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Role of government in management of commercial weeds

J.R.W. Burley, Biosecurity Victoria, Department of Primary Industries, PO Box 4440, Melbourne, Victoria 3001, Australia.

Introduction

We have a long history of government involvement in weed management in Australia. Colonial governments made weed management one of their earliest priorities for legislative action, recognizing the impact of weeds on primary production. For example, one of the first pieces of legislation introduced by the South Australian colonial government in 1851 was an Act to prevent the further spread of Scotch thistle. Despite this legislative commitment, weeds have continued to spread over much of Australia in the last century and a half.

Weeds have become established and spread in Australia: naturally, accidentally and by deliberate action, to the extent that 8-12 new plant species have until recently been established each year. At least 1-2 of these species are likely to become serious weed problems. While farmers have often been acutely aware of the problems caused by weeds to agricultural production, many have been largely oblivious to, or willing to ignore, the range of impacts that their activities have had on the spread and introduction of new weeds and of the fact that their potential new crops could become weeds impacting on either their own enterprises or on other interests.

Pressure to make Australia more suitable for the European style of farming and living inevitably meant that new species would be sought for introduction. Those that out-competed other plants and that produced a lot of palatable biomass or seed were usually pursued for agriculture, horticulture or for amenity. The possibility that these plants may have undesirable characteristics, or cause harm to the environment, was only rarely raised as an objection to their introduction and spread if they had desirable qualities.

Perhaps the most famous example was the role of Victoria's first Government botanist, Baron Sir Ferdinand von Mueller, in introducing blackberry to suitable habitat in Australia. I have not seen any evidence of any risk assessment in his role in promoting blackberry and in fact he was subsequently honoured by a number of countries in part for his role in introducing other species to their environments!

Ornamentals are our biggest source of declared weeds in Australia, but plants introduced for agronomic reasons are also a

major source of our weed burden, making up at least 15% of the total.

Recent examples of commercial introductions can be found in a study by Mark Lonsdale in 1994. He found that of 463 exotic pasture species introduced into northern Australia between 1947 and 1985, 13% turned out to be weedy and less than 5% were useful pasture species. Cases such as this have traditionally involved government agencies in introducing, evaluating and promoting new species, often without any reference to negative impacts on other sectors.

A recent case has been the promotion of gamba grass (*Andropogon gayanus*) as a useful pasture species in northern Australia, despite overwhelming evidence of its negative impacts on savannah woodlands by altering the intensity of fire and thus on the survival of key species. Gamba grass was introduced into Australia in the 1950s and developed by the Northern Territory government as a cattle feed. This led to the plant being released in 1978 and subsequently sown on properties from 1983 until 1993. This grass can support 40 times more cattle than the native grasses it replaces, leading to high weight gains for cattle. However when it becomes established in woodlands, its extreme height (up to 4 metres) and high biomass mean that any fires spread rapidly, burn more intensely and burn to a greater height than a similar fire in native grasses. This leads to scorching of the canopies and eventual death of the trees, with the predicted demise of most trees in woodlands across the north of Australia where gamba grass is allowed to spread. This could well lead to one of the most extensive vegetation clearance schemes in Australia, with native woodlands being transformed in to introduced grasslands with massive loss of biodiversity. Fortunately, the Queensland Government announced on 4th April that it was declaring the weed and thus banning its sale and requiring it to be controlled.

Government in this case has been an agent for weed spread both by its promotion of the species in the past and by current inaction. This raises the question as to what should government's role be in situations where a plant has both beneficial and deleterious impacts?

Why should Government be involved?

The basic role for government, in its widest context, should include:

- Enabling society to have access to the greatest production of goods and services, including environmental and social goods and services;
- Influencing, where this is considered desirable, the distribution of those goods and services; and
- Arbitrating between conflicts in the production and distribution of different goods and services.

This helps us understand why governments have pursued the introduction of new plant species – there is a clearly held belief that these new species would lead to greater productivity and that it is part of government’s role to promote that increase, or at least not to hinder it. However, promoting enhanced productivity alone has ignored the potentially negative impacts of those introductions on other sectors, whether these be the impacts caused by environmental damage or impacts to the interests of future generations who have to bear the burden of poor decision making regarding introductions. There is clear market failure where the benefits accrue to the sector of society promoting new plant species while any negative impacts are borne by others. If government intervention can lead to a better outcome for society by consideration of all economic, social and environmental outcomes, such intervention can be justified.

Government intervention in the management of weeds can be justified when:

- The market fails to produce the greatest net benefit to society and/or the distribution of those benefits leads to unacceptable inequities between winners and losers;
- There is no other practical way of addressing the market failure (eg by industry bodies intervening);
- The benefits of intervention clearly outweigh the costs; and
- There is a high likelihood of success that intervention will maximize the benefits and minimize the costs of the way ahead.

Government at both national and State/Territory levels has responsibilities and mechanisms to ensure a beneficial outcome to any proposed deliberate introduction, spread or promulgation as well as taking action to minimize accidental introduction, spread or promulgation of known deleterious species.

Who is responsible in Government?

We know that government intervention is most effective when taken as early as possible in the potential spread pathway of an invasive species, as illustrated in Figure 1 below. The Commonwealth Government has the constitutional responsibility for quarantine and now recognizes that quarantine covers both protection of primary industries and the environment. This responsibility covers preventive measures up to the border barrier, along with some post-border surveillance at targeted localities for targeted species. Since the Nairn review of the late 1990s, the Commonwealth Government has increasingly recognized the need for a holistic and preventive approach to weed management as part of the quarantine effort. Current arrangements, as outlined in the Australian Weeds Strategy (Natural Resource Management Ministerial Council 2007), clearly limit the introduction of new species to those on the permitted list of plants. Any proposal to add a species to the approved list requires the potential impacts on the environment as well as on primary production, and other potential impacts, to be considered. So far, I am not aware of an application to import a new species such as gamba grass, which is a species with both high potential benefits and high potential deleterious impacts, using the new protocols. Note that the potential impacts need to be considered but do not of themselves prevent the addition of a species to the permitted list and thus allow its importation. The record so far relating to applications for import of exotic vertebrate animals tends to indicate that pest potential may be outweighed by

economic imperatives or political considerations.

However, the constitution clearly left responsibility for management of land and associated resources with the States and thus weed management inside the national borders rests with State and Territory governments. Traditionally this has meant States and Territories regulated the control of established weeds and in the past there has been a gap between Commonwealth border protection and the States’ management of established weeds. This is the area where State and Territory governments are increasingly directing efforts to prevent or at least slow down the spread and impact of new weeds. All Commonwealth, State and Territory Governments have now recognized the importance of preventing new weed problems through their endorsement of an integrated weeds strategy for Australia. Central to this strategy is the risk management approach, requiring the identification of potential risks posed by introduction and spread of new species, along with assessment of the degree of risk and the feasibility of effective management and subsequent implementation of that effective management. For State and Territory jurisdictions, this approach needs to be applied not just to new species coming in to the country but to the potential establishment in their jurisdictions of species established elsewhere, along with species regarded as ‘sleeper’ weeds, species in gardens or elsewhere that have not yet become established and self-propagating and those species in the early stages of establishment.

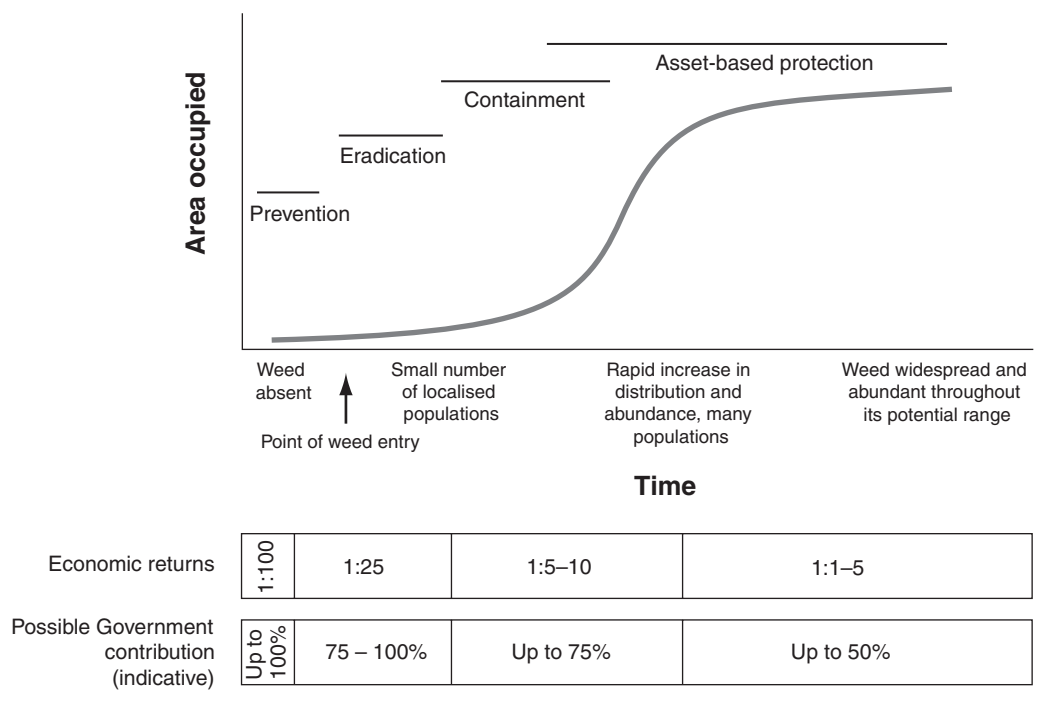


Figure 1. The potential spread pathway of an invasive species and response outcomes.

If the need for government intervention is to be justified, a thorough risk assessment process needs to be in place to ensure that all benefits and costs of intervening or alternate action are considered. For weeds with commercial benefits that are yet to establish or be introduced into a jurisdiction, government can then make a rational and informed decision on whether to allow one of the following options:

1. Unrestricted introduction, based on the species' potential for harm being insignificant compared to the potential benefits;
2. Restricted introduction, with government prepared to address the potential impacts of the weed, through regulatory, cooperative or other mechanisms, with the costs for this intervention being borne by some combination of the species' proponents and the wider community; or
3. Prohibition of the new species, based on its potential impacts being either completely unacceptable or that any potential benefits are far outweighed by the costs of that introduction.

The risk management framework for introduction of a new species can be summarized in a simplistic form in the Table 1.

The consequences of options 1 and 3 should be obvious: option 1 requires no legislative control while option 3 is an unequivocal exclusion backed by legislated prohibition and associated action. However option 2 is potentially fraught with difficulties. The next 'gamba grass' could well be dealt with by this option, with enormous political pressure brought to bear to realize the high economic gains while managing the risks through cooperation with industry and the wider community.

While the gains may be immediate, the costs of allowing the use of a new commercial weed may take many generations to become apparent, long after any cooperative or regulatory controls have been enforced. An analogous situation existed in some parts of the deer industry where commitment to adequate security fencing as the means of minimizing pest potential became irrelevant when the market collapsed. Many growers simply opened their gates and allowed the deer to roam free rather than dispose of them safely, with long term environmental impacts.

Currently there are many potential commercial weeds in the country being considered for traditional agricultural uses or for use as 'biofuels'. We should not be under any illusion that if the potential gains are great enough, every conceivable avenue may be pursued by a plant's proponents to enable those gains to be realized.

The take-home message for governments considering new species with both high potential benefits and high potential costs is this: to apply the precautionary principle, hasten slowly and remember that immediate benefits to a few can be outweighed by long term harm to the wider community. Legislation should be a result, not a cause, of a case for government intervention in weeds that have commercial value. Legislation will fail as a tool if it is not backed up by community support, understanding and commitment and legislation can always be repealed even though a new weed lasts forever.

Established crops or pasture plants with high weed potential

The situation is more complex when weeds are already in commercial use but have yet to realize their full deleterious potential. Our environment is full of weeds which were originally grown for their economic benefit and yet had unforeseen or undervalued negative impacts. The question for government involvement with these situations is whether we can prevent the deleterious impacts of species that have yet to realize their full impact. Clearly there is little chance of stopping the use of these species while there are significant economic benefits to be gained, but government should be actively engaging with these beneficiaries to ensure they meet, at least to some extent, the costs of minimizing or compensating for the negative impacts on others.

A locally relevant example would be *Phalaris aquatica* (Canary grass), clearly recognized as a valuable pasture species. However the species may be regarded by some as southern Australia's version of gamba grass. Our Victorian Country Fire Authority recognizes that it significantly increases fire risk along roads by accumulating a much higher biomass than the native grasses it displaces. The Phillip Island Nature Park weed strategy rates it as a priority species for management. The decommissioning plans for Lake Mokoan in Victoria's north east include the need

to manage what is described as a 'major pest plant', phalaris, to achieve a return to native wetland status. At the same time government continues to promote phalaris as a perennial pasture species eg, by DPI Agriculture Notes and by Landcare groups working on salinity management. This is clearly a dilemma for the Department of Primary Industries here which requires further consideration.

Any move to legislate against the spread of such species could have perverse impacts by accelerating its planting prior to legislation coming into effect. There is no clear course of action to maintain the economic benefits of such species while minimizing their negative impacts. However, as with other commercial weeds, stakeholders should be aware of the risks as well as the benefits of the continued use of such species and the total costs (environmental, social and economic) should be factored in to their continued management.

Established weeds with commercial potential

The last category of weeds I intend to consider are those that are at or near their potential spread across the Australian landscape. Government involvement with these weeds is usually limited to encouraging their control where particularly valuable assets are under threat and to limiting their further impact by preventing sale and spread by artificial means. A strong case could be made that such weeds be made available for commercial use provided that commercial activity does not enhance their negative impacts or potential for further spread, eg by selective breeding or genetic manipulation. Under these circumstances, a combination of government regulation and engagement with the industry seeking to use these species should seek to assess changing risks, minimizing any new or emerging risks and providing opportunities to maximize the benefits of use.

A case in point has been past moves in Victoria to harvest St John's wort (*Hypericum perforatum*) as a herbal remedy – previously it was used as a protection from ghosts and in witches' spells! Any move to increase the commercial value of a pest will mean there is decreased motivation to remove it completely and increased incentive to maintain a source of future re-establishment.

Table 1. The risk management framework for introduction of a new species.

Consequence	Likelihood		
	Low	Moderate	High
Low	1 Permit introduction no restriction	1 Permit introduction no restriction	1 Permit introduction no restriction
Moderate	2 Restricted introduction	2 Restricted introduction	3 Prohibit introduction
Extreme	3 Prohibit introduction	3 Prohibit introduction	3 Prohibit introduction

Conclusions

The role of government in relation to commercial weeds is clearly a subset of the overall responsibilities for government in weed management and indeed other areas of resource management. Governments should only intervene where the markets and the industries involved are not capable of ensuring the best overall outcome, as measured by comparing all economic, environmental and social benefits with the relevant costs.

This intervention is likely to be most needed in relation to the potential incursion or new use of commercially valuable weeds, where the benefits may accrue rapidly to the weed's proponents and yet the deleterious impacts are at least initially diffuse and less obvious to all concerned.

A key role for government is adherence to a rigorous system of risk assessment in relation to weeds, so that decisions on the use, regulation or prohibition of weeds can be as well informed as possible.

State and territory governments are increasingly seeking to address the risks posed by weeds not yet widely established in their jurisdictions, even if they are established elsewhere in Australia or are in cultivation. Any decision to permit the commercial use of such an emerging weed should only be contemplated when:

- the deleterious impacts are insignificant; or
- the potential benefits are overwhelming; AND
- all parties to the proposed use are committed to addressing the deleterious impacts in the long term and to the extent needed. In reality, this will be very difficult to establish.

The situation for established weeds with commercial potential and for commercial crops or pastures with weed potential is less clear-cut. Solutions to these problems are likely to remain a mixture of regulation, cooperative partnerships between industry and government and the application of practically feasible and politically astute compromises.

Legislation should be a result, not a cause, of a case for government intervention in weeds that have commercial value. Legislation will fail as a tool if it is not backed up by community support, understanding and commitment.

Legislation can and often is amended or revoked. Establishment of new weeds seems to be forever.

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