

Australia's Current Approval Procedures for Biological Control with Particular Reference to its *Biological Control Act*

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Abstract

In 2010 Biosecurity Australia introduced new procedures for evaluating applications to approve release of biocontrol agents in Australia under the *Quarantine Act 1908*. The first organism treated under the new system was the leaf beetle, *Plectonycha correntina* Lacordaire, for biocontrol of Madeira vine, *Anredera cordifolia* (Tenore) Steenis. This case is used to describe Australia's current protocols for release. Conflicts of interest can still be resolved by the *Biological Control Act 1984* which was introduced to allow continuation of the project for Paterson's curse (*Echium plantagineum* L.). After Paterson's curse was declared a target organism and eight insect species declared agent organisms in 1987, blackberry (*Rubus fruticosus* L.) and rabbits (*Oryctolagus cuniculus* L.) were later declared as target organisms in 1987 and 1995 respectively. No other cases have been considered under the Act. A case is presently being prepared by Queensland to declare mother-of-millions, *Bryophyllum delagoense* (Eckl. and Zeyh.) Schinz, as a target and the weevil *Osphilia tenuipes* (Fairmaire) as an agent under the Act because the weevil may attack closely related exotic ornamentals. This test case will provide perspective about the usefulness of the Act for weed biocontrol in Australia and internationally.

Introduction

As in other countries, Australia's protocols for approving the release of biological control agents are ever evolving. Early biological control projects were lantana (Day et al., 2003) and prickly pear (Dodd, 1940), both of which began before the First World War. The first four lantana insects were introduced and released in Australia on the basis that they appeared host specific and had not attacked non-targets in Hawaii after their release there a decade earlier. Host testing was undertaken for the prickly pear insects in the 1920s but the Prickly Pear Board decided that it would give the approvals to release, rather than the officer-in-charge of the scientific

investigation (Anon., 1923). No regulatory agency was involved at that stage and the Board also requested legislation to prevent individuals making their own importations and releases (Anon, 1923). As time progressed the approval process became more rigorous (McFadyen, 1997; McLaren et al., 2006).

This paper describes Australia's current arrangements using the leaf beetle *Plectonychia correntina* Lacordaire for illustration. The paper also provides an update on the use of the *Biological Control Act 1984*, which provides a mechanism for resolving conflicts of interest, whether regarding the target weed or the candidate biological control agent.

Standard procedures leading to release

Approval of a weed as a target for biological control

Regulatory agencies (and often funding bodies for the research) require that a weed be approved as a target for biological control to ensure that any beneficial uses of the plant are noted. Generally a weed would not be approved as a target if it had significant beneficial uses or if it were a native plant. The process has been that an agency makes written application to the Australian Weeds Committee, which considers the application and also notifies all of the Australian jurisdictions. It then makes a recommendation to the Standing Committee (a committee of departmental heads of all relevant federal and state jurisdictions) for approval by Standing Committee. In 2011 Standing Committee delegated responsibility to approve targets to the Australian Weeds Committee.

Madeira vine, *Anredera cordifolia* (Tenore) Steenis, is a serious weed along the east coast of Australia and elsewhere in the world (Vivian-Smith et al., 2007). It was approved as a target in May 2007 by the Natural Resource Management Standing Committee following an application submitted in April 2005 and subsequent recommendation from Australian Weed Committee.

Approval to import agents into Australian quarantine facilities

Two federal agencies, the Australian Quarantine and Inspection Service (AQIS), acting on recommendation by Biosecurity Australia (BA) (both part of the Biosecurity Services Group, Department of Agriculture, Fisheries and Forestry) and the Department of Sustainability, Environment, Water, Population and Communities (SEWPC) issue permits for biological control agents to be imported into approved quarantine premises. These actions are made under the authority of the *Quarantine Act 1908* and the *Environment Protection and Biodiversity Conservation Act 1999* respectively. Obtaining these permits is a relatively straightforward procedure, with the major consideration being the security of the quarantine facilities and associated arrangements.

Following approval of Madeira vine as a target, the leaf feeding beetle, *Plectonycha correntina* Lacordaire, was selected as the first candidate for testing. This chrysomelid was known to have a limited host range, to be multivoltine, and to attack the plant in both larval and adult stages (Cagnotti et al., 2007). Permits from both agencies were obtained within 2 months of application.

Approval to release agents from quarantine facilities

AQIS approves releases of biological control agents under the *Quarantine Act* but does so following a recommendation from BA. Until 2009, applications to release agents were reviewed for BA by 21 cooperators, drawn from all the jurisdictions and including representatives of all the weed biocontrol groups. Essentially the release application needed the support of all the cooperators before BA would recommend release.

In 2009, BA adopted new procedures. All applications are now reviewed within a formal risk assessment framework for imported goods (Australian Government Department of Agriculture, Fisheries and Forestry, 2011). Within that framework they have so far been treated as non-regulated cases of existing policy rather than as standard Import Risk Analyses (IRA). The essential steps of the non-regulated process are similar to an IRA and they are: (1) provisional assessment and recommendation by BA, (2) posting of the application and provisional assessment on the web for 50 working days, (3) consideration by BA of any objections to the release and (4) recommendation to AQIS to approve (or deny) the release.

SEWPC independently ascertains whether the proposed agent will harm Australia's flora or fauna. The SEWPC process is to post the application on their web site for stakeholder comment, to write to all appropriate jurisdictions, and to consider the recommendation of BA before deciding upon further import and release of the agent. Under the terms of the *Environment Protection and Biodiversity Conservation Act 1999* the Minister must sign the approval within 30 business days and there is provision for the decision to be tabled as a disallowable instrument in both Houses of Parliament for 15 sitting days. This tabling has been

a concern for biocontrol practitioners as it can result in an additional delay of 6-9 months (depending on when Parliament sits) in the release of the agent.

It should be emphasized that both BA and SEWPC conduct risk analyses and not benefit/cost analysis. They do not take into account the potential benefits of introducing the biocontrol agent and reject agents if there is significant risk to Australia's economy or Australia's flora or fauna.

Host testing of *P. correntina*, using 37 plant species, showed that the insect was specific to Madeira vine (Palmer, 2009). Some adult feeding and very occasional larval development occurred on the closely related Ceylon spinach, *Basella alba* L. This was interesting because Ceylon spinach is commonly grown as a vegetable by our Asian communities though there is little commercial trade.

Application to release *P. correntina* was made to both agencies in December 2009, and this agent was the first to be considered under BA's new procedures. In November 2010, AQIS advised that the insect could be released. The 11 months taken to process the application was longer than might be expected in the future. The approval from SEWPC was received in February 2011. A very important change made was that SEWPC did not require the decision to sit in the Parliament before the approval took effect and that this requirement may no longer be necessary in non-controversial cases. A final departmental approval was then obtained and the insect was released from quarantine in early April 2011, some 16 months after application.

The Biological Control Acts

Madeira vine is an uncontroversial weed and *P. correntina* is a host specific agent. Together they provide a clear cut example with which to demonstrate Australia's usual protocols for biocontrol agents. In some instances there may be conflicts of interest associated with either the target weed or the specificity of the agent, such as the examples provided by Palmer (2003a; -2003b). Australia can resolve these issues through the *Biological Control Act 1984 (Cwlth)* and the mirror legislation of each of the state jurisdictions.

The *Biological Control Act 1984* was enacted as a response to the conflict that developed between most

graziers, who regarded Patterson's curse (*Echium plantagineum* L.) as a serious weed and apiarists who valued the plant for its honey. Use of the Act allowed resolution of the *Echium* conflict (Anon., 1985) in 1987, the blackberry issue in 1992 and the rabbit calici virus issue in 1995 (Anon., 1996). These have been the only times the Act was applied over 16 years ago.

The mother-of-millions case

Mother-of-millions, *Bryophyllum delagoense* (Eckl. & Zeyh.) Schinz, and its hybrid *B. houghtonii* (D. B. Ward) P. I. Forst. (Crassulaceae), became approved targets for biological control in 2001. Exploration for agents in Madagascar and southern Africa resulted in consideration of four agents as potential biological control agents (Witt et al., 2004; Witt and Rajaonarison, 2004). Detailed host specificity testing of two agents and preliminary testing of the other two indicated that none was completely specific and all had narrow host ranges. The host range of the weevil *Osphilia tenuipes* (Fairmaire) provides a typical profile. Host testing indicated that *O. tenuipes* could utilize all *Bryophyllum* spp. found in Australia (all exotic), several of the closely related exotic *Kalanchoe* spp. and possibly a few other exotic Crassulaceae (Palmer, 2003a; -2003b). It does not attack any native Australian plant.

Queensland's actions

Because Queensland believes that the benefits of controlling mother-of-millions far outweigh possible costs to the nursery industry and private gardeners, it has recently proposed to the Primary Industries Ministerial Council that all *Bryophyllum* spp. be declared target organisms and that the four insect species be declared agent organisms under the Queensland *Biological Control Act 1987*. This proposal was unanimously supported by the Ministerial Council in April 2011.

Future course

The Queensland Minister for Agriculture, Food and Regional Economies who is the 'Biological Control Authority' for Queensland under the Act

will now ascertain whether there is significant community dissent about proceeding with biological control by releasing any of the insect species. Should objections be significant, the Biological Control Authority would appoint a commission of enquiry to ascertain the relationship between the potential benefits of the biological control of the weed and the potential costs to the nursery industry should the insect become a pest.

Should there either be no significant objections to the releases or the commission of enquiry finds that the benefits outweigh the costs, the Biological Control Authority would recommend that the declarations be approved by unanimous agreement of Ministerial Council.

After the weeds and the insects are declared target organisms and agent organisms, respectively, under the *Biological Control Act 1987*, application would then be made to AQIS and SEWPC to approve the releases under the *Quarantine Act 1908* and the *Environment Protection and Biodiversity Conservation Act 1999* respectively.

New ground

This application through a Biological Control Act breaks new ground in three aspects. All previous applications under the Act have been taken retroactively after agent organisms had been released or had escaped. This is the first application to be made completely *a priori*.

Previous applications have involved conflicts of interest with the target organisms, essentially when some stakeholders regarded the targeted species as beneficial. This is the first application where the potential conflict about the lack of specificity of the candidate agents.

Australia's first legislation providing resolution of these conflicts of interest was the Commonwealth's *Biological Control Act 1984* which was used for all three previous cases. All of the state jurisdictions enacted mirror legislation (e.g. Queensland's *Biological Control Act 1987*) but this will be the first use of state legislation and a state minister acting as the Biological Control Authority.

Discussion

Australia remains well placed to practise classical biological control, having appropriate legislation and protocols (summarized in Table 1) to assess applications in a reasonably rigorous and transparent fashion. Over the decades the process has become more rigorous (and onerous). In the early 1980s it took 2-3 months to receive permission to release and that permission was given by a single entity. Today we hope for permission in 9 to 12 months but quite often it takes longer.

It is of course highly desirable for approvals to be obtained as quickly as good evaluation will allow. There are significant costs and risks associated with the long term culturing of agents in quarantine, including the occupation of very valuable quarantine space, the labor costs associated the continued culture, the cost of continued control by stakeholders in the absence of the biocontrol, the risk that the culture could be lost or genetically modified, and even the risk that it might escape. It is therefore hoped that further modifications can be made to Australia's procedures to reduce the time taken by the decision making processes.

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