STATUS OF INVASIVE TREE SPECIES IN SOUTHERN AFRICA

SOUTH AFRICA

Background

South Africa is fairly wooded, with 7 percent of the land area under forest cover and a further 27 percent under some form of woodland. Other vegetation types include moist savannah, ‘bushveld’ savannah and arid savannah. Natural forests and woodlands, which have predominantly slow growing tree species, would not have met increasing requirements for timber, mine props, tannin, charcoal, etc., for South Africa. Introduction and subsequent commercial production of selected exotic, fast growing tree species was considered an alternative to meet the demand.

About 750 tree species and around 8 000 shrubby, succulent and herbaceous species are recorded as having been introduced into South Africa (van Wilgen *et al*., 2001). Of these 8 750 species, 161 are now regarded as invasive, 68 percent of these invasive species (110 species) are classified as being woody, and the number may go up as the status of recent introductions becomes clearer. The earliest record of introduced alien tree species (pines) invading natural vegetation in South Africa is from about 1855, when *Pinus halapensis* was noted to be spreading into the fynbos biome (Richardson and Higgins, 1998). However, Poynton (1979a) referred to *Pinus pinea* as among the very first of all exotic conifers to become established in the Cape. It was also one of the first introduced species to become naturalized in its new environment, where it was reported to be reproducing spontaneously and freely from seed in the Cape Peninsula. *P. pinea* reached South Africa in about the middle of the eighteenth century, while *P. halapensis* was introduced into South Africa in about 1830, which makes the former probably the first to become naturalized. Further observations on the natural spread of other species, such as *Pinus pinaster,* were made in about 1928 (Kruger, 1977). Since then, significant progress has been made, particularly in the last quarter century, in the study of invasive tree species, especially introduced or alien species in South Africa (Kruger, 1977; Stubbings, 1977; le Roux, 1981; Wells *et al*., 1986; Richardson *et al*., 1994, 1997). In the only recorded case of an indigenous species as an invader species, Theron (1978) noted *Acacia ataxacantha* as an aggressive invader species in eastern South Africa.

Introduction of tree species in South Africa dates back to the middle of the seventeenth century, when species were introduced for a range of purposes that included timber, tannins, oils, firewood, ornamentals, stabilizing sand dunes, windbreak barriers, hedges, soil conservation and shade (Troup, 1932; Streets, 1962; Poynton, 1979a, b). Among the species introduced for commercial purposes, softwoods, mostly *Pinus* spp., are currently planted on 707 200 ha, while hardwoods (wattle, eucalypts and poplar) occupy 623 738 ha. On a species basis, *Pinus patula*, *P. elliottii*, *P. radiata*, *P. taeda*, and *P. pinaster* constitute 47.7, 28.3, 9.3, 5.5 and 3.0 percent respectively of the *Pinus* spp. area, with the remaining 6.2 percent being minor species and hybrids. Among the hardwoods, *Eucalyptus grandis*, other gums (mostly hybrids), *Acacia mearnsii* and poplars occupy 45.0, 36.1, 17.1 and 0.3 percent respectively of the total area of hardwoods.

Some of the introduced tree species (quickly naturalized in the new environment) are reproducing consistently and have sustained populations over many life cycles without direct human intervention. Furthermore, some of these naturalized species have become invasive in the new environment, where, without their attendant natural enemies (mostly left behind in the country of origin), they are able to survive, reproduce and spread unaided and at alarming rates across the landscape (Richardson *et al*., 2000a; van Wilgen *et al*., 2001).

Invasive alien tree species and extent of invasion

The total area invaded by alien trees in South Africa is over 100 000 km^2, which is over 8 percent of the country's total area (van Wilgen *et al*., 2001). These invasions are mostly concentrated in wetter regions of the country or sometimes along river systems (perennial, seasonal or ephemeral). When split into the major biomes, the fynbos (a Mediterranean-type shrub land) is the most invaded biome by *Pinus*, *Acacia* and *Hakea* species in the mountains, lowlands and along all major river systems (Richardson *et al*., 1997; Cowling *et al*., 1999; Le Maitre *et al*., 2000; van Wilgen *et al*., 2001). The forest biome is also heavily invaded, but the extent has not yet been quantified (Richardson *et al*., 1997). The forest biome is invaded by mainly *Acacia cyclops*, *Acacia mearnsii*, *Acacia saligna*, *Eucalyptus* spp., *Melia azederach*, *Pinus* spp., *Psidium guajava*, *Sesbania punicea* and *Solanum mauritianum*. The grasslands and savannah biomes are also said to be extensively invaded by a range of species that include *Acacia* spp., *Melia azedarach* and *Jacaranda mimosifolia,* which invade the open land, river banks and beds. The Nama karoo (semi-desert shrub land of summer rainfall) is probably the fourth most invaded biome, where *Prosopis* species have invaded at least 18 000 km^2 of the low lying alluvial plains and seasonal and ephemeral water courses. The succulent karoo (semi-desert shrub land with winter rainfall) are also heavily invaded by *Prosopis* spp.

Richardson *et al*. (1994) gave a rough ranking of different vegetation types in terms of their vulnerability to invasion by pines as:

Forest < shrubland < grassland < < dunes < bare ground

Very degraded or fragile environments (bare ground, dunes) actually benefit from pine colonization, since the trees contribute to habitat restoration and accelerate the natural dynamics of environmental reconstitution.

Table 1 shows the major invasive tree species in South Africa, the original purpose of introduction, the areas affected and their relative invasiveness. For commercial plantation species, the area under plantation for each species is also shown for comparison purposes. The year of introduction is also shown for comparing the effect of time on affected areas. Some of these factors have been used to explain the extent of invasions in a model that incorporates information on the species' attributes, residence time, extent of planting, ground cover characteristics, locality (latitude), disturbance regime, and the resident biota in the receiving environment (Richardson, 1998).

Table 1. Invasive alien tree species, area affected and their degree of invasiveness in South Africa

Species	Planted area (ha)	Purpose of introduction [1]	Area affected(ha)	Category [2]	Year introduced	Invasiveness Index [3]
Pinus canariensis	3 498	pole, amen., orn.	-	2 invader	1878	4
P. elliottii	199 923	timber	-	2 invader	1916	1
P. halapensis	-	amen, orn., wind	-	2 invader	1830	2
P. patula	337 337	timber	17 600	2 invader	1907	5
P. pinaster	21 110	timber	325 600	2 invader	1690	5
P. pinea	-	timber, amen., orn., nuts	-	2 invader	1750	5
P. radiata	65 732	timber	34 000	2 invader	1865	5
P. roxburghii	-	amen, orn., wind	-	2 invader	1850	2
P. taeda	39 231	timber	-	2 invader	1890	1
***Pinus* spp (all)**	**707 205**		**3 000 000**			
Acacia ataxacantha		indigenous	-	-	-	3
A. baileyana	-	orn.	-	3 invader	1870	3
A. cyclops	-	stabilize sand dunes	1 900 000	2 invader	1886	4
A. dealbata	-	char., wind, shelter, tan.	-	1 weed	1880-1890	5
A. decurrens	-	fwood, wind, shelter, tan.	-	2 invader	<1922	4
A. elata	-	orn.	-	3 invader	<1922	3
A. implexa	-	furniture	-	1 weed	1830s	4
A. longifolia	-	stabilize sand dunes	-	1 weed	1864	4
A. mearnsii	106 687	tannin, charc.	2 500 000	2 invader	-	4
A. melanoxylon	8 656	furniture	1 800 000	2 invader	-	3
A. paradoxa	-	hedge, stab sand dunes	-	1 weed	-	4
A. podalyriifolia	-	orn.	-	3 invader	1870	3
A. pycnantha	-	tannin	-	1 weed	1848	4
A. saligna	-	fwood, pole	1 900 000	2 invader		3
Eucalyptus camaldulensis	-	short poles, fuelwood	-	2 invader	1870	2
E. cladocalyx	-	poles	-	2 invader	1865	2
E. diversicolor	-	tool handles	-	2 invader	-	2

E. grandis	280 823	poles, timber	-	2 invader	1890	1
E. lehmannii	-	short poles, fuelwood	-	1 weed	1896	4
E. paniculata	-	poles	-	2 invader	1878	2
E. sideroxylon	-	timber	-	2 invader	1884	2
Prosopsis grandulosa		fodder	-	2 invader	-	4
P. velutina		fodder	-	2 invader	-	4
***Prosopsis* spp. (all)**			**1 800 000**			
Jacaranda mimosifolia		orn.	-	3 invader		4
Hakea sericea		hedge	13 000	1 weed	-	5
H. gibbosa		hedge		1 weed	-	4
H. drupacea		hedge, shelt., orn., sand	**700 000**	1 weed	-	4
***Hakea* spp. (all)**						
Populus alba		matches	-	2 invader	-	4
P. x canescens		matches, gully erosion	-	2 invader	-	4
Melia azedarach		orn., shade	**3 000 000**	3 invader	-	5
Psidium guajava		fruit	-	2 invader	-	4
P. guineense		fruit	-	3 invader	-	3
P. cattleianum		fruit	-	3 invader	-	3
P.´ durbanensis		fruit		1 weed	-	3
Albizia lebbeck		orn., shade tree for tea	-	1 weed	-	2
A. procera		shade tree for tea	-	1 weed	-	2
Bauhinia purpurea		orn.	-	3 invader	-	3
B. variegata		orn.	-	3 invader	-	2
Casuarina equisetifolia		poles, windbreak	-	2 invader	-	2
C. cunninghamiana		windbreak	-	2 invader	-	2
Grevillea robusta		orn.	-	3 invader	-	3
Leucaena leucocephala		fodder	-	1 weed	-	4
Senna bicapsularis		orn.	-	3 invader	-	2
S. didymobotrya		orn.	-	3 invader	-	3

S. pendula		orn.	-	3 invader	-	2
Toona ciliata		shade, orn.	-	3 invader	-	2
Caesalpinea decapetala		orn., hedge	-	1 weed	-	4
Morus alba		fruit	-	3 invader	-	2
Total area			**10 073 900**			

Notes:

(1) Purpose of introduction: amen. = amenity use; orn. = ornamental use; shelt. = shelterbelt use; charc. = charcoal production; fwood = fuelwood production.

(2) Category – these are the three categories used in Republic of South Africa legislation. See Appendix for regulations for each category.

(3) Index of invasiveness: 5 = highly invasive; 1 = not invasive.

Sources: Hall and Boucher, 1977; Duggan and Henderson, 1981; Richardson *et al*., 1994; Dept. of Agriculture, Regulation No. 15, 2001.

There are more than a dozen other tree species and shrubs that have been declared weeds. However, most are localized species or their importance is currently not as great as those listed in Table 1. Nevertheless, many of them have the potential to spread quickly if allowed to establish in new, suitable habitats, and so should be considered dangerous. The declared weeds are *Cestrum aurantiacum*, *C. laevigatum, Chromoleaena odorata* (considered by some to be the No.1 alien weed and threat to biological diversity in eastern South Africa), *Cinnamomum camphora*, *Cytisus scoparius*, *C. monspessulanus*, *Eugenia uniflora*, *Lantana camara* (massive priority problem weed in South Africa), *Leptospermum laevigatum*, *Litsea glutinosa*, *Nerium oleander*, *Nicotiana glauca*, *Opuntia* spp. (in drier regions), *Paraserianthes lophantha*, *Pittosporum undulatum*, *Rhus succedanea*, *Rosa rubiginosa, Rubus* spp. (a major biological diversity threat as difficult to control and known to hybridize with native species), *Sesbania punicea* (becoming less important as a result of successful biological control), *Schinus terebinthifolius*, *Solanum mauritianum* (a major and widespread weed), *Spartium junceum, Tamarix chinensis*, *T. ramosissima*, *Tecoma stans*, *Thevetia peruviana* and *Triplaris americana*. The tree species and shrubs declared as invaders include *Ailanthus altissima*, *Eriobotrya japonica, Gleditsia triacanthos*, *Ligustrum ovalifolium*, *Lonicera japonica, Metrosideros excelsa*, *Mimosa pigra*, *Myoporum tenuifolium*, *Pyracantha angustifolia*, *P. crenulata, Phytolacca dioica, Robinia pseudoacacia*, *Salix babylonica*, *S. fragilis*, *Syzygium cumini, S. jambos* and *Tipuana tipu*.

Environmental and economic impact of invasive tree species

Invasive alien tree species have been shown to cause both environmental and economic impacts in South Africa. They have been shown to have a negative effect on all components of biological diversity, from genes to whole ecosystems. In South Africa, invasive alien tree species and shrubs have been shown to have the following negative effects:

- reduction in stream flow and available water;
- loss of potentially productive land;
- loss of grazing potential;
- poisoning of humans and livestock (e.g. *Melia azedarach* and *Lantana camara*);
- increasing costs of fire protection and increasing damage in wildfires;
- increasing soil erosion following fires in heavily invaded areas;
- siltation of dams;
- changing soil nutrient status;
- loss of biological diversity and threat to native plant species;
- changing biomass of ecosystems;
- changing habitat suitability for native animal species; and
- hybridization with local related genera (e.g. *Rubus* sp.), thus exchanging genes.

South Africa has made significant strides in describing and quantifying the economic and environmental impact of alien invader tree species in its various ecological regions (Le Maitre *et al*., 1996; Chapman and Versfeld, 1995; Prinsloo and Scott, 1999; Holmes and Marais, 2000; Le Maitre *et al*., 2000; van Wilgen *et al*., 2001). Table 2 shows some of the documented environmental impacts caused by different invasive alien tree species.

In the fynbos biome, Richardson *et al*. (1989) estimated that invasions could reduce species richness by between 45 and 67 percent. Other studies have provided documented evidence of modified nutrient regimes due to either increased nitrogen fixation or increased decomposing biomass (Musil and Midgley, 1990; Witkowski, 1991; Stock and Allsopp, 1992; Musil, 1993; Yelenik, 2000) and impacts on seed banks of native fynbos species associated with *Acacia saligna* invasions (Holmes and Cowling, 1997a, b).

The impact of invasive alien tree species on water sources in South Africa has been studied. The results indicate a reduction in steam flows of between 4.7 and 13.0 percent (Dye, 1996; Le Maitre *et al*., 1996; Prinsloo and Scott, 1999, Le Maitre *et al*., 2000). A nationwide study revealed that invasive alien plants were using 6.7 percent of the total mean annual surface runoff, or 9.95 percent of the utilizable surface runoff, on the basis of modelled estimates (Le Maitre *et al*., 2000). These figures are crude estimates since there are large variations even between very similar adjacent watersheds, but are considered to be the best possible estimate on a national scale (Le Maitre pers. comm.). The invasive alien species have also been ranked according to their water use (Le Maitre *et al*., 2000). In decreasing order of water use, they are *Acacia mearnsii*, *A. cyclops*, *A. dealbata*, *Pinus* spp., *Eucalyptus* spp., *Prosopis* spp., *A. saligna*, *Melia azedarach*, *Solanum mauritianum*, *Lantana camara*, *Chromolaena odorata*, *Hakea* spp., *Populus* spp., *Jacaranda mimosifolia*, *Sesbania punicea*, *Rubus* spp., *A. longifolia*, *Psidium guajava*, *Caesalpinea decapetala*, *Salix* spp., *A. melanoxylon*, *A. decurrens* and *Quercus robur*. Recent studies show however that steam-flow reduction by forest trees is not a constant for any tree species, and varies considerably in both time and space (Anon. page 29).

Table 2. Some of the notable environmental impacts of invasive alien trees in South Africa and the biomes affected

Species	Biome	Effects
Acacia cyclops	Fynbos Forest Savannah	1. Changes coastal sediment dynamics 2. Changes seed dispersal dynamics 3. Out-competes native species 4. Increases the biomass 5. Provides nesting habitat for rare African penguins
Acacia longifolia	Fynbos Savannah	1. Increases litter fall 2. Decreases diversity of ground living invertebrates 3. Decreases stream flow
Acacia mearnsii	Grassland Fynbos Forest Savannah	1. Decreases diversity of ground living invertebrates. 2. Decreases stream flow 3. Destabilizations of streambanks 4. Can increase erosion, but also used for land stabilization
Acacia saligna	Fynbos Forest Savannah	1. Increases the biomass 2. Increases litter fall 3. Changes nutrient chemistry in lowland fynbos. 4. Changes seed dispersal dynamics 5. Increases the biomass 6. Changes size and distribution of fuel 7. Decreases moisture content resulting in change in fire regime 8. Attrition of seed banks of native plants in dense stands over time
Eucalyptus spp.	Fynbos Grassland Savannah Forest	1. Increases water repellence 2. Affects soil erosion to a variable degree

Hakea sericea	Fynbos Forest	1. Increases the biomass 2. Changes size and distribution of fuel 3. Decreases moisture content resulting in change of fire regime 4. Increased biomass results in very intense fires when felled plants are burnt 5. Dense stands limit options for fire management 6. Changes vegetation structure resulting in decrease in abundance and diversity of native birds 7. Changes arthropod community structure with some taxa increasing while others decrease 8. Decreases leaf retention and seed percentage set in native Proteaceae
Melia azederach	Forest Savannah	1. Out-competes native plants 2. Changes feeding dynamics of frugivorous birds
Pinus pinaster	Forest Savannah Fynbos	1. Out-competes native trees 2. Dense stands limit options for fire management 3. Decreases stream flow
Pinus patula	Forest Savannah	1. Out-competes native trees 2. Dense stands limit options for fire management 3. Decreases stream flow
Pinus radiata	Fynbos	1. Decreases stream flow
Prosopis spp.	Savannah	1. Increases biomass 2. Changes vegetation structure 3. Decreases accessibility 4. Decreases pasture productivity 5. Out-competes native trees 6. Decreases diversity of dung beetle assemblages
Psidium guajava	Forest Savannah Grassland	Out-competes native trees
Rubus spp.	Savannah Grassland Forest	Hybridizes with native *Rubus* sp.
Salix babylonica	Karoo	Destabilizes river banks and excludes native plants
Sesbania punicea	Savannah Forest Fynbos Grassland	1. Decreases accessibility 2. Increases bank erosion 3. Decreases stream flow 4. Poisons stock
Solanum mauritianum	Savannah Forest Grassland	1. Decreases diversity of ground dwelling invertebrates 2. Changes in feeding ecology of Rameron Pigeon (and other native birds) 3. Out-competes native trees
Lantana camara	Forest Savannah Fynbos Grassland	1. Decreases diversity of ground dwelling invertebrates 2. Suppresses regeneration via allelopathy 3. Poisons livestock

Source: van Wilgen *et al*., 2001.

Control of invasive trees

Early studies on the impact of invasive alien trees in South Africa concentrated on environmental impacts, such as effects on native species, loss of ecological services and biological diversity. Some studies (van Wilgen *et al*., 1992, 1996, 1997; Le Maitre *et al*., 1996, 2000; Chapman and Versfeld, 1998) quantified the impact of invasive alien tree species on water resources. These studies demonstrated that invasive alien trees were consumptive water users, and, based on mathematical modelling, it was estimated that they were using as much as 6.7 percent of the country's total run-off. These studies convinced the Government of South Africa to take the issue of invasive trees seriously in a country where water is considered to be a limited resource, as average rainfall is only 490 mm per annum, although the invasive aliens problem is primarily one of higher-rainfall areas. The work led to the establishment of the 'Working for Water' programme that aims to control invasive alien plants to protect water resources and ensure the security of water supply (van Wilgen *et al*., 1998, 2001). Besides enhancing water supply, other benefits of controlling invasive trees include stemming loss of biological diversity, reducing fire hazard, stabilizing catchment areas and modifying erosion impacts, with social benefits such as job creation in the labour-intensive clearing programmes (Le Maitre *et al*., 2001). The government also enacted laws that govern the marketing of seed and growing of some species declared as weeds or invaders in South Africa (Government Gazette, 2001).

There are four main immediate methods used in South Africa to control invasive alien tree species:

mechanical control (hand pulling, slashing, rotor tilling, mowing, ring-barking and felling);

chemical control (spraying young saplings, frilling and painting, chop-and-squirt treatments, and injecting chemicals into large trees);

use of fire in controlled burning; and

a combination of mechanical and chemical control methods in an integrative manner, coupled with biological control where suitable.

Biological control is being developed as a long-term programme, using insects, fungi or other biological control agents, *inter alia* to destroy seeds of the invasive trees. The biological control programme has successfully released an insect that attacks seeds of *Acacia mearnsii* a seed-feeding weevil (*Melanterius maculatus*) in most of the provinces of South Africa (Pieterse and Boucher, 1997). The role of biological control as one element in an integrated control programme in South Africa is discussed by Little *et al.* (in press).

There are proposals to legislate the screening of new species for their potential invasiveness before introduction (Van Wilgen *et al*., 2000). Without a protocol for screening potential invasive species before their introduction, the problem becomes a vicious cycle in which one set of problems is replaced by another as new species enter the country taking over from those brought under control (Richardson *et al*., 1990; Rejmánek and Richardson, 1996; Van Wilgen *et al*., 2000). Researchers are also looking into the possibility of producing seedless clones of commercially grown pines (Richardson, 1998).

The following are some important conclusions and developments in the control of alien invasive tree species in South Africa:

The cost of controlling alien plant invasions in South Africa has been estimated to be around US$ 1 200 million, or US$ 60 million per year for the estimated period of 20 years that it will take to deal with the problem (Chapman and Versfeld, 1998), although some authorities challenge the shortness of the 20-year timeframe and the consequent financial calculations, and others contest the values used in costing the operation (Dave Dobson, SAWGU, pers. comm.).

The potential reduction in value of the fynbos biome (1 million ha) due to invasion (based on six components: water production, wild flower harvesting, hiker visits, ecotourism, endemic species and genetic storage) was estimated at US$ 11 750 million annually (Higgins *et al*., 1997).

The net present cost of invasions by black wattle (*Acacia mearnsii*) in South Africa has been estimated to amount to US$ 1 400 million, although some assumptions of the model used[1] are debated.

The plantation forestry industry, which is often thought to be the major source of infestation for invasions, contributes US$ 300 million, or 2 percent of the Gross Domestic product (GDP), and employs 100 000 people. The downstream forest-based industries contribute a further US$ 1 600 million, much of it in export earnings. However, in trying to attribute blame, it must be remembered that the forest industry was often supported by government in its introduction activities, and also that probably half of the problem species arrived as ornamentals.

Thirty-eight percent of the area invaded by woody alien species in South Africa is occupied by species used in commercial forestry, although not necessarily planted for commercial logging, as the commercial species were also used by official agencies and land users as a source of seedlings for fuelwood, shelter belts, windbreaks, woodlots, etc.

The Government of South Africa committed US$ 100 million between 1995 and 2000 to the ‘Working for Water’ Programme for the control of these invasive alien species.

The control or eradication programme, which is mostly manual and chemical, has created significant employment opportunities for poor communities. In 1998, about 40 000 people were employed by the ‘Working for Water’ Programme to clear invasive alien tree species.

In South Africa, biological control is envisaged as a long-term option for controlling further invasions and re-invasions. The total cost of biological control research initiatives between 1997 and 2000 was US$ 3 million.

Using biological control to clear invasive alien tree species and shrubs could cost US$ 400 million over 20 years, or US$ 20 million per year, a cost considered manageable for a developing country like South Africa. However, biocontrol is currently only applicable to a very limited range of tree species, and extreme care has to be taken to ensure that there are no unwanted side-effects associated with the introduction of alien biocontrol agents. This presupposes considerable technical capacity, which is in limited supply. The provisions of CBD must also be adhered to in this context.

Awareness and potential conflicts of interest

Judging by the number of publications on invasive alien tree species in South Africa, awareness of the negative impacts of invasive alien tree species must be very high. The government has put in place regulations governing the marketing of seed and planting of species declared as invaders (Government Gazette, 2001). The government has also produced campaign materials in the form of easily readable brochures, flyers, pamphlets, etc., on the negative impacts of invasive alien tree species. One such brochure is entitled *The Environmental Impacts of Invading Alien Plants in South Africa* and is an easily readable brochure aimed at the lay person. The government also set up the ‘Working for Water’ programme that aims to eradicate and control invasive alien tree species in South Africa to minimize water lost to these undesirable plants.

Legislation already exists within South Africa which requires an Environmental Impact Assessment for listed activities (National Environmental Management Act), and the introduction of new species is classed as a listed activity.

Many land owners (other than timber companies) are making use of alien commercial (category 2) species that have various desirable attributes other than simple commercial value. These include shade, shelter for livestock, windbreaks, fuelwood and structure on river banks (to diversify habitat for angling). These are used in areas where the country has little in the way of alternative native species to provide a similar function.

It should also be borne in mind that many invasions have had their origin in non-commercial activities.

There was lobbying and counter-lobbying on a proposal to declare one of the commercial species (*Acacia mearnsii*) a weed (Stubbing, 1977; Pieterse and Boucher, 1997). The potential rift between commercial users of invasive tree species and environmentalists has been avoided by the declaration of most of the economic species as invaders rather than weeds. If declared weeds, the law would require that they be eliminated automatically. One area of conflict has been the start of a biological control programme for *Acacia mearnsii* (Pieterse and Boucher, 1997). The release of the seed-feeding weevil (*Melanterius maculatus*) for the biocontrol of *Acacia mearnsii* was done in most of the provinces of South Africa, with the exception of KwaZulu-Natal and Mpumalanga provinces, where there is a conflict of interest with wattle growers (PPRI, 2002). The wattle growers in KwaZulu Natal, with most of the South African commercial wattle plantations, rely on seed in the soils for about half of the regeneration, and have negotiated with PPRI to release initially in non-commercial areas to allow growers to build up seed banks sufficient to supply the entire industry for line-sowing purposes (Dave Dobson, SAWGU, pers. comm.).