

Quarantine law loophole: an examination of the known weed species permitted for import without weed risk assessment

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Summary The importation of exotic plants into Australia is regulated by the Australian Quarantine and Inspection Service (AQIS) using a Permitted List, a Prohibited List and a Weed Risk Assessment (WRA) process. A plant not found on the Permitted List is either explicitly prohibited or must undergo a risk assessment. Once on the Permitted List a plant can be imported into Australia without impediment. The Permitted List (*Quarantine Proclamation 1998 Schedule 5*) currently includes over 6600 entries. These listings allow the import of seeds of expressly named species and those of any species in named genera. The majority of species in these genera have not undergone any kind of weed risk assessment and therefore pose a sizeable threat to Australian agriculture and natural ecosystems.

The key findings of this study show that as of 1 December, 2003, Schedule 5 permits the legal import of 125,241 plant species in 2916 genera without any WRA. Of these plants, 4003 species are known agricultural and environmental weeds not yet present in Australia that are permitted entry through 700 (24%) of the 2916 listed genera. The Permitted List includes numerous weeds that are closely related to Weeds of National Significance (WONS) and all plants in many genera that contain some significant weeds. Plants can also be imported that may be identified by the importer using synonyms of prohibited species.

This substantial weakness undermines both the intent and purpose of the Permitted List and Weed Risk Assessment system and places Australian agriculture and natural ecosystems at significant risk from further weed invasions.

Keywords Risk assessment, quarantine, weed invasion, AQIS.

INTRODUCTION

Many non-native plants found in Australia were deliberately imported for agricultural, horticultural, or ornamental use with few restrictions. Some of these plants have become significant weeds in both agricultural and natural ecosystems. Weeds have a substantial impact on Australia's economy and natural heritage and further invasions will increase the burden substantially.

In 1997 there were major changes in the process for plant importation in response to a review of quarantine procedures. A system of Weed Risk Assessment (WRA) was instituted to more carefully regulate the deliberate movement of plants into Australia. There was also a major shift in policy from the reliance on a Prohibited List to a focus on the use of a Permitted List. A plant may be deliberately imported only if it is found on the Permitted List. Prior to the implementation of this system, there were few restrictions on plant importations. The current approach is designed to result in fewer new weed incursions. However, there is a weakness in the Permitted List that allows known weeds not yet present in Australia to be imported without any WRA or restriction.

In this paper we outline the nature and implications of this weakness, identify the number of known weeds not yet present in Australia in genera listings found on the Permitted List, and provide recommendations to remove the loopholes.

A policy of prevention The Australian, State and Territory governments have recognised the importance of preventing new weed problems. In 1997 the National Weeds Strategy was adopted after an agreement in 1991 between Commonwealth, State and Territory ministers that such a plan was necessary to 'reduce the impact of weeds on the sustainability of Australia's productive capacity and natural ecosystems' (Agriculture and Resource Management Council of Australia and New Zealand (ARMCANZ) *et al.* 1999). Revised in 1999, the National Weeds Strategy (ARMCANZ 1999) recognises that 'prevention and early intervention are the most cost effective techniques that can be deployed against weeds'. Consequently, the first goal is to prevent the development of new weed problems and includes an objective (1.1) to prevent the introduction of new plant species with weed potential by strengthening import entry protocols for assessing all new plant imports.

The agreed timetable for completion of actions to achieve the first National Weeds Strategy objective was set out in the National Objectives and Targets for Biodiversity Conservation, 2001–2005 (Commonwealth

of Australia 2001). The targets stated below were determined to be Commonwealth responsibilities.

Target 4.1.1: By 2001, the import of **all** new live organisms is subject to a risk-based assessment process that identifies the conditions necessary to minimise threats to the environment.

Target 4.1.2: By 2001, no **new** non-native species are deliberately introduced into Australia **unless assessed** as being of low risk to the environment.

Quarantine legislation and its weakness Prevention of new weed problems takes place at the border. The Australian Quarantine and Inspection Service (AQIS) has the role of border control while Biosecurity Australia determines what material is allowed across the border. Activities of AQIS are legislated by the Australian *Quarantine Act 1908*. Section 13 of the *Quarantine Proclamation* which specifically identifies the plants that are permitted, prohibited, and restricted from importation into Australia.

Quarantine procedures have been reviewed several times. The most recent review occurred eight years ago in 1996 (Nairn *et al.* 1996). The Review Committee commissioned several reports to aid them in constructing their recommendations, one of which specifically addressed the issue of weed incursions. Based on the weed report the Review Committee felt there was a need to strengthen the assessment process for importing plants, particularly ornamental plants used in the nursery trade (Nairn *et al.* 1996). They noted that the prohibited list system which AQIS was currently working under did not adequately serve the purpose of reducing the introduction of new weeds (Nairn *et al.* 1996).

In Recommendation 54 the Review Committee proposed that ‘the regulations governing the import of seeds and plant germplasm be based on a permitted list for entry rather than solely the current prohibited list’ (Nairn *et al.* 1996). This permitted list was intended to be based upon ‘scientific risk analysis’ and a prohibited list maintained as a supplement to the permitted list (Nairn *et al.* 1996). Biosecurity Australia and AQIS adopted this approach and both Permitted and Prohibited Lists were included in the redrafted *Quarantine Proclamation 1998*. Propagable material of any plant not on the Permitted or Prohibited Lists is now subject to a WRA before permission to import is granted. Once a decision is made the plant species is added to the relevant list.

The Permitted List is found in *Schedule 5* of the *Quarantine Proclamation 1998*. Any plant species included on this list can be imported as seed material without limitation unless contaminated with a

prohibited species. According to AQIS (2004a), ‘Schedule 5 of the Quarantine Proclamation lists “permitted seeds” as being those that have been scientifically assessed not to be a quarantine risk. Seeds listed in Schedule 5 do not require an AQIS Import Permit.’ This is the case for any new plant species added to the Permitted List because these are subjected to a WRA before being approved. However, the inclusion of many plants on the Permitted List is an historical artefact and these may not have undergone a WRA.

Prior to 1990 many grasses that were imported for pasture were evaluated only on the basis of whether they harboured pathogenic diseases that might detrimentally impact agriculture; weed potential was not a consideration at this time. Any protocols developed for that species may have been the basis for approving the entire genus for entry into Australia (C. Walton pers. comm.). This same philosophy may have also been applied to garden plants: where one or more species in a genus was commonly imported then the whole genus was permitted entry. These genera were transferred over to the current Permitted List because they were historically permitted and all species within the genus were ‘exempt’ from a WRA when the new protocols were put in place. Seeds of any plant species in these permitted genera can be imported without constraint and have not undergone a weed risk assessment. Thus the Permitted List now includes specific plants that have undergone a WRA and whole genera containing species that have not undergone WRA (an excerpt of the Permitted List is found in Table 1).

From 1991–96, when an application to import a new plant was made, a scoring system based on the method described by Hazard (1988) was used to evaluate the species. This was followed by the more comprehensive WRA protocol instituted in 1997.

Some of the permitted genera contain species that are a serious risk to Australian agriculture and native environments. These species are weeds in other parts of the world and even based on the pre-1997 scoring system used by AQIS they may not have been permitted entry. Certainly under the WRA protocol now used

Table 1. List of the first 10 entries from Schedule 5 Permitted Seeds (example genera listings indicated in bold).

<i>Aa</i> spp.	<i>Abelia prostrata</i>
<i>Abarema</i> spp.	<i>Abelia schumannii</i>
<i>Abdominea</i> spp.	<i>Abelia spathulata</i>
<i>Abelia chinensis</i>	<i>Abeliophyllum distichum</i>
<i>Abelia grandiflora</i>	<i>Abelmoschus</i> spp.

by AQIS they would not have been permitted entry. This is undoubtedly the case for the recent importation of bear claw fescue, *Festuca gautieri*. This plant has demonstrated its weed potential elsewhere in the world but did not undergo a WRA before entry into Australia because it is in one of the permitted genera. In January 2004 an application to import the species into Western Australia was made and was rejected for importation based on a WRA. Had a similar procedure been followed by AQIS this plant would not have been permitted entry into the country.

Closing the door The lists contained in the Schedules of the *Quarantine Proclamation 1998* are the basis for the import process. When this process became reliant on a Permitted List system it was evident that the current lists would need to be revised. Without a comprehensive overhaul of the Permitted List the National Weeds Strategy objective and Biodiversity Conservation targets cannot be met. The Nairn Review Committee recognised the need to update the Quarantine Proclamations and Regulations (Recommendation 107; Nairn *et al.* 1996), as did the National Weeds Strategy which provided funding for the review of both the Permitted and Prohibited Lists (Walton 2001). This review was to be completed by 1999 and according to Walton (2001) at the completion of the review:

‘...genera will not be permitted unless all members of the genus pose an acceptably low risk. In most cases the genus will be removed from the list and only those native or naturalised species will remain. All other species in the genus will require full assessment before importation.’

More than two years after the target dates, and more than four years after the proposed completion of the review, **only one plant genus, *Lens*, has been removed** (June 17, 2003) from the Permitted List, not because of weed concerns but for consistency with its addition to the list of restricted seed to address plant disease concerns. Individual species have been removed while the genus listing remains with a contingent of weeds e.g. *Ipomoea* (AQIS 2004a). Additional species have also been added to the Permitted List. At this rate it will take decades for the entire revision to be completed.

METHODS

We sought to determine the extent to which this weakness in the Permitted List might affect Australia. To do so we aimed to determine the number of plants importable under genus listings and the number of these plants that are already known weeds elsewhere in the world but not yet present in Australia. A list

of permitted genera was created from the published version of the Permitted List found on SCALEplus (2004). A complete list of all entries was obtained and then the named species deleted leaving only the genera listings. Through this process we determined the total number of entries and the number of permitted genera.

To determine the number of species in the permitted genera we used Mabberly (1998) as an internationally accepted reference to determine the number of accepted names in each genus on the Permitted List. Some of the genera names were synonymous. In these cases we included the accepted name only. For each genus we determined the number of prohibited species using the ICON database (AQIS 2004b) and the information provided on the published Schedule 5. The ICON database is the resource AQIS inspectors use to enforce quarantine. Both resources were used in this study because there were some permitted genera found in the ICON database that were not found on the published schedule. Where we could find these genera we included these in the list to determine the total number of species.

At the Department of Agriculture Western Australia (DAWA) a database has been constructed that is currently used for State WRA (Randall 1996–2003). This database contains over 466,700 species records from over 1.1 million referenced sources and was the basis for the book, ‘A Global Compendium of Weeds’ (Randall 2002). Each entry on the database contains taxonomic information on each plant including species name and any synonyms, references with details of its weed status, whether it is permitted entry into Australia by AQIS and if it is already present in Australia. Essentially this database acts as a digital library catalogue for weed information.

From this database a ‘permitted weeds’ list was created. The list consists of weedy species in permitted genera (those on the AQIS Permitted List) that are not yet present in Australia. All entries in the database that met the criteria of weediness AND being in a permitted genus AND not yet present in Australia were extracted from the database. The initial list included over 5000 species. The list was further refined to remove synonyms, spelling errors, duplicates and each entry was checked for its status on the Permitted List.

From this list we were able to determine the number of genera with weedy species and the number of permitted weedy species not yet present in Australia. We also were able to determine the genera with the greatest number of weeds not yet present in Australia and those with over 50% of their species that are known weeds not yet present in Australia. From this information we generated a list of 30 genera of most

concern. These genera were selected on the following criteria:

1. if they have significant weeds present in Australia;
2. if they have a large number of known weeds not yet recorded in Australia; and
3. if they have a large proportion of their species not yet recorded in Australia that are also weeds.

We have made every effort to ensure that these lists are as accurate as possible. However, we acknowledge that there still may be errors where species are included on the list when in fact they are already present in Australia or their status as permitted plants may have changed. We believe these errors are few in number and do not diminish the overall importance of this analysis.

RESULTS AND DISCUSSION

Of the 6632 entries on Schedule 5, there are 2916 plant genera listed. In these 2916 permitted genera we estimate there are 125,774 accepted species. Some of these species are prohibited from importation while the remaining 125,241 can be imported into Australia without any form of assessment. This does not include the 18,500 species in the family ORCHIDACEAE which are also included on the Permitted List.

We identified 4003 known weedy plant species not yet recorded in Australia from 700 genera on the Permitted List. These potential weeds can be legally imported into Australia without any impediment. Therefore, approximately 24% of permitted genera contain known weedy species. These plants may be agricultural and/or environmental weeds, many of which have close relatives that are already weedy in Australia further increasing the potential threat.

Hymenachne (*Hymenachne amplexicaulis* Rudge (Nees)), pond apple (*Annona glabra* L.) and blackberry (*Rubus fruticosus* L.) have been listed as Weeds of National Significance (WONS; Thorp and Lynch 2000) and are themselves prohibited species. However all other members of these genera barring a few exceptions can be legally imported into Australia without any WRA. In the case of the genus *Rubus* there are 69 species that are already known weeds in other parts of the world but are not yet present in Australia (Table 2). In the genus *Annona* there are two weedy species not yet present in Australia plus 137 other species in the genus that can be imported. Bridal creeper (*Asparagus asparagoides* (L.) Druce), also a WONS, is a member of a permitted genus and itself a permitted species. The *Asparagus* genus has several other weeds besides bridal creeper already present in Australia, including bridal veil (*A. declinatus* L.), which was a WONS nominee. *Parkinsonia aculeata* L. is another WONS still permitted for

Table 2. List of 30 genera of most concern (from 2916) selected as examples of those permitted entry into Australia on the *Quarantine Proclamation 1998 Schedule 5 Permitted Seeds* list.

Permitted genus †	No. of species approved for importation	No. of known weeds not yet in Australia
<i>Astragalus</i>	1749	67
<i>Bromus</i>	99	21
<i>Cardaria</i>		1
<i>Carduus</i>	88	21
<i>Cassia</i>	25	25
<i>Centaurea</i>	494	58
<i>Cortaderia</i> *	21	1
<i>Cotoneaster</i>	261	39
<i>Cytisus</i>	32	3
<i>Genista</i>	86	4
<i>Geranium</i>	298	19
<i>Gnaphalium</i>	49	30
<i>Heliotropium</i>	248	31
<i>Impatiens</i>	850	9
<i>Ipomoea</i>	642	73
<i>Jatropha</i>	175	6
<i>Lepidium</i>	137	27
<i>Linaria</i>	148	33
<i>Lolium</i>	8	3
<i>Mikania</i>	427	4
<i>Paspalum</i>	325	25
<i>Physalis</i>	80	22
<i>Poa</i>	199	29
<i>Potentilla</i>	500	37
<i>Reseda</i>	60	7
<i>Rubus</i> *	240	69
<i>Sida</i> *	198	29
<i>Silene</i>	699	46
<i>Sporobolus</i>	158	13
<i>Stipa</i> *	296	26

† The genus may have some species prohibited.

* Contains WONS species/synonyms or nominees.

importation although the genus is not on the Permitted List.

Correctly identifying all species being imported is critical in preventing the introduction of unwanted

weed species. There are many prohibited weedy plants that can be imported under synonyms of permitted genera. *Stipa neesiana* Trin & Rupr is a synonym of *Nassella neesiana* (Trin & Rupr.) Barkworth also known as Chilean needle grass, a WONS. *N. neesiana* is not specifically prohibited, however, the genus *Stipa* is permitted and so this plant could be imported under the name *S. neesiana*. Until it was recently placed on the prohibited list, *S. trichotoma* Nees also known as *N. trichotoma* Hackel ex Arech., a WONS and prohibited species, was allowed to be brought into Australia. Without determining all plant imports to species level synonymy cannot be determined. This in itself is a huge loophole whereby prohibited plants can enter Australia under illegal or invalid names in permitted genera. The number of plant names that would fall into this area alone is in the tens of thousands.

Many permitted genera contain large numbers of weedy species not yet present in Australia. Any plant in the genus *Ipomoea* (morning glory) can be legally imported. There are 73 weeds not yet here in this very large genus of over 650 species (Table 2). The genus *Centaurea* has 58 potential new permitted weeds among its 500 species which would not be exposed to a WRA (Table 2). This genus has some rather notorious agricultural weeds such as yellow starthistle and the knapweeds. The genus *Taraxacum* contains the familiar dandelion plant *Taraxacum officinale* G.H. Webber ex. Wiggers. This genus has 41 weeds, constituting 70% of the genus, not yet present in Australia that can be imported without a permit.

Other genera have a very large proportion of their membership with weedy characteristics. The genus *Cassia* (cassias and sennas) has 25 species approved for importation and all 25 of those species are known weeds elsewhere in the world (Table 2). The genus *Gnaphalium* has 30 outstanding weeds constituting 61% of the genus (Table 2). Other well known permitted genera with a large proportion of weedy species allowed into Australia include *Cynara* (thistles) and *Distichilis* (saltgrasses).

While only a small proportion of the 125,774 species in these permitted genera are known weeds not yet in Australia there is of course potential among even the supposedly non-weedy plants of a permitted genus to become weeds in Australia. Only a WRA could determine this potential however, under current procedures, these plants are completely overlooked.

RECOMMENDATIONS

We make the following recommendations to Biosecurity Australia.

1. Biosecurity Australia should develop a publicly available plan that sets out the approach and

timetable for removing genera from the Permitted List and the protocols for assessment of these previously exempt species.

2. All permitted genera should be removed from the Permitted List. We suggest the following model for the revision of the Permitted List.
 - a. Immediately remove all permitted genera.
 - b. Any assessed species in previously permitted genera should remain permitted, their status unchanged.
 - c. Each unassessed species from the previously permitted genus should be reviewed when an application to import is made. The importer is responsible to identify the plant to species level. For all unassessed species, AQIS would determine if the species has been previously imported. If a well documented history of importation can be established for a previously imported plant then it is immediately placed on the Permitted List. However, if the plant has not been previously imported it must undergo a WRA and a decision about its status made.
 - d. In addition, weed risk assessment reviews of previously permitted genera should continue.
 - e. An entire genus should only be added to the list when every species in the genus has undergone a WRA and all are permitted (Recommendation 2). All species in these genera should also be listed to allow for synonyms and taxonomic revisions.
3. An inquiry into the status of the review of the Permitted List should be undertaken. The slow progress on the review is a major concern.
4. All published lists in the Quarantine Proclamation should be reviewed for consistency and accuracy. It was found that several genera were spelled incorrectly and duplicate genera appeared on the Schedule 5 list. Such inconsistencies should be immediately corrected.

CONCLUSION

Our nation already suffers substantially from the burden of well established weeds. We spend millions of dollars each year to control weeds in agriculture and incur incalculable and irreplaceable losses to our natural ecosystems. In addition, we face the threat of new and emerging weeds already present within our borders.

The loophole in Quarantine law places these systems at further risk. As demonstrated by *Festuca gautieri* (Hackel) K.Richter (a plant recently imported into Australia as a member of a permitted genus) this is not an hypothetical possibility but a very real occurrence.

The inclusion of 2916 genera on the Schedule 5 Permitted List is an unacceptable risk to Australian environments and agriculture. Twenty-four percent of these genera already contain known weedy species (many with more than 50% of their permitted species as known weeds). We face a substantial financial, social and ecological cost if any one of these plants is introduced deliberately and legally. The impact of 4003 weedy plants would be massive.

We face a further risk from plants in any of the permitted genera that have potential to be weeds but have not yet had an opportunity to demonstrate their weedy potential. These too have not been subjected to any WRA and also pose a threat to our nation.

In this paper we have highlighted the absolute necessity for the Australian Government to take action to reduce the deliberate introduction of plants that pose a threat to our environment. A report presented to the Prime Minister's Science, Engineering and Innovation Council stated 'A successful 21st century Australia will tend to its natural assets as carefully as it does its financial assets' (Morton *et al.* 2002). This and future generations of Australians deserve no less from the Australian Government and its biosecurity agencies.

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