

## How well are we currently dealing with contentious plants?

Margaret H. Friedel<sup>1</sup>, Tony (A.C.) Grice<sup>2</sup>, John R. Clarkson<sup>3</sup>, Keith Ferdinands<sup>4</sup> and Samantha A. Setterfield<sup>5</sup>

<sup>1</sup>CSIRO Sustainable Ecosystems, PO Box 2111, Alice Springs, NT 0871, Australia

<sup>2</sup>CSIRO Sustainable Ecosystems, Private Bag, PO Aitkenvale, Qld 4814, Australia

<sup>3</sup>Department of Environment and Resource Management, PO Box 156, Mareeba, Qld 4880, Australia

<sup>4</sup>NT Dept of Natural Resources, Environment, Arts and Sport, PO Box 496, Palmerston, NT 0831, Australia

<sup>5</sup>Charles Darwin University, Darwin, NT 0909, Australia

Corresponding author: margaret.friedel@csiro.au

**Summary** Australia has a number of introduced plant species that are (or potentially are) commercially valuable and invasive. There has been little effort to date to explore better ways of countering the negative effects of species that are used for production whilst continuing to enable commercial exploitation. Policies that work for weeds in general are not always appropriate and policies that should allow better management are not always implemented. There are presently few tools for investigating true benefits and costs and for encouraging appropriate management. Well thought out criteria for determining the success of management strategies are lacking. We summarise the current situation.

**Keywords** Contentious plants, weed risk assessment, policy, legislation, tools, management.

### INTRODUCTION

A substantial number of plant species introduced to Australia for their likely commercial value have proved to be invasive. Native Australian species transplanted for commercial purposes beyond their natural range may also be invasive. These invasive species are particularly problematic when the commercial industries based on them are well established before their off-site impacts are recognised. Such commercially valued plants that threaten other economic, environmental or social values are a source of contention because, while the benefits accrue to the producer, the costs are borne by other stakeholders who must use their own resources to deal with the consequences.

Three broad classes of contentious plants (or 'conflict species') are:

1. Widely distributed and exploited plants with commercial value but which are declared as weeds under legislation. Gamba grass (*Andropogon gayanus* Kunth) and Olive hymenachne (*Hymenachne amplexicaulis* (Rudge) Nees) are examples.
2. Widely distributed and exploited plants with commercial value but which are not declared as weeds under legislation. Examples include para grass (*Urochloa mutica* (Forsk.) T.Q. Nguyen)

and buffel grass (*Cenchrus ciliaris* L. synonym *Pennisetum ciliare* (L.) Link).

3. New or novel species of unproven commercial value. Species currently being proposed as sources of biofuels, such as physic nut (*Jatropha curcas* L.), diesel tree (*Copaifera langsdorffii* Desf.), giant reed (*Arundo donax* L.) and the native tree pongamia (*Milletia pinnata* (L.) Panigrahi synonym *Pongamia pinnata* (L.) Pierre), meet these criteria. None has yet been extensively planted in Australia. Neem (*Azadirachta indica* A.Juss.), a prospective horticultural crop, is a more widespread example, with some grown in informal domestic situations and others in speculative industry plantings.

### CURRENT POLICIES AND TOOLS

Australia has a robust system for national pre-border weed risk assessment, which minimises the likelihood of introducing new high risk species into the country. In addition most Australian states and territories have decision-making tools for assessing weed risk and feasibility of control post-border, for those species already present. These weed risk management (WRM) systems help to identify categories of declaration and priorities for management action.

However, the process for selecting which species to assess can sometimes be ad hoc, inconsistent amongst jurisdictions and subject to lobbying by interest groups. For example, following substantial public conflict, including regular media coverage of government inaction (Setterfield *et al.* 2006), over the beneficial use and major environmental and social impacts of gamba grass, WRM systems were used to assess and recommend declaration of the grass in Queensland, the Northern Territory and Western Australia. On the other hand, although the high environmental, social and economic impacts of buffel grass are well known in Queensland, it has not been assessed through that state's weed risk system.

Timeliness is important. Delays in assessments or acting on the outcomes of assessment may result in more widespread invasion and greater

management costs, potentially beyond a resource availability threshold for effective action. For example, a weed risk assessment was completed on the ponded pasture grass, Aleman grass (*Echinochloa polystachya* (Kunth) Hitchc.), in Queensland in July 2008, but there has been no management response despite the conclusion that it is 'a highly invasive species that readily escapes cultivation to pose a significant threat to natural freshwater wetlands, mainly in coastal central Queensland' (Hannan-Jones and Weber 2008). Moreover there are no requirements in the current Act to force action on species that perform poorly in weed risk assessment. The Northern Territory undertook weed risk assessments on para grass and buffel grass in 2007, and categorised both as high risk. There has been no official management response at the time of writing and therefore no restriction on their planting or management, but both remain under consideration by weed authorities. Prevention or restriction of sale and further planting can be among the most worthwhile aims of weed legislation but their effectiveness is very much dependant on how extensively the species have been adopted prior to declaration. To this end it can be in the interests of the proponents to delay declaration for as long as possible while private benefits accrue. In this way the species can be widely adopted by producers in many areas prior to controls on further planting. In short, having risk assessment tools in place is important, but acting on the risk assessment results in a timely manner is necessary if recommended management responses are to have the best chance of success.

Assessment of the benefits and costs of contentious plants could help to identify appropriate management decisions and actions (see Ferdinands *et al.* 2010) but, at present, assessment of benefits and costs is largely confined to weeds of agriculture, and hence to economic impacts on production. Environmental and social benefits and costs that are not reflected in markets are harder to quantify and hence to trade off amongst themselves and economic costs and benefits. In a notable exception, gamba grass was declared by the Queensland and Northern Territory governments on the basis of a partial analysis of invasion impacts, incorporating loss of infrastructure, increased fire management costs in the invaded areas and the cost of control (Setterfield and Drucker 2007). In this example, although the impacts of invasion on ecosystem services were well documented (Rossiter *et al.* 2003, Brooks *et al.* 2010), there was no need to attempt to incorporate these into the analysis because there was sufficient evidence of substantial cost from other impacts. However, this case is an exception, and the practice has been generally to recognise the economic benefits and costs to production of contentious plants

(e.g. Chudleigh and Bramwell 1996) and to underrate or ignore the importance of other impacts.

#### WHY MANAGEMENT IS INADEQUATE

**Lack of implementation of existing legislation** A number of plants that offer significant real or potential economic benefits to some sectors, but which are clearly invasive, are declared plants under state and territory legislation. For example, gamba grass and Olive hymenachne were declared in Queensland, Northern Territory and Western Australia between 2003 and 2008, but both species had been planted widely, often on the advice and encouragement of extension officers from government agricultural departments, potentially creating tensions and inconsistencies amongst agencies and individual officers.

Under Queensland legislation, people cannot 'keep', 'release', 'take' or 'supply' a declared Class 2 plant (see Grice *et al.* (2008) for definitions) without a reasonable excuse unless they hold a declared pest permit. However, no growers of gamba grass or Olive hymenachne hold a declared pest permit and the definition of 'reasonable excuse' is open to interpretation.

In some jurisdictions the role of implementing legislation falls to local governments. Invasive plants may not be a priority issue for local governments and they may lack the resources or the skills and knowledge for implementation. Allocation of resources is likely to be driven by local community expectations, so that collective and consistent action across jurisdictions may be difficult.

**Lack of policy for non-declared species** The declaration of plants that have an established commercial use, particularly within the pastoral sector, is a fairly recent phenomenon. Species such as buffel grass and para grass, which are widespread and of considerable commercial value, were in use before most current weeds legislation was enacted. Moreover, in the case of buffel grass, it took a century for its negative consequences to be generally recognised or appreciated. In the absence of legislation there are no processes for limiting unwanted impacts and the 'declaration' pathway is not necessarily the best option for all contentious plants. Other policies and legislation may be more effective and more generally acceptable (see Clarkson *et al.* 2010).

The same policy gap applies to other invasive plants, including those that are not yet an established problem. For example proposed biofuels, such as physic nut and pongamia, and crops like neem are of possible but unproven economic value, and have high invasive potential in some environments. There are also novel crops of unlikely economic value, such as

diesel tree, which may never be extensively planted but are nevertheless promoted by entrepreneurs, potentially leading to many small and widely distributed plantings. Currently these activities are not controlled and the risk of escape is high.

**Lack of clearly defined strategic goals** The strategic goals commonly proposed for managing invasive plants are prevention, eradication, containment and suppression. Containment is usually assumed to be the fall-back position when eradication is not achievable, on the grounds that containment is a more feasible option. For commercially valuable invasives, where eradication is not a likely option, containment is a means of alleviating negative impacts beyond the boundaries of commercial exploitation.

Successful containment is difficult to ascertain. The goal of a management plan may be to maintain a species behind a specified containment line, 'concentrating on small outlying populations and individuals while attempting to restrain further expansion of the population' (Blood 2002), but until all plants and propagules are within that boundary, containment has not been achieved. This is problematic for species like Olive hymenachne, whose propagules are spread downstream by water but which can also be distributed to new catchments by waterbirds, or buffel grass whose seeds can be carried large distances by wind. Consequently containment includes consideration of spatial scales specific to each species. Timeframes are also important in judging the success of containment, since expansions of infestations may be episodic. It is also possible that a lack of spread may have been achieved regardless of any containment action.

Thus, while containment appears to be a feasible alternative to eradication, there is not much hard evidence that it is achievable (see Grice *et al.* 2010).

**Social challenges** Implementation of management strategies is constrained by social factors as well as policy or biophysical issues. Perceptions and attitudes at all levels from national, state and regional weed strategists and policy-makers to weed managers and landholders are critical to implementation. Why are existing policy options relating to the management of contentious species not always implemented? Appropriate policy development can be derailed by lobby groups or conflicting goals within or between agencies. Governments usually prefer education to litigation as a means of achieving compliance, wishing to avoid alienation of landholders as well as the burdens of cost and time. Local governments may be reluctant to serve compliance notices due to personal relationships between the enforcer and landholders within the local

community. At the operational level, landholders may be unwilling or unable to follow policy directions.

Consequently, one of the important barriers to action is human nature. Martin (2008) argued that the challenges that weed managers face include 'overcoming institutional inefficiencies (economic, managerial and legal (challenges)) and the behaviour of communities, including farmers, road authorities, local government officers and the nursery sector (social systems/marketing)', as well as sufficient and sustained resources. He observed that knowledge of how to adjust behaviour to improve sustainability is much less advanced than knowledge of biophysical systems.

Summarising several decades of research on the adoption of technology, Pannell *et al.* (2006) concluded that landholders were unlikely to adopt conservation practices if their broader economic, social or environmental goals could not be met. The goals of landholders were shaped by individual circumstances and personal preferences, and adoption depended on perceptions and expectations, not objective truth (Pannell *et al.* 2006).

Despite extensive evidence of the importance of the human element in land management there has been limited progress in providing incentives for improving implementation of weed management policies. For example, there is potential to use financial incentives such as bonds and levies to achieve compliance, instead of penalising (or ignoring) land managers who do not comply. However, as Martin (2008) points out, innovation can meet with resistance because of a preference for 'the devil you know' (current policies and tools) rather than the 'devil you do not' (e.g. market incentives), despite there being no particular dangers in using markets to encourage innovation. On the other hand, perceived conflicts amongst practitioners or organisations may not be as great as is often supposed (Friedel *et al.* 2009), suggesting that policy initiatives may not be resisted as much as governments expect.

## CONCLUSIONS

Commercially valued plants that are invasive create particular challenges for governments, industries, landholders and conservationists. Current policies are not always applied effectively and tools to support decision making are not used as widely as they could be, although they are available. More rigorous thinking could improve the assessment of the success or failure of management. A further barrier to progress is human nature: the values, perceptions and preferences that drive decisions and actions. There are opportunities to improve our approach to contentious species, and these are outlined in subsequent papers in this symposium.

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