

## A revised list of alien plants for the Kruger National Park

L.C. FOXCROFT, L. HENDERSON, G. R. NICHOLS and B.W. MARTIN

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Alien plants recorded in the Kruger National Park are listed, providing an update of species that have been recorded since the last published list in 1988. The serious consequences that invasive alien plants pose are widely recognised internationally and are regarded as the greatest threat to the Kruger National Park. It is extremely important to maintain an updated list of species to use as a reference and from which to monitor changes in the influx of invasive species. The list contains the invasive status of the plants, current impact, habitat types, biological control status and status according to the Conservation of Agricultural Resources Act (CARA), Act 43 of 1983, as amended in March 2001.

The list comprises 370 species, of which 121 are invaders and two are transformer weeds, which may cause considerable damage and alterations to the indigenous biodiversity. A total of 91 species listed herein are also listed in the CARA regulations or are proposed additions to the CARA regulations.

Key words: alien plants, invasive, species list, status, Kruger National Park.

*L.C. Foxcroft and B.W. Martin, Invasive Alien Species Section, Conservation Services, Kruger National Park, Private Bag X 402, Skukuza, 1350; L. Henderson, ARC-Plant Protection Research Institute, National Botanical Institute, Private Bag X 101, Pretoria, 0001; G. R. Nichols, Geoff Nichols Horticultural Services, 8 Larch Road, Durban, 4001 Republic of South Africa.*

### Introduction

The species list in this paper contains reference to lists previously published by a number of authors of alien plant species recorded in the Kruger National Park (KNP). The first published list was by Obermeijer (1937), who listed six alien plant species ("troublesome weeds": *Chenopodium ambrosioides* L., *Tagetes minuta* L., *Argemone mexicana* L., *Gomphrena celosioides* Mart., *Boerhavia diffusa* L., and *Cocculus hirsutus* (L.) Diels. (Foxcroft & Richardson 2003), thereafter Codd (1951) indicated 32 species, Van der Schijff (1957 & 1969) indicated 43 and 76 species, respectively, and Macdonald & Gertenbach (1988) listed 150 alien plant species. Between 1988 and 1997, the species list increased to 216 species (KNP alien plant section records). In February 1999, Nichols and Foxcroft undertook a survey in the Skukuza personnel village listing approxi-

mately 243 species. The number of alien plant species in the KNP then totalled approximately 360 species, prompting a revision of the KNP alien plant list to provide a more accurate reflection of the records. Figure 1 indicates the increase in alien plant species in the KNP. The long-term average increase in alien plant species, since the first record of alien plants was made in 1937, is 5.6 alien species per year. Thirteen species have been removed from the list presented by Macdonald & Gertenbach (1988), as information now indicates that these species are probably indigenous (Appendix 1).

### Presentation of the list

Families and species, respectively, are listed alphabetically within each of the major plant groupings of Pteridophyta (ferns and fern allies), Gymnosperms, Angiosperms (Monocotyledons and Dicotyledons).

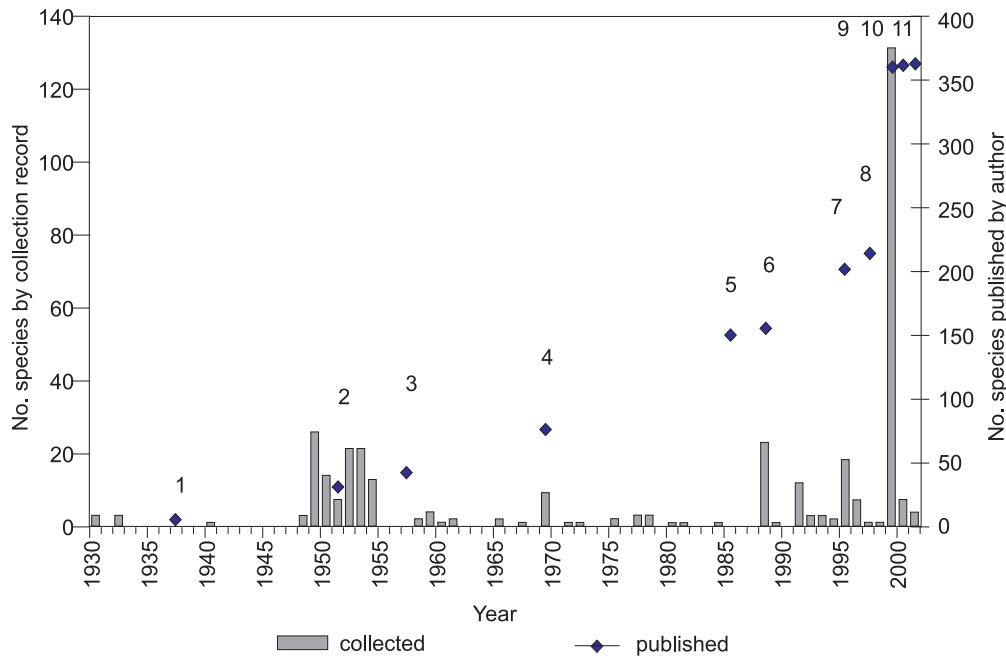


Fig. 1: The number of invasive alien plant species recorded in the Kruger National Park between 1930 and 2001. The list includes species listed according to published and other lists, as well as according to dates of collections/observations of species. For published and other species lists, the authors are indicated: 1. Obermeijer (1937); 2. Codd (1951); 3. Van der Schijff (1957); 4. Van der Schijff (1969); 5. Gertenbach (1985); 6. Macdonald & Gertenbach (1988); 7. Anon (1995); 8. Anon (1996); 9. Foxcroft (1999); 10. Foxcroft (2000); 11. Foxcroft (2001).

The list further provides information on the status of the weed and its current impact in the KNP, as well as its biological control and legal status for South Africa. The date provided is that of the first record for the species or when the species was first listed in publications. 'M&G' is added to the date column to indicate plants listed in the last published list (Macdonald & Gertenbach 1988). All plants not indigenous to the KNP lowveld have been listed in a manner similar to Macdonald & Gertenbach (1988).

Weed status (as is currently observed in the KNP) is described using the terminology proposed by Richardson *et al.* (2000):

- *Alien plants*: plant taxa in a given area whose presence there is due to intentional or accidental introduction as a result of human activity (synonyms: non-native plants, non-indigenous plants).
- *Casual alien plants*: alien plants that may flourish

and even reproduce occasionally in an area, but which do not form self-replacing populations and which rely on repeated introductions for their persistence (denoted by C).

- *Naturalised plants*: alien plants that reproduce consistently and sustain populations over many life cycles without direct intervention by humans (or in spite of human intervention); they often recruit offspring freely, usually close to adult plants, and do not necessarily invade natural, semi-natural or human-made ecosystems (denoted by N).
- *Invasive plants*: naturalised plants that produce reproductive offspring, often in very large numbers, at considerable distances from parent plants and thus have the potential to spread over a considerable area (denoted by I). Where the species is considered as a potential invader, PI is added.
- *Transformers*: a subset of invasive plants which change the character, condition, form or nature of ecosystems over a substantial area relative to

the extent of that ecosystem (denoted by T). Where the species is considered as a potential transformer, PT is added.

Impact on the KNP is noted as the current known impact, and rated as high (H), moderate (M) or low (L). This information is an estimate based on records of the species in the KNP and the authors' personal experience.

The habitat types where the plants are currently observed in the KNP are: disturbed areas and roadsides denoted by the symbol (DR), villages and rest camps (V), aquatic habitats (A), riparian/riverine (R) and terrestrial/dryland habitats (TD).

Status of biological control is indicated at two levels; that taken from the national biocontrol list (Olckers & Hill 1999); and, that for the KNP (Martin & Foxcroft 2001) indicated by (\*).

Legal status refers to the recently revised regulation 15 in terms of the Conservation of Agricultural Resources Act, 1983 (Act No. 43 of 1983):

- *DW1*: Declared weed (category 1) are prohibited plants which must be controlled, or eradicated where possible (except in biocontrol reserves, which are areas designated for the breeding of biocontrol agents);
- *DI2*: Declared Invader (category 2) are mainly commercial plantation species but also plants for woodlots, animal fodder, soil stabilisation, etc., allowed only in demarcated areas, by permit holders, under controlled conditions and in biocontrol reserves;
- *DI3*: Declared Invader (category 3) are mainly ornamental species that may no longer be planted (except with special written permission), nor may there be trade in propagative material. Existing plants may remain but must be prevented from spreading.

All three categories of plants are prohibited within 30 m of the 1:50 year floodline of watercourses or wetlands, unless exemption is obtained. The full regulations and species list are given in Henderson (2001).

## Discussion

A total of 370 alien plant species are listed and contain some subspecies, forms and varieties. Of the list, 2 species (0.5 %) (*Lantana camara* L. and *Opuntia stricta* (Haworth.) Haworth.) are transformers, 125 (33.8 %) are invasive and 223 (60.2 %) are either casual aliens or naturalised species, as

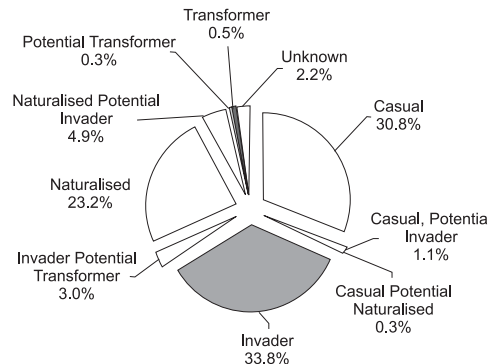


Fig. 2: Weed status of alien plant species.

is indicated by Fig. 2. The basic under-riding principle of the South African National Parks (SANParks), "to preserve biodiversity in all its natural facets and fluxes" (Braack 1997) is directly violated by the introduction, whether intentional or accidental, of alien organisms, and according to definition, indicates the requirement to remove or control all alien species. In practice, the control of prioritised transformer and invader species, to acceptable limits of abundance, is the most likely scenario. At this minimal level of abundance, the impact on biodiversity (as described by Noss 1990) is hoped to be minimal.

Macdonald & Gertenbach (1988) stated that the increase in number of alien plant species recorded for the KNP was probably due to increased collecting and awareness between 1937 and 1983. Further increase may also be ascribed to increased tourism (Macdonald 1988), which has unintentionally brought in seeds from other infested parts of the country as well as increased infestation of the lowveld. Infestations and new species may also have arisen due to the considerable increase in size of towns such as Nelspruit and others along the escarpment, over the past 50 years.

Although Macdonald & Gertenbach (1988) state that 10 species had been eradicated, at least four of these (*Senna didymobotrya*,

Table 1  
Revised alien plant list for the Kruger National Park

Order and Families	Species	Common Name	Date of 1st record	Status & Impact	Habitat type	Bio-control	Legal Status
Order: Pteridophyta							
Aspleniaceae	<i>Asplenium nidus</i> L.	bird's nest fern	1999	C L	V		
Azollaceae	<i>Azolla filiculoides</i> Lam.	red water fern	1994	I H		C*	DW1
Cyatheaceae	<i>Cyathea australis</i> (R. Br.) Domin.	rough tree fern	1999	C L	V		
Davalliaceae	<i>Nephrolepis exaltata</i> (L.) Schott	sword fern/Boston fern	1999	I M	V	R	DI 3
Polypodiaceae	<i>Phlebodium aureum</i> L. (= <i>Polypodium aureum</i> )	gold-foot fern/rabbit's foot fern/blue fern	1999	I L	V	R	Proposed
Salviniaceae	<i>Salvinia molesta</i> D.S. Mitchell	Kariba weed	1974 M&G	I H		C	DW1
Order: Gymnospermae							
Cycadaceae	<i>Cycas circinalis</i> L.	queen sago	1999	C L	V		
	<i>Cycas revoluta</i> Bedd.	king sago	1999	C L	V		
Pinaceae	<i>Pinus</i> sp.	pine	SR 1995	C L		R	
Zamiaceae	<i>Encephalartos ferox</i> Bertol. f.	Zulu/land cycad	1999	C L	V		
Order: Angiospermae							
Monocotyledonae							
Agavaceae	<i>Agave attenuata</i> Saml-Dyck	soft-leaved agave	1999	C L	V	TD	
	<i>Agave sisalana</i> Perrine	sisal	1965 M&G	N PI L		TD	
	<i>Agave vivipara</i> L. ( <i>A. angustifolia</i> misapplied in SA)	narrow-leaved sisal/century plant	1999	C L	V	TD	DI 2
	<i>Cordyline frutescens</i> Goepp. (= <i>C. terminalis</i> )	ti plant	1999	C L	V		
	<i>Sansevieria trifasciata</i> hort. ex Prain	mother-in-law's tongue	1999	C L	V		

Table 1 (continued)

Order and Families	Species	Common Name	Date of 1st record	Status & impact	Habitat type	Bio-control	Legal Status	
Alliaceae	<i>Allium neapolitanum</i> Cirillo (= <i>Nothoscordum inodorum</i> )	fragrant false garlic	1988 M&G	N	L			
	<i>Nothoscordum gracile</i> (Ait.) Stearn	onionweed/Steam slender false garlic	1959	I	L			
	<i>Hymenocallis littoralis</i> (Jacq.) Salisb.	spider lily	1999	N	L	V		
Araceae	<i>Alocasia</i> sp.	elephant's ear	1999	N	L	V	R	
	<i>Anthurium andraeanum</i> Linden	flamingo lily	1999	C	L	V		
	<i>Colocasia esculenta</i> (L.) Schott	elephant's ear/taro	1999	I	L	V	R	
	<i>Epipremnum pinnatum</i> (= <i>E. aureum</i> )	golden pothos/marble queen	1999	C	L	V		
	<i>Monstera deliciosa</i> Liebm.	delicious monster/Swiss cheeseplant	1999	N	L	V	R	
	<i>Philodendron bipinnatifidum</i> Schott	horsehead philodendron	1999	N	L	V	R	
	<i>Philodendron bipinnatifidum</i> (= <i>P. selloum</i> )	lacy tree philodendron	1999	N	L	V	R	
	<i>Pistia stratiotes</i> L.	water lettuce	1977 M&G	I	M	V	A	
	<i>Syngonium podophyllum</i> Schott	goose-foot plant/arrowhead-vine	1999	N PI	L	V		
	<i>Spathiphyllum</i> hybrid	peace lily	1999	C	L	V		
Arecaceae	<i>Archontophoenix cunninghamiana</i> H. Wendl. & Drude	king palm/bangalow palm	1999	C	L	V		
	<i>Caryota urens</i> L.	common fish-tail palm	1999	C	L	V		
	<i>Caryota mitis</i> Loureiro	clustered fish-tail palm	1999	C	L	V		
	<i>Chamaedorea elegans</i> (Mart.) Liebm. ex Oersted	parlour palm	1999	C	L	V		
	<i>Dypsis lutescens</i> (H. Wendl.) Beentje & Dransf. (= <i>Chrysalidocarpus lutescens</i> )	yellow bamboo palm/butterfly palm	1999	C	L	V		
	<i>Howea belmoreana</i> (T. Moore & F. Muell.) Becc.	belmore sentry palm	1999	C	L	V		
	<i>Livistona chinensis</i> (Jacquin) R. Brown ex Martius	Chinese fountain palm/Chinese fan palm	1999	C	L	V		
	<i>Phoenix roebelenii</i> O'Brien	dwarf date palm/pygmy date palm	1999	C	L	V		

Table 1 (continued)

Order and Families	Species	Common Name	Date of 1st record	Sans & impact	Habitat type	Bio-control	Legal Status
	<i>Psychosperma macarthurii</i> (H. Wendl.) Nichols	hurricane palm/Macarthur palm	1999	C L	V		
	<i>Roystonea regia</i> (Kunth) Cook	Cuban royal palm	1999	C L	V		
	<i>Sabal palmetto</i> (Walt.) Lodd. ex JA & JH Schultes	common palmetto/blue palmetto	1999	C L	V		
	<i>Syagrus romanzoffiana</i> (Cham.) Glassman (= <i>Arecastrum romanzoffianum</i> , <i>Cocos plamosa</i> )	queen palm	1999	C L	V		
	<i>Washingtonia robusta</i> H. Wendland	thread palm/Mexican fan palm	1999	C L	V		
Asphodelaceae	<i>Aloe longibracteata</i> Pole Evans		1988 M&G	C L	V		
Cannaceae	<i>Canna indica</i> L.	canna/Indian shot	1999	I L	V	R	DW1
Commelinaceae	<i>Callisia repens</i> (Jacq.) L. (= <i>C. Commelina benghalensis</i> L.)	striped creeping inch plant	1999	I L	V	R	
	<i>Dichorisantha thyrsiflora</i> Mikan f.	Bengal wandering Jew	1953 M&G	I L	V	R	
	<i>Tradescantia fluminensis</i> Vell.	blue ginger	1999	N PI	V	R	
	<i>Tradescantia pallida</i> Rose (= <i>Setcreasea pallida</i> )	spiderwort/wandering Jew	1953	N PI	V	R	
	<i>Tradescantia spathacea</i> Sw. (= <i>Rhoeo spathacea</i> )	purple wandering Jew/purpleheart	1988	N PI	V	R	
	<i>Tradescantia zebrina</i> Hort. ex Heynh.	boat plant/oyster plant	1999	N PI	V		
	<i>Aspidistra elatior</i> Bl.	striped wandering Jew	1999	N PI	V	R	
Convallariaceae	<i>Liriope muscari</i> 'variegata' (Decne.) L.H.Bail.	cast iron plant/milky way	1999	C L	V		
	<i>Liriope muscari</i> (Decne.) L.H.Bail.	variegated blue lily turf	1999	C L	V		
	<i>Liriope muscari</i> (Decne.) L.H.Bail.	lily turf	1999	C L	V		
Cyperaceae	<i>Cyperus compressus</i> L.	poorland flat sedge	1953 M&G	C L	V		
	<i>Cyperus cyperoides</i> subsp. <i>Cyperoides</i> (L.) O. Kuntze (= <i>Mariscus sumatrensis</i> )		1953	C L	V		
Dracaenaceae	<i>Dracaena fragrans</i> (L.) Ker.-Gawl. (= <i>D. deremensis</i> )	palmillo/striped dracaena	1999	C L	V		
	<i>Dracaena marginata</i> Lam.	tricolor/dragon tree/sanderiana	1999	C L	V		

Table 1 (continued)

Order and Families	Species	Common Name	Date of 1st record	Status & impact	Habitat type	Bio-control	Legal Status
Hypoxidaceae	<i>Molinieria capitulata</i> (Lour.) Herb. (NoR) (= <i>Curculigo capitulata</i> (Lour.) Kuntze)	palm-grass	2000	C	V		
Iridaceae	<i>Belamcanda chinensis</i> (L.) DC	leopard lily/blackberry lily	2000	I	V		
	<i>Neonaria caerulea</i> (Ker-Gawl.) Sprague	blue walking dietes	1999	C	V		
Musaceae	<i>Musa X paradisiaca</i> Linnaeus	banana/plantain	1999	C	V		
Orchidaceae	<i>Epidendrum obrienianum</i> Rolfe	scarlet orchid	1999	C	V		
	<i>Vanilla roscheri</i> Reichb. f.	climbing orchid	1965	N		R	
Pandanaeae	<i>Pandanus baptistii</i> hort. Misome	variegated screw-pine	1999	C	V		
	<i>Pandanus utilis</i> Bory	common screw-pine	1999	C	V		
Poaceae	<i>Arundo donax</i> L.	giant reed/Spanish reed	1953 M&G	IPT	V		DWI
	<i>Axonopus fissifolius</i> Chasc (= <i>A. affinis</i> )	carpet grass	1999	N	V		
	<i>Bambusa balcooa</i> Roxb.	giant bamboo/halcooa bamboo	1988 M&G	N	V		
	<i>Bambusa multiplex</i> (Lour.) Rausch. ex Schult. & Schult. f. (= bamboo)	hedge bamboo/Chinese dwarf bamboo	1999	N	V		
	<i>Bambusa vulgaris</i> Schrad. ex J. C. Wendl.	common bamboo	SR 1995	N	V		
	<i>Brica maxima</i> L.	big quaking grass	1978	I	V		
	<i>Cenchrus brownii</i> Roem. & Schult.	burgass/sandbur	1969 M&G	N	V		
	<i>Cortaderia settoana</i> (Schult.) Asch. & Graebn	pampas grass	SR 1995	C	V		DWI
	<i>Digitaria nuda</i> Schumach.	naked crab grass	1972	N		R	
	<i>Digitaria sanguinalis</i> (L.) Scop. grass	large crab grass/crab finger grass	1980	C		R	
Echinochloa crus-galli (L.) P. barnyard grass	<i>Eragrostis barrelieri</i> Dav.	Mediterranean love grass	1949	I		A	
	<i>Paspalum urvillei</i> Steud.	tall paspalum/Vasey grass	1971 M&G	N		R	
	<i>Pennisetum clandestinum</i> Chiov.	kikuyu grass	1969 M&G	N		R	
	<i>Pennisetum purpureum</i> Schumach.	elephant grass/Napier grass	NR	C			Proposed
			1958 M&G		V		Proposed

Table 1 (continued)

Order and Families	Species	Common Name	Date of 1st record	Status & impact	Habitat type	Bio-control	Legal Status
Pontederiaceae	<i>Pennisetum setaceum</i> (Forssk)	fountain grass	1953	N			DW1
	<i>Stenotaphrum secundatum</i> (Walt.) Kuntze	buffalo grass	NR	C	V		
Zingiberaceae	<i>Eichhornia crassipes</i> (Mart.) Solms	water hyacinth	1977 M&G	I PT			DW1
	<i>Pontederia cordata</i> L.	pontederiac/pickereel weed	1952	I	V	A R	DI3
	<i>Alpinia zerumbet</i> (Pers.) Burt &	shell ginger	1999	N PI	V	R	
	<i>Alpinia zerumbet</i> 'variegata'	variegated shell ginger	1999	N PI	V	R	
	<i>Costus speciosus</i> (J. Koenig) Smith	crepe ginger	1999	N PI	V	R	
	<i>Hedychium coccineum</i> Sm.	red ginger lily	1999	N PI	V	R	DW1
	<i>Hedychium coronarium</i> J. Koenig	butterfly ginger/white ginger lily	1999	N PI	V	R	DW1
	<i>Hedychium gardnerianum</i> Ker	kabili ginger lily	1999	N PI	V	R	DW1
	<i>Zingiber zerumbet</i> (L.) Sm.	wild ginger/pinecone ginger	1999	N PI	V	R	
Dicotyledonae							
Acanthaceae	<i>Acanthus mollis</i> L.	bear's breeches	1999	C	V		
	<i>Hypoestes phyllostachya</i> Baker	polka dot plant	1999	I	V	R	
	<i>Justicia brandegeana</i> Wassh. & L.	shrimp plant	1999	C	V		
	B. Sm.						
	<i>Megaskepasma erythrochlamys</i>	Brazilian red-cloak	1999	C	V		
	Lindau						
	<i>Odontonema strictum</i> Kuntze	firespike	1999	C	V		
	<i>Sanchezia nobilis</i> Hook.f.	noble sanchezia	1999	C	V		
	<i>Strobilanthes dyerianus</i> M.T. Mast.	Persian shield	1999	C	V		
	<i>Thubergia grandiflora</i> (Roxb. ex Rottler) Roxb.	Bengal clock vine/blue sky flower	1999	N	V	R	
Aizoaceae	<i>Zaleya pentandra</i> (L.) Jeffr.	African purslane	1950	N	V	R	
Amaranthaceae	<i>Achyranthes aspera</i> var. <i>aspera</i> L.	chaff flower/devil's horsewhip	1949 M&G	I		R	DW1
	<i>Achyranthes aspera</i> L. var. <i>sicula</i> L. (= <i>A. sicula</i> )		1949	I			
	<i>Alternanthera denticulata</i> R.Br.	large purple alternanthera	NR	I	V	R	

Table 1 (continued)

Order and Families	Species	Common Name	Date of 1st record	Status & impact	Habitat type	Bio-control	Legal Status
	<i>Alternanthera ficoidea</i> (L.) R. Br. ex R. & S.	purple alternanthera/Joseph's coat	1999	I L	V R		
	<i>Alternanthera pungens</i> H.B.K.	khaki bur weed	1950 M&G	I L	V		
	<i>Alternanthera sessilis</i> (L.) DC.	sessile joyweed	1949 M&G	I L	V		
	<i>Amaranthus spinosus</i> L.	thorny pigweed	1952 M&G	I L	V		
	<i>Gomphrena celosoides</i> C. Martius	prostrate globe amaranth/soft khakiweed	1932 M&G	I L	V		
	<i>Guilleminea densa</i> (Humb. & Bonpl. ex Willd.) Moq. (= <i>Iresine herbstii</i> Hook.	small matweed/woolly cottonflower	1952	I L	V		
	<i>Pupalia lappacea</i> (L.) A. Juss.	blood leaf	1999	N L	V		
	<i>Alstroemeria perigrina</i> L.	sweethearts	1949 M&G	I L	V		
Amaryllidaceae		Peruvian lily	1999	C L	V		
Anacardiaceae	<i>Harpephyllum caffrum</i> Bernh. ex C.F. Krauss.	South African wild plum	SR 1988 M&G	C PN L	V		
	<i>Mangifera indica</i> L.	mango	1951 M&G	C L	V		
	<i>Rhus lancea</i> L. f.	karee	1969 M&G	C L	V		
Annonaceae	<i>Annona reticulata</i> L.	custard apple	1991	N L	V		
Apocynaceae	<i>Allamanda cathartica</i> L.	golden trumpet	1954 M&G	L	V		
	<i>Beaumontia grandiflora</i> Wall.	Easter lily vine/herald's trumpet	1999	C L	V		
	<i>Catharanthus roseus</i> (L.) G. Don. (= <i>Lochnera rosea</i> )	graveyard flower/Madagascar periwinkle	1951 M&G	I M	V	R	
	<i>Nerium oleander</i> L.	oleander	1988 M&G	N L	V	R DR	DW1
	<i>Plumeria rubra</i> L.	frangipani	1954 M&G	C L	V		
	<i>Thevetia peruviana</i> (Pers.) K. Vinca major L...	yellow oleander blue periwinkle/greater periwinkle	1950 M&G 1991	I L I L	V V	R DR R	DW1
Araliaceae	<i>Hedera helix</i> L.	English ivy	1999	N L	V		Proposed
	<i>Schefflera actinophylla</i> (Endl.) Harms	Australian cabbage tree/Queensland umbrella tree	1999	I L	V	R	Proposed
	<i>Schefflera arboricola</i> Hayata	dwarf umbrella tree	1999	I L	V	R	
	<i>Tetrapanax papyrifer</i> (Hook.)	rice-paper tree	1999	C L	V		

Table 1 (continued)

Order and Families	Species	Common Name	Date of 1st record	Status & impact	Habitat type	Bio-control	Legal Status
Aristolochiaceae	<i>Aristolochia elegans</i> Mast.	Dutchman's pipe/calico flower	1950 M&G	I	V		
Asclepiadaceae	<i>Asclepias curassavica</i> L.	scarlet milkweed/bloodflower	1991	I	V	R	
	<i>Cryptostegia grandiflora</i> (Roxb.) R. Brown	rubber vine	1996	C PI	V		
	<i>Hoya carnosa</i> (L. f.) R. Br.	wax plant/Hindu rope plant	1999	C	V		
Asteraceae	<i>Acanthospermum australe</i> (Loefl.) Kuntze	eight-seeded prostrate starbur/Paraguay starbur	1950 M&G	N	V		
	<i>Acanthospermum hispidum</i> DC.	bristly starbur/ upright starbur	1949 M&G	N	DR V		
	<i>Ageratum conyzoides</i> L.	invading ageratum	1949 M&G	I	DR V	R	DW1
	<i>Ageratum houstonianum</i> Mill.	Mexican ageratum/floss flower	2000	I	DR V	R	DW1
	<i>Bidens biternata</i> (Lour.) Merr. & Sherff	five leaved-blackjack/nose stud bur	1949 M&G	I	DR V	R	
	<i>Bidens pilosa</i> L.	common blackjack	1975 M&G	I	DR V	R	
	<i>Chromolaena odorata</i> (L.) R.M. King & H. Rob.	chromolaena/trifid Weed	1997	I PT	V		U
	<i>Chrysanthemum</i> spp.	daisies	1999	C	V		
	<i>Cirsium vulgare</i> (Sari) Ten.	spear thistle/Scotch thistle	SR 1995	I	DR V	R	
	<i>Conyza sumatrensis</i> Spreng. (= <i>C. albida</i> , <i>C. floribunda</i> )	tail fleabane	1988 M&G	N	V		DW1
	<i>Conyza bonariensis</i> (L.) Cronq.	flax-leaf fleabane/wavy-leaf fleabane	SR 1995	I	V		
	<i>Cosmos bipinnatus</i> Cav. (= <i>Bidens formosa</i> )	cosmos	1949 M&G	C	DR V	R	
	<i>Eclipta prostrata</i> (L.) L.	false daisy/tattoo plant	1952 M&G	C	V		
	<i>Floueria bidentis</i> (L.) Kuntze	smelter's bush/cyflowtop	1953 M&G	N	V		
	<i>Helianthus annuus</i> L.	sunflower	2000	C	V	R	
	<i>Parthenium hysterophorus</i> L.	parthenium/congress weed/feverfew	1991	I PT	DR V	R	DW1
	<i>Pseudognaphalium luteo-album</i> (L.) Hilliard & Burt (= <i>Gnaphalium luteo-album</i> )	cutweed/Jersey cutweed	1953	I	V	R	
	<i>Schkuhria pinnata</i> (Lam.) Cabr.	dwarf margold	1949 M&G	N	V		

Table 1 (continued)

Order and Families	Species	Common Name	Date of 1st record	Status & impact	Habitat type	Bio-control	Legal Status
	<i>Sonchus asper</i> (L.) Hill	spiny sowthistle	1950 M&G	N	V		
	<i>Sonchus oleraceus</i> (L.) Hill	sowthistle/smooth sow thistle	1950 M&G	N	V		
	<i>Sphagneticola trilobata</i> (= <i>Thelectonia trilobata</i> , <i>Wedelia trilobata</i> )	Singapore daisy	1999	I	V	R	DW1
	<i>Tagetes minuta</i> L.	khaki weed/khaki bush/stinkweed	1930 M&G	I	DR V	R	
	<i>Tithonia diversifolia</i> (Hemsl.) A.	Mexican sunflower	1953 M&G	I PT	DR V	R	DW1
	<i>Tridax procumbens</i> L.	tridax daisy	1950 M&G	N	V		
	<i>Xanthium strumarium</i> L.	large cocklebur	1953 M&G	I	DR V	R	DW1
	<i>Zinnia peruviana</i> (L.) L.	redstar zinnia/Peruvian zinnia	1950	I	V	R TD	
Balsaminaceae	<i>Impatiens walleriana</i> Hook. f.	busy Lizzy	1999	C	DR V		
Basellaceae	<i>Anredera cordifolia</i> (Ten.) Steenis (= <i>A. baselloides</i> misapplied in SA)	Madeira vine/bridal wreath	1954 M&G	N	V		DW1
	<i>Basella alba</i> L.		SR				
	<i>Basella paniculata</i> Volkens		1959 M&G	C	V		
Begoniaceae	<i>Begonia X tuberhybrida</i>	wax begonia/hybrid tuberous begonia	1999	C	V		
Berberidaceae	<i>Nandina domestica</i> Thunb.	heavenly bamboo	1999	N	V	R	
Bignoniaceae	<i>Arrabidaea mollis</i> (Vahl) Bureau ex K. Schum. (= <i>Bignonia mollis</i> )	liana	1949 M&G	N	V	R	
	<i>Campsis grandiflora</i> (Thunb.) K. Schum.	Chinese trumpet vine	1999	C	V	R	
	<i>Distictis buccinatoria</i> (DC.) A.	Mexican blood-trumpet	1999	C	V		
	<i>Jacaranda mimosifolia</i> D. Don	jacaranda	1969 M&G	I	V	R	DI 3
	<i>Macfadyena unguis-cati</i> (L.) A.H. Gentry	cat's claw creeper	SR 1995	I PT	V	R	DW1
	<i>Pyrostegia venusta</i> (Ker-Gawler) Miers	golden shower/flare trumpet vine	SR 1996	C	V		
	<i>Spathodea campanulata</i> Pal.	African flame tree/African tulip tree	1949 M&G	N	V	R	

Table 1 (continued)

Order and Families	Species	Common Name	Date of 1st record	Status & impact	Habitat type	Bio-control	Legal Status
	<i>Tabebuia ochracea</i> (Cham.) Standl. (= <i>Tecoma ochracea</i> )	South American trumpet tree	2000	C	V		
	<i>Tecoma stans</i> (L.) Kunth	yellow bells/yellow trumpet flower	1950 M&G	I PT	V	R	DWI
Bombacaceae	<i>Bombax</i> spp.						
	<i>Ceiba pentandra</i> (L.) Gaertn.	kapok tree/silky cotton tree	1988 M&G	C	V		
	<i>Pachira glabra</i> Aubl. (= <i>Bombax glabra</i> , <i>Pochota glabra</i> )		1999	N	V		
			1954 M&G	C	V		
Boraginaceae	<i>Heliotropium indicum</i> L.	Indian heliotrope	1959 M&G	I	V	R	
Brassicaceae	<i>Diplolaxis muratis</i> (L.) DC.	sand rocket/wall rocket	1953 M&G	N	V	R	
	<i>Lepidium bonariense</i> L.	pepperwort	1954 M&G	N	V	R	
	<i>Lepidium ruderale</i> L.		1969	N	V		
Bromeliaceae	<i>Bromelia</i> spp.	bromeliad	1999	C	V		
	<i>Tillandsia usneoides</i> (L.) L.	Spanish moss	1999	C	V		
Buddlejaceae	<i>Buddleja madagascariensis</i> Lam.	Madagascar sagewood/Madagascar butterfly bush	1952 M&G	C	V		
Cactaceae	<i>Cereus jamacaru</i> DC.	queen of the night	1988	I		TD	DWI
	<i>Echinopsis multiplex</i> Pfeiff. & Otto	easter lily cactus	2000	I	V	TD	
	<i>Hyocereus undatus</i> (Haw.) Britt. & night-blooming cereus		1996	I	V	R TD	
	Rose						
	<i>Opuntia aurantiaca</i> Lindl.	jointed cactus	1967 M&G	I		TD	DWI
	<i>Opuntia ficus-indica</i> (L.) Mill.	sweet prickly pear	SR 1995	I		TD	DWI
	<i>Opuntia imbricata</i> (Haw.) DC	imbricate prickly pear	1996	I		TD	DWI
	<i>Opuntia leptocaulis</i> DC.	desert Christmas cactus/pencil cholla	1991	CPI		TD	C
	<i>Opuntia monacantha</i> Haw. ( <i>O. vulgaris</i> misapplied)	cochineal prickly pear/drooping prickly pear	1969 M&G	I		TD	DWI
	<i>Opuntia stricta</i> (Haworth.) Haworth	sour prickly pear/Australian pest pear	1953	T		TD	DWI
	<i>Pereskia aculeata</i> Mill	Barbados gooseberry/pereskia	1999	PT		R TD	DWI

Table 1 (continued)

Order and Families	Species	Common Name	Date of 1st record	Status & impact	Habitat type	Bio-control	Legal Status	
Caesalpinaceae	<i>Bauhinia X blakeana</i> S. T. Dunn.	fragrant orchid tree	1999	N	V			
	<i>Bauhinia purpurea</i> L.	butterfly orchid tree	1951	N	V		DI3	
	<i>Bauhinia variegata</i> L.	orchid tree	1951 M&G	I	V	R	DI 3	
	<i>Caesalpinia decapetala</i> (Roth ) Alston	Mauritius thorn/Mysore thorn	1961 M&G	I PT	DR V	R	DW1	
	<i>Caesalpinia gilliesii</i> (Wall. Ex Hook.) Benth.	bird of paradise bush	1996	N	V			
	<i>Caesalpinia pulcherrima</i> (L.) Delonix regia (Bojer ex Hook.) Raf. (= <i>Poinciana regia</i> )	pride of Barbados flamboyant	1949 M&G 1952 M&G	N N	V V			
	<i>Senna bicapsularis</i> (L.) Roxb (= <i>Cassia bicapsularis</i> )	rambling cassia/butterfly cassia	1992	I	DR V	R	DI 3	
	<i>Senna corymbosa</i> Lam. (= <i>Cassia corymbosa</i> )	autumn senna/yellow senna	1949 M&G	I	DR V	R		
	<i>Senna didymobotrya</i> (Fresen.) Irwin & Barnaby (= <i>Cassia</i> )	peanut-butter cassia	1961 M&G	I	DR V	R	DI 3	
	<i>Senna multiglandulosa</i> L. f. (= <i>Cassia tomentosa</i> )	sicklepod	1988 M&G	N	V			
	<i>Senna obtusifolia</i> L. (= <i>Cassia obtusifolia</i> )	coffee senna	1953 M&G	I	DR V	R		
	<i>Senna occidentalis</i> L. (= <i>Cassia occidentalis</i> )	Christmas senna	1952 M&G	I	DR V	R		
	<i>Senna pendula</i> (Willd.) Irwin & Barnaby (= <i>Cassia coluteoides</i> )	arsenic bush	1995	I	DR V	R	DI 3	
	<i>Senna septentrionalis</i> Willd. (= <i>Cassia floribunda</i> , <i>C. laevigata</i> )	scented cassia/golden shower	1993	I	DR V	R	Proposed	
	<i>Senna spectabilis</i> (DC.) Irwin & Barneby (= <i>Cassia spectabilis</i> )		1992	I	DR V	R		
	Cannabaceae	<i>Cannabis sativa</i> L.	dagga/marijuana/hemp	1981 M&G	N		R	
	Capparaceae	<i>Cleome gynandra</i> L.	spider-wisp/cat's whiskers	1953	N	V		
	Caricaceae	<i>Carica papaya</i> L.	pawpaw/papaya	1988 M&G	C	V		
	Caryophyllaceae	<i>Polycarpha corymbosa</i> (L.) Lam.	old man's cap	1949 M&G	N	V		
Chenopodiaceae	<i>Chenopodium album</i> L.	white goosefoot	1950 M&G	I	V	R		
	<i>Chenopodium ambrosioides</i> L.	wormseed goosefoot	1930 M&G	I	V	R		

Table 1 (continued)

Order and Families	Species	Common Name	Date of 1st record	Status & impact	Habitat type	Bio-control	Legal Status
Convolvulaceae	<i>Chenopodium polyspermum</i> L.	many-seeded goosefoot	1949 M&G	I	V	R	
	<i>Convolvulus arvensis</i> L.	field bindweed	SR 1995	N	V	R	DW1
	<i>Cuscuta campestris</i> Yunck.	dodder	1988 M&G	N	V	R	DW1
	<i>Ipomoea alba</i> L.	moonflower	1993	I	V	R	DW1
	<i>Ipomoea purpurea</i> (L.) Roth	morning glory	1988 M&G	I	V	R	DI 3
	<i>Ipomoea trilobata</i> Cav.	heavenly blue/blue star	SR 1998	C	V	R	
	<i>Stictocordia beraviensis</i> (Vatke) Hallier f. (= <i>Ipomoea beraviensis</i> )	mite a minute	1992	N	V	R	
	<i>Bryophyllum daigremontianum</i> (Raym.-Hamet & E.P. Perrier)	good luck plant/mother of millions	1999	I	V	R	DR
	<i>Bryophyllum delagoense</i> (Eckl. & Zeyh.) Schinz. (= <i>Kalanchoe delagoense</i> , <i>K. tubiflora</i> )	chandelier plant/mother of millions	1988 M&G	I	V	R	TD
	<i>Bryophyllum gastonis-bonnierei</i> Raym.-Hamet & H. Perrier	donkey ears/life plant	2001	I	V		
Crassulaceae	<i>Bryophyllum pinnatum</i> (Lam.) Kalanchoe	air plant	2001	I	V		
	<i>Kalanchoe beharensis</i> Drake	velvet leaf	SR 1995	N	V	R	TD
	<i>Kalanchoe fedtschenkoi</i> Raym.-Hamet & E.P. Perrier	lavender scallops/South American air plant	2001	I	V		
	<i>Luffa aegyptiaca</i> Mill.	sponge gourd/loofah	1999	C	V		
	<i>Momordica charantia</i> L.	bitter cucumber/ bitter melon	1999	N	V		
	<i>Acalypha wilkesiana</i> Mull. Arg.	copper leaf	1949 M&G	N	V	R	
	<i>Breytia disticha</i> J.R. & G. Forst.	snowbush	1999	N	V	R	
	<i>Codiaeum variegatum</i> (L.) Bl.	gold spot/croton	1999	N	V	R	
	<i>Euphorbia cyathophora</i> Murr.	fire on the mountain	1999	I	V	R	
	<i>Euphorbia heterophylla</i> L.	dwarf poinsettia	1950 M&G	I	V	R	
Euphorbiaceae	<i>Euphorbia hypericifolia</i> L. Millsp. (= <i>Chamaesyce hypericifolia</i> )	graceful sandmat/spurge	1949	N	V	R	
	<i>Euphorbia leucocephala</i> Lotsoy.	snow flake	1999	N	V	R	
	<i>Euphorbia milit</i> Boj. (= <i>E. prostrata</i> (Ait.) Small)	crown of thorns	1952 M&G	N	V	R	
	<i>Euphorbia prostrata</i> (Ait.) Small (= <i>E. chamaesyce</i> , <i>Chamaesyce</i> )	hairy creeping milkweed	1969 M&G	N	V	R	

Table 1 (continued)

Order and Families	Species	Common Name	Date of 1st record	Status & impact	Habitat type	Bio-control	Legal Status
	<i>Euphorbia pulcherrima</i> Willd. ex Klotzsch	poinsettia	1954 M&G	C	V		
	<i>Jatropha podagrica</i> Hook.	buddah belly plant/gout plant	SR 1995	C	V		
	<i>Manihot esculenta</i> Crantz.	bitter cassava/manioc/tapioca	1999	N	V		
	<i>Pedilanthus tithymaloides</i> (L.) Poit.	Jacob's ladder/devil's backbone	1969	C	V		
	<i>Ricinus communis</i> L.	castor-oil plant	1953 M&G	I		R	DI 2
Haloragaceae	<i>Myriophyllum aquaticum</i> (Vell.)	parrot's feather	1989	I		A	DW 1
Heliconiaceae	<i>Heliconia</i> sp.	false bird of paradise	1999	C	V		
Lamiaceae	<i>Ajuga reptans</i> L.	carpet bugleweed	1999	N	V	R	
	<i>Salvia microphylla</i> Benth.	cherry sage/wild watermelon	1999	N	V	R	
	<i>Solenostemon scutellarioides</i> Hort. ex Cobreau (= <i>Coleus hybridus</i> )	coleus/painted nettle	1999	C	V		
Lauraceae	<i>Cassytha filiformis</i> L.	false dodder/love vine	1953 M&G	N	V	R	
	<i>Cinnamomum camphora</i> (L.)	camphor tree	1999	C PI	V	R	
	<i>Litsea glutinosa</i> (Lour) C. B. Rob (= <i>Indian laurel</i> )		1991	C PI	V		DW 1
	<i>L. sebifera</i>				V		DW 1
	<i>Persea americana</i> Mill.	avocado	1953 M&G	C	V		
Lythraceae	<i>Lagerstroemia indica</i> L.	pride-of-India/crepe myrtle	SR 1995	I	V	R TD	
Malvaceae	<i>Hibiscus rosa-sinensis</i> L.	Chinese cotton rose/rose of China	1969	C	V		
	<i>Hibiscus schizopetalus</i> (Mast.)	coral hibiscus	1999	C	V		
	<i>Malvastrum coromandelianum</i> (L.) Gaerke.	prickly malvastrum/tree lobed false mallow	1954 M&G	N	V		
	<i>Malvastrum arboreum</i> var. <i>mexicanus</i> Schlechtend.	Turk's cap/fire dart/wax mallow	1999	C	V		
Marantaceae	<i>Calathea</i> sp.	rattlesnake plant	1999	C	V		
	<i>Marantia leuconeura erythronera</i> E. Morr.	ten-commands	1999	C	V		

Table 1 (continued)

Order and Families	Species	Common Name	Date of 1st record	Status & impact	Habitat type	Bio-control	Legal Status
Melastomataceae	<i>Tibouchina elegans</i> (Gardner)	tibouchina	SR 1995	C	V		
Meliaceae	<i>Melia azedarach</i> L.	Persian lilac/seringa	1948 M&G	I PT	DR V	R	DI 3
	<i>Toona ciliata</i> M. Roem.	toon tree	1988 M&G	I	V	R	DI 3
Menispermaceae	<i>Cocculus hirsutus</i> (L.) Diels	silver wattle	1930 M&G	N	V	R	
Mimosaceae	<i>Acacia dealbata</i> Link.	red sandalwood/red bead tree	1950 M&G	C	V	R	DI 2
	<i>Adenanthera pavonina</i> L.	fairy duster tree	1999	N	V	R	
Molluginaceae	<i>Leucaena breviplex</i> Benth.	leucaena/wonder tree/giant wattle	1995	I PT	V	R TD	DI 2
	<i>Mimosa pigra</i> L.	giant sensitive plant	1999	I PT	DR V	R	DI 3
	<i>Mollugo nudicaulis</i> Lam.	carpet weed	1949 M&G	N PI	DR V	R	
Moraceae	<i>Morus alba</i> L.	white mulberry/common mulberry	SR 1995	I	DR V	R	DI 3
Moringaceae	<i>Moringa oleifera</i> Lam.	horse-radish tree	1977 M&G	C	V		
Myrtaceae	<i>Callistemon viminalis</i> (Sol. ex Gaertn.) G. Don ex Loudon	weeping bottlebrush	1999	C	V		
	<i>Callistemon</i> sp.	bottlebrushes	1999	C	V		
	<i>Eucalyptus camphora</i> R.T. Baker	eucalypts/gums	1954 M&G	N	V	R TD	
	<i>Eugenia uniflora</i> L.	piangpi/Surinam cherry	1991	I	V	R	DW1
	<i>Melaleuca leucadendra</i> (L.) L.	cajaput tree/weeping tea tree	1954 M&G	C	V		
	<i>Psidium guajava</i> L.	guava	1949 M&G	I	V	R TD	DI 2
Nyctaginaceae	<i>Syzgium cumini</i> (L.) Skeels	jambolan	1994	I	V	R	DI 3
	<i>Syzgium paniculatum</i> Gaertn.	Australian water pear/brush-cherry	1999	I	V	R	Proposed
	<i>Boerhavia diffusa</i> L.	erect boerhavia/spreading hogweed	1932 M&G	I	V	R	
Bougainvilleaceae	<i>Bougainvillea glabra</i> Choisy	paper flower	1952 M&G	C	V		
	<i>Bougainvillea spectabilis</i> Willd.	bougainvillea	1952 M&G	C	V		

Table 1 (continued)

Order and Families	Species	Common Name	Date of 1st record	Status & impact	Habitat type	Bio-control	Legal Status
	<i>Mirabilis jalapa</i> L.	four-o'clock	1953 M&G	I L	V		Proposed
Oleaceae	<i>Fraxinus americana</i> L.	American ash/white ash	1952 M&G	N L	V		Proposed
	<i>Ligustrum vulgare</i> L.	common privet	1988 M&G	I L	V		DI 3
Oxalidaceae	<i>Oxalis corniculata</i> L.	creeping wood-sorrel/creeping oxalis	1952 M&G	N L	V		
	<i>Oxalis latifolia</i> H.B.K.	red garden sorrel	1978 M&G	N L	V		
Papaveraceae	<i>Argemone mexicana</i> L.	yellow-flowered Mexican poppy	1932	I H	DR V		DW1
	<i>Argemone ochroleuca</i> Sweet subsp. <i>ochroleuca</i> (= <i>A. subfusiformis</i> GB.Ownby)	white-flowered Mexican poppy	1952 M&G	I H	DR V		DW1
Papilionaceae	<i>Aeschynomene indica</i> L.	knuckle bean bush/curly	1949	I L	V		
	<i>Cajanus cajan</i> (L.) Millsp.	pigeon pea	1996	N L	V		
	<i>Clitoria ternatea</i> L.	butterfly pea	1951 M&G	I L	V		
	<i>Erythrina pallida</i> Britton	pink coral tree	1999	C L	V		
	<i>Ghircidia sepium</i> (Jacq.) Kunth ex Walp.	forest liiac/Nicaraguan cocoashade	1950 M&G	N PI L	V		
	<i>Sesbania bispinosa</i> (Jacq.) W. f.	prickly sesbania	1949 M&G	I L	DR V		
	<i>Sesbania punicea</i> (Cav.) Benth	red sesbania	1984 M&G	I L	V		
	<i>Tipuana tipu</i> (Benth.) Kuntze	tipu tree	1952 M&G	I L	V		
	<i>Zornia diphylla</i> auct. non Pers.		1988 M&G	I L	V		
		<i>Passiflora edulis</i> Sims	purple granadilla/ purple passion fruit	NR	I L	V	
Passifloraceae	<i>Passiflora edulis</i> f. <i>flavicarpa</i> Degen	guavadilla/ yellow passion fruit		I L	V		
	<i>Passiflora edulis</i> f. <i>flavicarpa</i> Degen	guavadilla/ yellow passion fruit	NR	I L	V		
Plantaginaceae	<i>Plantago major</i> L.	broad-leaved ribwort/greater or common plantain	1996	N L	V		
Phytolaccaceae	<i>Phytolacca dioica</i> L.	belhambra	1952 M&G	I L			DI 3
Piperaceae	<i>Peperomia marmorata</i> Hook.f.	silver heart	1999	C L	V		

Table 1 (continued)

Order and Families	Species	Common Name	Date of 1st record	Status & impact	Habitat type	Bio-control	Legal Status
Polygonaceae	<i>Antigonon leptopus</i> H.&A.	coral creeper	1951 M&G	I	V		
	<i>Homalocladium platycladum</i> (F. J. Bailey)	tapeworm plant	1999	C	V		
	<i>Polygonum aviculare</i> L.	prostrate knotweed	1988 M&G	N		R	
	<i>Pericaria lapathifolium</i> (L.) F.	spotted knotweed/pale periscaria	1959	N		R	
	Gray (= <i>Polygonum lapathifolia</i> var. <i>maculatum</i> )						
	<i>Pericaria limbatum</i> (Meisn.) Hara	knottweed	1960 M&G	N		R	
	(= <i>Polygonum limbatum</i> )						
	<i>Portulaca oleracea</i> L.	common purslane/tittle hayweed	1954 M&G	N	V		
	<i>Portulaca quadrifida</i> L.	purslane/chickenweed	1952	N	V		
	<i>Talinum paniculatum</i> (Jacq.) Gaertn.	jewel's of opar/pink baby breath	1999	N	DR V	R	
Proteaceae	<i>Grevillea robusta</i> A. Cunn.	Australian silky oak/ silver oak	1952 M&G	I		R	DI 3
	<i>Stenocarpus sinuatus</i> Endl.	fire-wheel-tree	1999	C	V		
Rosaceae	<i>Duchesnea indica</i> (Andr.) Focke	wild strawberry/false strawberry	1999	C	V		
	<i>Eriobotrya japonica</i> (Thunb.) Loquat				V		
	<i>Pyracantha coccinea</i> M.J. Roem	scarlet firethorn	1988 M&G	N PI	V	R	
	<i>Rosa</i> spp.	roses	SR 1995	I	V	R	DI 3
	<i>Rubus</i> sp.	bramble	1999	C	V		
			1988	I	V	R	
Rubiaceae	<i>Coffea arabica</i> L.	Arabian coffee/ coffee tree	1999	I	V	R	Proposed
	<i>Gardenia jasminoides</i> Ellis	Cape jessamine	1953	N	V		
	<i>Hamelia chrysantha</i> Jacq.	fire bush	1999	C	V		
	<i>Isora coccinea</i> L.	flame of the woods	1988	N	V		
	<i>Mussaenda frondosa</i> L.	flag bush	1999	C	V		
	<i>Richardia brasiliensis</i> Gomes	tropical richardia/Mexican clover	1954 M&G	N PI	V	R	
Rutaceae	<i>Citrus aurantiifolia</i> (Christm.) Swingle (= <i>Limonia aurantiifolia</i> )	lime	1978	C	V		
	<i>Citrus limon</i> (L.) Burm.f.	lemon	1988 M&G	C	V		

Table 1 (continued)

Order and Families	Species	Common Name	Date of 1st record	Status & impact	Habitat type	Bio-control	Legal Status
	<i>Citrus sinensis</i> (L.) Osbeck (= <i>C. aurantium</i> var. <i>sinensis</i> )	sweet orange/Valencia orange/navel	1952 M&G	C	V		
Salicaceae	<i>Salix babylonica</i> L.	weeping willow	1951 M&G	I		R	DI 2
Sapindaceae	<i>Cardiospermum grandiflorum</i>	balloon vine	1995	I	V	R	DW1
	<i>Cardiospermum halicacabum</i> L. (= heart pea/lesser balloon vine)		1953	I	V	R	Proposed
	<i>C. corindum</i>			H			
	<i>Litchi chinensis</i> Sonn.	litchi	1999	C	V		
Solanaceae	<i>Browallia americana</i> L.	amethyst violet/Jamaican forget-me-not	1999	N	V		
	<i>Brugmansia arborea</i> (L.) Lagerh. (= <i>Datura arborea</i> , <i>D. cornigera</i> )	angel's trumpet	1999	N	V		
	<i>Brugmansia X candida</i> (Pers.) Saff. (= <i>Datura candida</i> )	moonflower	SR 1995	N	V		
	<i>Brugmansia pauciflora</i> (Cham. & Schltdl.) Benth.	yesterday, today & tomorrow	1999	C	V		
	<i>Capsicum frutescens</i> L. (= <i>C. minimum</i> )	bird's eye chili/bird pepper/cayenne	1991	I	V	R	
	<i>Cestrum diurnum</i> L.	inkberry/day jessamine	1999	I	V	R	
	<i>Datura ferox</i> L.	large thorn apple	1993	I	DR V	R	DW1
	<i>Datura innoxia</i> Mill.	downy thorn apple	1991	I	DR V	R	DW1
	<i>Datura stramonium</i> L.	common thorn apple	1953 M&G	I	DR V	R	DW1
	<i>Nicotiana physaloides</i> (L.) Gaertn.	apple-of-Peru	2000	I	DR V	R	DW1
	<i>Nicotiana glauca</i> R.C. Graham	wild tobacco/tree tobacco	1958 M&G	I	DR	R	
	<i>Physalis angulata</i> L.	wild gooseberry	1952 M&G	I	V	R	
	<i>Physalis peruviana</i> L.	Cape gooseberry/Peruvian cherry/goldenberry	1954 M&G	I	V	R	
	<i>Solanum laxum</i> Paxt. (= <i>S. jasminoides</i> )	jasmine nightshade/poaiato vine	1952	I	V	R	
	<i>Solanum mauritanium</i> Scop. (= <i>S. auriculatum</i> )	bugweed	1954 M&G	I	V	R	U
<i>Solanum physalifolium</i> Rusby	green nightshade/hoc nightshade	NR	I	V			
<i>Solanum seagorithianum</i> Andrews	potato creeper/Brazilian nightshade	1991	I	V	R	DW1	



*Nicotiana glauca*, *Tecoma stans* and *Ipomoea purpurea*) are frequently found in the rivers. They have either re-invaded the KNP or were never eradicated in the first instance. *Nicotiana glauca* appears to have long-term cycles, where plants flourish along the Olifants River and then for a number of years disappear.

Two more species are present despite having been reported as eradicated. *Salvinia molesta*, first recorded in the KNP in 1974 (Joubert 1986) was chemically controlled over a long period, and despite being recorded as eradicated a number of times (Joubert 1986) was reported in 1985 on the Sabie River at Lower Sabie rest camp. Biological control was released on the Sabie River in 1992, and the infestation is now under complete biological control. The infestation recorded at Mtshawu Dam (near Pretoriuskop) in 1974 had biological control released in 1995 (Lotter 1997), but was sprayed chemically soon afterwards, and then aggressively controlled using herbicide from 1997 to 2000, with small isolated plants still occasionally being found. However, during 2000-2001 the plants re-infested the pool below the Mtshawu Dam wall and a decision was taken to release biological control agents on the infestation. Eight months after releasing the biocontrol agent *Cyrtobagous salviniae* below the Mtshawu Dam wall, the plant population crashed and remains clear of *S. molesta*. Macdonald & Gertenbach (1988) also reported that *Solanum mauritianum* was first reported along the Crocodile River and was either eradicated or later failed to be reported as present along the river by officials from Skukuza. This indicates that, for a reserve the size of the KNP, the likelihood of a species being eradicated is remote once listed, and it may appear in another area at a later stage. Furthermore, the large infestations of most of these weeds on the boundaries of the KNP make it unlikely that only a few plants will enter the KNP and re-invasion by the plants is inevitable.

Evidence to prove the lag phase and our limited knowledge of the ability of alien plants to become invasive is borne by the listing of

43 species by Macdonald & Gertenbach (1988) as non-invasive. Of these species, 17 are now well-known invasive species, while seven have since become invasive in the park. In a national park, which aims at the protection of indigenous biodiversity, policy should rather err on the side of caution. The removal of all alien species accompanied by the replacement thereof with indigenous species should be promoted. Although a species may not, at a single point in time, exhibit a tendency to invade, the lack of knowledge of the species and the long phase that is often found to prelude an explosion in the distribution of invasive species, places most species in an unknown category. This may result in serious, often immense, insidious and irreversible problems at a later stage (McNeely 2000), as species enter a rapid growth phase.

The habitat invaded indicates that the vast majority of the species occur, or occurred, in the staff villages or rest camps (320 species) and is of concern (Fig. 3). Disturbed/roadside areas are invaded by 40 species, terrestrial/dryland by 27 species, riparian by 191 species and aquatic areas are invaded by seven species. A notable example in the KNP of a species intentionally introduced and then escaping into the surrounding areas is that of *O. stricta*. Assumed to have been introduced into the KNP during the 1950s, probably as an ornamental garden plant in

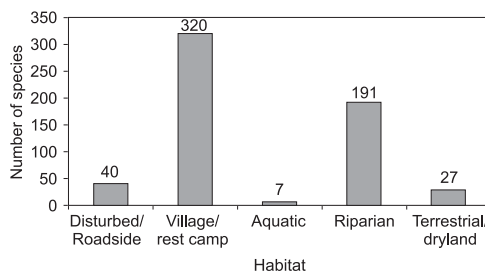


Fig. 3: Number of alien plant species per habitat type (some species may occur in more than one habitat type)

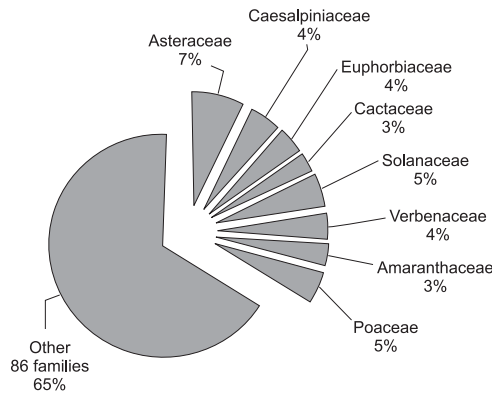


Fig. 4: Families of alien plant species in KNP.

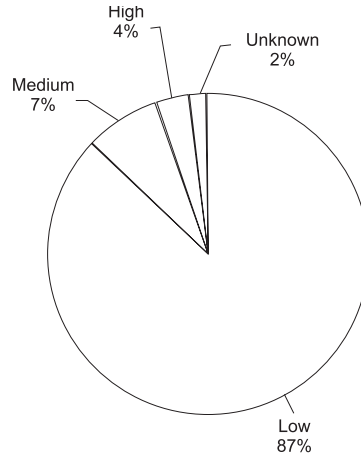


Fig. 5: Impact of alien plant species in KNP.

Skukuza personnel village, *O. stricta* was reported by Lotter & Hoffmann (1998) to cover an area of 30 000 ha around Skukuza. Currently, the management area of *O. stricta* is approximately 66 000 hectares, with a number of outlying invasions in the Tshokwane area, Nyamundwa dam and near the Mtshawu and Sabie River confluence. *Opuntia stricta* is also an example of the problems associated with poor record keeping and incorrect identification. Thought to have been first recorded in the KNP by Obermeijer in 1953 (Lotter & Hoffmann 1998, cite Zeller 1996), the first record of *O. stricta* being recorded by name was in the KNP alien plant sections records in 1995. No indication was made of the observer or date. However, Brynard & Pienaar (1960) refer to experiments on *O. vulgaris* (= *O. monacantha*) in the Skukuza area, and it is likely that these plants were in fact *O. stricta*. *Opuntia monacantha* (= *O. vulgaris*) was however recorded by Zeller (KNP alien plant sections records, 1996) in Orpen rest camp in 1992, and also by van der Schijff (1957) at the Komati River and Shilova (Mooiplaas ranger section).

Examination of the plant list indicates the total number of plant families represented is

98, of which eight families collectively contain 125 species (or 35 % of the total) (Fig. 4). The other 90 families contribute to the remaining 245 species.

Impact ranking assigned to the species indicates that 87 % of the species are rated as having a low impact, 7 % medium and 4 % as having a high impact (Fig. 5). Although the perception may be created that invasive species therefore represent a minimal impact to the KNP, the combined effects of only a few invasive species can have major consequences and result in dense stands that cover vast areas.

### Conclusion

Invasive alien plants have been recognised as one of the greatest threats to the biodiversity of the KNP (Braack 1997). In order to address this, proactive work on the prevention of species reaching and infesting the KNP is necessary. Early detection is the single most important step in combating the plants. While still in the early stages of invasion, the plants may be removed before they are able to set seed and become established.

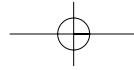
Updated species lists provide a firm base from which to work and are necessary to determine new invasions in an area as well as the rate of invasion. It is however only a starting point as spatial data is needed to determine the areas invaded, the extent to which they are invaded and the densities of invasions, in order to make meaningful interpretations and recommendations.

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### References

- ANON. 1995. Alien Biota Section records. Scientific Services Department, Skukuza. Unpublished records, South African National Parks.
- ANON. 1996. Alien Biota Section records. Scientific Services Department, Skukuza. Unpublished records, South African National Parks.
- BRAACK, L.E.O. 1997. Vol VII. An objectives hierarchy for the management of the Kruger National Park. A revision of parts of the Management Plan for the Kruger National Park. <http://www.parks-sa.co.za>.
- CODD, L.E.W. 1951. Trees and shrubs of the Kruger National Park. *Memoirs of the Botanical Survey of South Africa* 26: 1-192.
- FOXCROFT, L.C. 1999. Alien Biota Section records. Scientific Services Department, Skukuza. Unpublished records, South African National Parks.
- FOXCROFT, L.C. 2000. Alien Biota Section records. Scientific Services Department, Skukuza. Unpublished records, South African National Parks.
- FOXCROFT, L.C. 2001. Alien Biota Section records. Scientific Services Department, Skukuza. Unpublished records, South African National Parks.
- FOXCROFT, L.C. & D.M. RICHARDSON. 2003. Managing alien plant invasions in the Kruger National Park, South Africa. Pp. 385-403. *In*: CHILD, L.E., J.H. BROCK, G. BRUNDU, K. PRACH, P. PYSEK, P.M. WADE & M. WILLIAMSON (eds.). *Plant Invasions: Ecological threats and Management Solutions*. Leiden: Backhuys.
- GERTENBACH, W.P.D. 1985. Alien Plant Section records. Scientific Services Department, Skukuza. Unpublished records, South African National Parks.
- HENDERSON, L. 2001. *Alien weeds and invasive plants*. Pretoria: Plant Protection Research Institute. (Handbook No. 12. Agricultural Research Council).
- JOUBERT, S.C.J. 1986. Master plan for the management of the Kruger National Park. National Parks Board, Skukuza, South Africa. <http://www.parks-sa.co.za>
- LOTTER, W.D. 1997. Management proposals for the alien aquatic biological invasions of the Kruger National Park. Scientific Report 10/97. National Parks Board, Republic of South Africa.
- LOTTER, W.D. & J.H. HOFFMANN. 1998. An integrated management plan for the control of *Opuntia stricta* (Cactaceae) in the Kruger National Park, South Africa. *Koedoe* 41(1): 63-68.
- MACDONALD, I.A.W. & W.P.D. GERTENBACH. 1988. A list of alien plants in the Kruger National Park. *Koedoe* 31: 137-150.
- MCNEELY, J.A. 2000. Global strategy for addressing the problem of invasive alien species. A result of the Global Invasive Species Programme (GISP). Unpublished report. IUCN- The World Conservation Union, Switzerland.
- NOSS, R.F. 1990. Indicators for monitoring biodiversity: a hierarchical approach. *Conservation Biology* 4: 355-364.
- OBERMEIJER, A.A. 1937. A preliminary list of the plants found in the Kruger National Park. *Annals of the Transvaal Museum* 17(4): 185-227.
- Olckers, T & M.P. Hill (eds). 1999. Biological control of weeds in South Africa (1990-1998). *African Entomology Memoir* No.1.
- Richardson, D.M., P. Pysek, M. Rejmanek, M.G. Barbour, F.D. Panetta & C.J. West. 2000. Naturalization and invasion of alien plants: concepts and definitions. *Diversity and Distributions* 6: 93-107.
- VAN DER SCHIFF, H.P. 1957. Ekologiese studie van die flora van die Nasionale Krugerwildtuin. D.Sc. thesis, Potchefstroom University for Christian Higher Education, Potchefstroom.
- VAN DER SCHIFF, H.P. 1969. *A checklist of the plants of the Kruger National Park*. Publikasies van die Universiteit van Pretoria, Nuwe reeks 53: 1-100.



## Appendix 1

*List of plants not classed as aliens*

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1. *Centella asiatica* (L.) Urb.
  2. *Trichodesma zeylanicum* (Burm.) R. Br.
  3. *Ocimum americanum* L. var. *americanum*
  4. *Hibiscus cannabinus* L. var. *cannabinus*
  5. *Sida alba* L.
  6. *Sida cordifolia* L.
  7. *Crotalaria sphaerocarpa* Perr. ex DC. subsp. *sphaerocarpa*
  8. *Vigna oblongifolia* A. Rich. var. *oblongifolia*
  9. *Dodonaea angustifolia* L.f.
  10. *Striga asiatica* (L.) Kuntze
  11. *Withania somnifera* (L.) Dunal
  12. *Triumfetta pentandra* A. Rich. var. *pentandra*
  13. *Triumfetta rhomboidea* Jacq. var. *rhomboidea*
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