is now in its fourth issue and is circulated to a mailing list of approximately 400 recipients across Australia. Funding from the Australian Government's Defeating the Weed Menace Programme has been received to compile an *Asparagus* Weeds Control Manual. Management information has been made available on the national bridal creeper web page, hosted by the Weeds Australia website (Weeds Australia 2005). Information available on the page includes back copies of the newsletter, executive summaries of annual reports to the Australian Weeds Committee, presentations on the use of 'spore water' and an electronic version of the Weeds CRC management guide.

Objective 2.1.3 Establish long-term community commitment to fund and implement actions in the strategy.

To assist community and State groups tailor funding project proposals that match the national strategic plan, a framework (Figure 1) has been developed by the NAWMC, based on a similar approach initiated for bitou bush/boneseed, *Chrysanthemoides monilifera* (L.) Norl. The framework ranks the strategic plan's objectives according to current priorities. This framework is extensively promoted to all prospective project proponents and is available from the national bridal creeper web page (Weeds Australia 2005). The framework is reviewed prior to each project funding call.

Strategy 2.2 Eradication and prevent spread

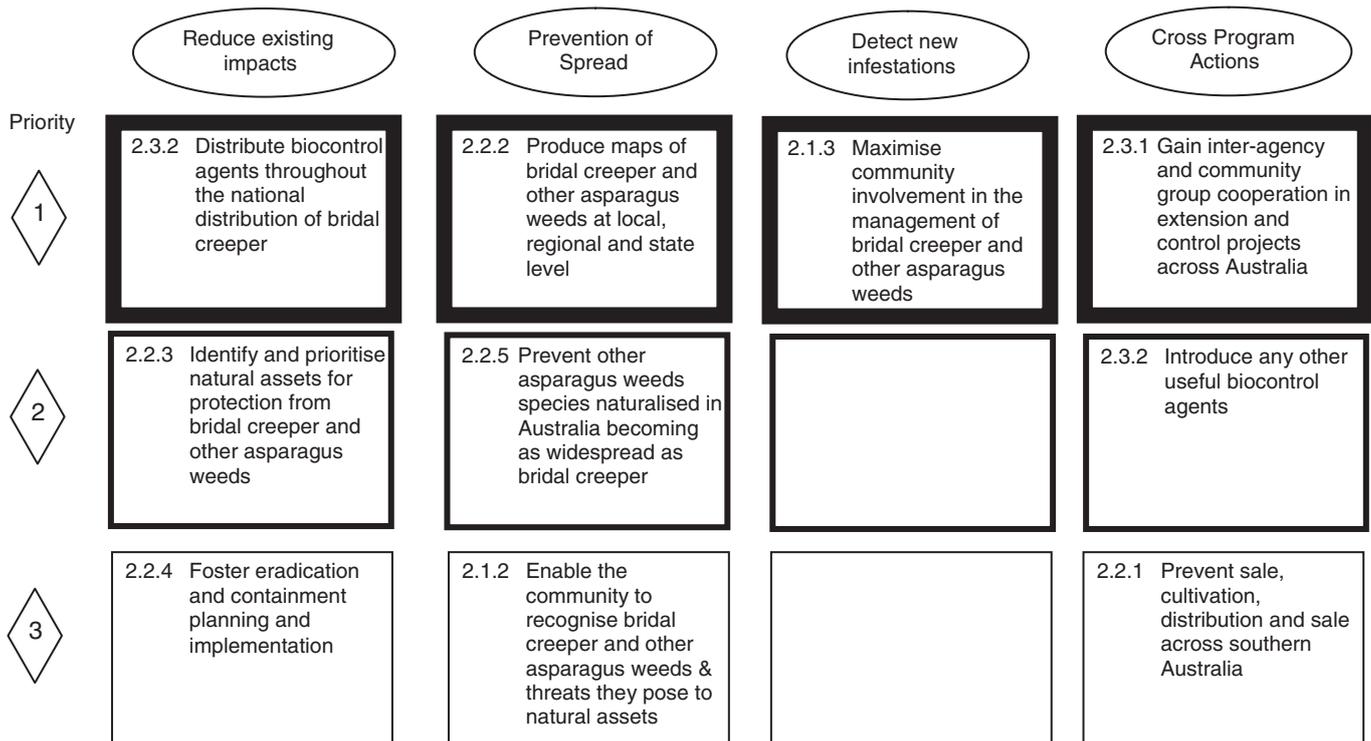
Objective 2.2.1. Prevent the sale, distribution and cultivation of bridal creeper.

All States and Territories now have legislation in place banning the sale and movement of bridal creeper.

Objective 2.2.2. Map bridal creeper infestations

Morin *et al.* (2006a) have produced a national distribution map of bridal creeper, consolidating release sites of biological control agents and national herbarium records. Similar maps are needed for other *Asparagus* weeds in Australia. The National Coordinator has encouraged all project proponents to include a mapping component into their funding

Bridal Creeper and Asparagus Weeds National Priority Action Framework



Priorities are strategies listed within the National Bridal Creeper Strategic Plan. Numbers correspond to objectives in the strategic plan.

Figure 1. Priority framework for preparing Asparagus weed projects.

applications, which will be used in future to compile accurate distribution maps. A project commenced in 2005 to map the Western Cape form of bridal creeper in south-east South Australia and south-west Victoria (Coles *et al.* 2006).

Objective 2.2.3. Identify and prioritize natural assets for protection from bridal creeper.

Regional projects targeting the protection of priority biodiversity sites have been and continue to be undertaken in Western Australia, South Australia and Victoria. The continuity and success of such projects is closely tied to accessing Australian Government funding opportunities via Regional Investment Strategies, Envirofund and the Defeating the Weeds Menace Programme.

Objective 2.2.4. Develop and implement regional eradication or containment strategies.

The key national project is the statewide eradication of bridal creeper from Tasmania (Cooper and Warren 2006). An intensive eradication effort is also underway on Lord Howe Island (LeCussan 2006).

Objective 2.2.5. Contain other, newly emerging Asparagus weeds.

This is a very important objective within the strategic plan because it legitimizes the development of projects and initiatives

for all weedy *Asparagus* species present in Australia under the Weeds of National Significance (WoNS) banner. It allows for the development of initiatives that enable pre-emptive management of other Asparagus weeds before they reach the national infestation and impact levels achieved by bridal creeper. Particular effort has been put into containing bridal veil, *Asparagus declinatus* L., in South Australia (Lawrie 2006) and the containment and eradication of the western cape form of bridal creeper (Coles *et al.* 2006) was seen as a national priority at the National Asparagus Weeds Management Workshop.

Strategy 2.3 Reduce existing impacts

Objective 2.3.1. Gain land manager adoption of the most effective and appropriate management practices for bridal creeper infestations (including rehabilitation), based on current knowledge.

The Weeds CRC has produced two best practice management guides for the management of bridal creeper (Willis 2000, Weeds CRC 2005). The latter document has been widely distributed to community groups, landholders and weed managers throughout Australia. Workshops on the most effective distribution methods for the three biological control agents have been held across the country as part of the CSIRO's national program since 2001. Local weed control and environmental

officers have in turn run annual site demonstrations involving smaller community groups. Funding has been received from the Federal Government through the Defeating the Weed Menace Programme to develop a best practice manual for all Asparagus weeds. The manual will be distributed in autumn 2006.

2.3.2. Distribute biocontrol agents to regions where eradication of bridal creeper is not technically feasible.

The CSIRO has been the lead agency in distributing the biocontrol agents throughout the growth range of bridal creeper, with the exception of the Department of Primary Industries managing biocontrol distribution in Victoria. Of the three agents released, the bridal creeper rust (*Puccinia myrsiphyllii* (Theum) Wint.) has proved the most successful (Morin *et al.* 2006b). The use of biological control has been enthusiastically embraced by both State and community land managers. A combination of natural spread and active redistribution of agents from nursery sites has seen a rapid infection of bridal creeper sites throughout the country. However, pockets of uninfected bridal creeper remain, particularly in areas of limited rainfall. The monitoring of the effectiveness of the biocontrol program will continue to be undertaken by the CSIRO, pending funding arrangements. Detailed information on release sites of all three biological control agents can be

found on the CSIRO's national database (<http://www.ento.csiro.au/weeds/bridal-creeper/project.html>).

2.3.3. Refine and promote best practice for bridal creeper infestations where biocontrol agents are established.

To date limited research has been undertaken into the post-biocontrol management of infestations, integrating it with other techniques to enable the rapid recovery of native vegetation. Turner and Virtue (2006) found the dead tuber mats of bridal creeper persist for at least eight years, and dealing with these mats remains a significant management problem. There is some urgency to this as the biocontrol agents are proving so successful in some areas that rehabilitation of once infested land is now required to prevent invasion by other weeds.

Setting priorities for Asparagus weeds management

At the National Asparagus Weeds Management Workshop participants discussed what they felt were the major issues that must be addressed in the next three years. Groups were then asked to nominate and vote on their top issues for bridal creeper and other Asparagus weeds. A similar process had also been undertaken prior to the workshop, at a meeting of the NAWMC. There was much similarity between the priority lists from the NAWMC meeting and the national workshop and these were consolidated.

Future priorities for bridal creeper management

The following issues are listed in order of importance.

Bridal Creeper (BC) Priority 1. Support (both financial and research) for ecosystem restoration, following the removal of bridal creeper by herbicide and/or biocontrol methods.

This may include revegetation strategies and the control of new weeds (e.g., grasses) advantaged by bridal creeper's decline. The persistence of dead tuber mats are likely to significantly inhibit regeneration of native plants. Research into hastening the decomposition of tuber mats and directing plant successional processes towards indigenous species are needed, so that land managers have tools to restore natural ecosystems. Applying these tools in priority biodiversity areas will require funding.

BC Priority 2. Finding new outbreaks for eradication and developing on-ground control plans, including eradication zones.

Where bridal creeper is still in the early stages of invasion (e.g., Tasmania, parts of NSW), 'search and destroy' projects

are a national priority. This may also incorporate protection of uninvaded, high biodiversity sites within infested regions. Mapping (see priority 3) is vital to determine the feasibility of eradication or containment lines, as is gaining the long-term support of Natural Resource Management (NRM) regions, community groups and/or local governments whose task it is to establish and maintain such lines.

BC Priority 3. Produce maps of bridal creeper distribution of sufficient detail to inform management decisions at the regional and local levels.

This will involve the collation of point and polygon data from around Australia to enable production of distribution maps from national to local scales. Regional maps are needed to determine appropriate eradication and containment zones. Local maps are important for community groups to determine whether key biodiversity sites are at risk from invasion.

BC Priority 4. Inclusion of bridal creeper management in all relevant NRM regional strategies or plans.

An information pack on bridal creeper needs to be sent to all NRM regions that are currently or at risk of being invaded by the weed, followed up by visits by the National Bridal Creeper Coordinator. The outcome sought is that bridal creeper in recognized by NRM regions as an important issue and its management is explicitly funded in their regional investment strategies. This activity is most efficiently done in conjunction with other WoNS National Coordinators, so that a consistent approach for WoNS management can be presented to regions.

BC Priority 5. Forming regional committees where none exist.

Regional committees, consisting of government and community members, have had significant success in securing regional and national funding opportunities for on-ground projects. Priority regions for committee development are south-east South Australia/ south-west Victoria, coastal zones of New South Wales and the Mallee cross-border region between South Australia and Victoria.

BC Priority 6. Community awareness campaign, including potential funding opportunities and linkages between community groups.

The launch of the Asparagus Weeds Control Manual in 2006 will attract media attention to raise general public awareness. The national newsletter is providing an effective vehicle to reach community groups and the National Coordinator will link groups in developing local and regional projects.

BC Priority 7. Cost: benefit analysis of bridal creeper management.

This is needed to demonstrate the returns gained from the significant time and financial investment that has been made into managing bridal creeper, particularly the biological control program. Estimating the cost of bridal creeper management will also demonstrate the need to avoid a repeat scenario with other Asparagus weeds.

BC Priority 8. Fire management and ecological research.

This is linked to Priority 1, focusing on tuber destruction, access for herbicide application and regeneration of indigenous species.

BC Priority 9. A national, off-label permit for the herbicide management of bridal creeper.

Any legal issues that are barriers to effective herbicidal control of bridal creeper throughout Australia should be resolved.

BC Priority 10. Continued dispersal of biological control agents.

Reasons for poor biological control performance in certain regions in Australia need to be determined and overcome, including achieving better establishment success with the leaf beetle (Morin *et al.* 2006b).

BC Priority 11. Better bridal creeper management in citrus.

Citrus industry funding opportunities need to be pursued for further research.

BC Priority 12. Understanding dispersal of bridal creeper.

Models for how to detect and delimit bridal creeper infestations need further development into a tool, which can be used by community groups.

BC Priority 13. Evaluate WoNS achievements.

The degree to which these listed priorities and the objectives in the national strategic plan have been addressed needs to be reviewed again in three years.

Future priorities for management of other Asparagus weeds

Other Asparagus (OA) Priority 1. Aim to eradicate or contain the Western Cape form of bridal creeper.

Whilst it is a challenging task to commence strategic control of the Western Cape form of bridal creeper over its recently mapped range in south-east South Australia and south-west Victoria (Coles *et al.* 2006), its current distribution is still minute relative to its potential range across Australia (Scott and Batchelor 2006). Its low susceptibility to the bridal creeper rust (Coles *et al.* 2006) also means that biocontrol

cannot be relied upon to significantly limit its spread. Hence, workshop participants considered it a national eradication priority and resources to commence a strategic herbicide program in 2006 will be sought. Further research is needed into optimal herbicide treatments, the potential for the leaf beetle to enhance control efforts and the taxonomic status of the Western Cape form.

OA Priority 2. Determine the taxonomic status, current distribution, rate of spread and biodiversity impacts of all Asparagus weeds.

National distribution maps are needed for all *Asparagus* spp. and it is clearly efficient to record the presence/absence of all such species when mapping bridal creeper, and to make observations on their impacts on indigenous vegetation (Downey 2006). Rates of spread are difficult to quantify but are important in determining urgency of control actions. A key need in mapping is proper taxonomic identification of specimens. For example, uncertainty over the true identity of specimens named as *A. aethiopicus* L. in Australia was raised at the workshop (Batchelor and Scott 2006).

OA Priority 3. Determine strategic management priorities for all Asparagus spp. naturalized in Australia, by analysing their relative weed risks and feasibility of coordinated control.

This follows on from priority 2 above, using distribution, impacts and control information to determine which other *Asparagus* species are priorities for investment into their targeted management. For some species biological control may be the most cost-effective action, whereas for others it may be regional containment.

OA Priority 4. Legal restrictions on sale and movement of Asparagus species, especially those of limited distribution.

Following priorities 2 and 3 above, an information pack needs to be prepared for all State/Territory noxious weed authorities indicating which *Asparagus* spp. should be targeted via legislation to limit their further spread.

OA Priority 5. Research potential biocontrol agents.

There was considerable interest at the workshop on investigating biocontrol agents that target a range of African *Asparagus* species, particularly tuber feeders. Research directions would be pending outcomes from priorities 2 and 3 above.

OA Priority 6. Quantify the cost of managing Asparagus weeds, from an environmental, economic and social perspective.

This expands BC Priority 7 to all *Asparagus* species.

OA Priority 7. Obtain funding clarity for other Asparagus weeds.

Strategic management of other *Asparagus* weeds is an endorsed component of the national bridal creeper strategic plan (ARMCANZ *et al.* 2001). The NAWMC has chosen to cover all *Asparagus* weeds, in recognition of the efficiencies to be gained in a genus approach to management and of the need to prevent close relatives of bridal creeper from reaching similar, widespread levels of ecosystem damage. However, funding guidelines only specify bridal creeper as being eligible for investment. The NAWMC will seek clarity on this matter through the Australian Weeds Committee. This will be of particular benefit to regionally funded projects.

Conclusion

Bridal creeper and other *Asparagus* weeds are major invaders of natural ecosystems throughout southern and eastern Australia. They have major impacts on native plant biodiversity and are difficult to control due to their vegetative reproduction and dispersal by vertebrates, particularly birds. Nonetheless, significant gains have been made in their management in the past five years, facilitated by the national bridal creeper strategic plan (ARMCANZ *et al.* 2001). Of particular note is the widespread distribution of biocontrol agents for bridal creeper, and the many factsheets and guides produced for community groups and landholders. The inaugural National *Asparagus* Weeds Management Workshop was an opportunity to document this progress and to chart future directions. Post-biocontrol recovery of native vegetation, early intervention against the Western Cape form of bridal creeper and strategic investment into national management of other *Asparagus* species are top priorities for the National *Asparagus* Weeds Management Committee.

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