

# Invasive, naturalized and casual alien plants in southern Africa: a summary based on the Southern African Plant Invaders Atlas (SAPIA)

L. HENDERSON\*

**Keywords:** biomes, casual alien plants, invasive plants, Lesotho, naturalized plants, roadside surveys, SAPIA mapping project, South Africa, Swaziland

## ABSTRACT

The primary objective of this publication is to provide an overview of the species identity, invasion status, geographical extent, and abundance of alien plants in South Africa, Swaziland and Lesotho, based on field records from 1979 to the end of 2000. The dataset is all the species records for the study area in the Southern African Plant Invaders Atlas (SAPIA) database during this time period. A total of 548 naturalized and casual alien plant species were catalogued and invasion was recorded almost throughout the study area. Most invasion, in terms of both species numbers and total species abundance, was recorded along the southern, southwestern and eastern coastal belts and in the adjacent interior. This area includes the whole of the Fynbos and Forest Biomes, and the moister eastern parts of the Grassland and Savanna Biomes. This study reinforces previous studies that the Fynbos Biome is the most extensively invaded vegetation type in South Africa but it also shows that parts of Savanna and Grassland are as heavily invaded as parts of the Fynbos. The Fabaceae is prominent in all biomes and *Acacia* with 17 listed species, accounts for a very large proportion of all invasion. *Acacia mearnsii* was by far the most prominent invasive species in the study area, followed by *A. saligna*, *Lantana camara*, *A. cyclops*, *Opuntia ficus-indica*, *Solanum mauritianum*, *Populus alba*/*>canescens*, *Melia azedarach*, *A. dealbata* and species of *Prosopis*.

## INTRODUCTION

### History of roadside surveys in South Africa

Roadside surveys of invasive plants in South Africa were pioneered by Henderson and Musil (née Duggan) starting in 1979 in the central Transvaal, now Gauteng (Wells, Duggan & Henderson 1980), with the remainder of the Transvaal surveyed in 1982 and 1983 (Henderson & Musil 1984). Surveys of the rest of South Africa were conducted by Henderson from 1986, starting with Natal (Henderson 1989), followed by the Orange Free State (Henderson 1991a), northern Cape (Henderson 1991b), eastern Cape (Henderson 1992), western and central Cape (completed in 1993 but unpublished), and southern and southwestern Cape (Henderson 1998a).

All terminology used in this paper relating to invasive plants such as 'alien', 'invasive', 'naturalized', 'casual alien', 'weed' and 'environmental weed' conforms, as far as possible, to the definitions provided by Richardson *et al.* (2000) and Pyšek *et al.* (2004). The method used in these surveys was designed initially to make use of otherwise unproductive travelling time whilst engaged in other research projects. The method was refined as the surveys progressed until a standardized method was developed (see Henderson 1992, 1998a). The presence and abundance of all alien trees, large shrubs and conspicuous climbers which appeared to be naturalized or occurring outside of cultivation were recorded for each veld type category, habitat type (roadsides and adjoining veld, and streambanks) and quarter-degree/fifteen minute square traversed by road.

Recordings of species on roadsides and in the adjacent veld were made from a moving vehicle along road

transects of between five and 10 km long. Recordings of streambank species were made at virtually all water-course crossings on the survey route.

### The Southern African Plant Invaders Atlas mapping project (SAPIA)

The Southern African Plant Invaders Atlas (SAPIA) is a mapping project, launched in January 1994, to collate information on the distribution, abundance and habitat types of invasive and naturalized alien plants in southern Africa (Henderson 1998b). The first phase of SAPIA, involving volunteer participants, was scheduled for a five-year period, ending in December 1998. The atlas region covered South Africa, Lesotho and Swaziland. Information was recorded on two standardized atlas sheets, with slightly different species lists, covering the western and eastern halves of the atlas region. One hundred plant taxa were listed on each sheet, with a combined total of 161 species. A pocket field guide was compiled to help with the identification of all listed species (Henderson 1995).

### SAPIA database

A computerized SAPIA database was created by incorporating all Henderson survey data ( $\pm$  23 000 records) and SAPIA phase one project data ( $\pm$  20 000 records). The SAPIA project continued on an ad hoc basis and by the end of 2000 a total of  $\pm$  48 000 records had been accumulated. Thereafter, the SAPIA initiative dwindled due to lack of funding. Only 10 000 records were added in the five year period from 2001 to the end of 2005. The SAPIA project was revived in 2006 with funding from the Department of Water Affairs and Forestry's Working for Water Programme. The SAPIA database has been computerized using Microsoft Access and is housed at the Plant Protection Research Institute in Pretoria.

\* Agricultural Research Council: Plant Protection Research Institute, c/o SANBI, Private Bag X101, 0001 Pretoria.

E-mail: henderson@sanbi.org

MS. received: 2006-10-06.

## Objectives of this study

- To provide an overview of the species identity, invasion status, geographical extent, and abundance of alien plants in South Africa, Swaziland and Lesotho, based on field records from 1979 to the end of 2000.
- To highlight the most prominent invaders in the region as a whole, in each of the biomes, and in riparian and wetland habitats.
- To compare invasion and provide species profiles for each of the biomes.

## METHODS

### Sampling method

The dataset for this study is all the species records for South Africa, Swaziland and Lesotho in the SAPIA database collected from 1979 until the end of 2000 ( $\pm 48\ 000$  records). During this period a concerted effort was made to gather as much data from as wide an area as possible. The information gathered is the best available data concerning the extent of invasion and species composition, at least of the larger trees, shrubs and conspicuous climbers, in the study area over this time period.

The SAPIA dataset was subdivided on a quarter-degree square (QDS) basis into six datasets representing the biomes of southern Africa. According to Rutherford (1997) there are seven biomes in southern Africa: Savanna, Fynbos, Forest, Grassland, Nama-Karoo, Succulent Karoo and Desert. The Forest Biome in southern Africa is miniscule, only occurring in the Knysna area. However, if all the forest patches elsewhere are included, its area increases several-fold (Rutherford 1997). In this study Forest refers to the Forest Biome and also forest habitats within the Savanna, Fynbos and Grassland Biomes. The Desert Biome occurs almost exclusively in Namibia, except for a very small patch along the Orange River bordering on South Africa that has been excluded from this study.

## Data treatment

### Abundance

Species abundance ratings in the SAPIA database are qualitative estimates. Table 1 shows the abundance ratings used in the SAPIA database and the equivalent rating used in Henderson surveys. For the purposes of this study, species abundance ratings were converted to a numerical value as done in previous surveys (Henderson 1998a) and each abundance rating was expressed in numbers of individuals or groups per 10 km transect/recording (Table 1).

### Prominence

A similar formula was used in this study to calculate prominence as in previous studies by Henderson (1998a). The prominence value of a species *x* in category *y* (biome or study area) was calculated as follows:

$$\text{prominence value} = \frac{\text{total abundance of species } x \text{ in category } y}{\text{sum of the abundances of all species in category } y} \times 100 + \frac{\text{total species records of species } x \text{ in category } y}{\text{sum of the records of all species in category } y} \times 100$$

The highest prominence values in a given category which add up to  $\pm 160$  points out of a total of 200 are printed in bold in Appendices 1–3. The cut-off point is arbitrary but represents the upper 80% of the summed prominence values.

## RESULTS

A total of 548 naturalized and casual alien plant species were catalogued in the SAPIA database for South Africa, Swaziland and Lesotho from 1979 to the end of 2000 (Appendix 4). At least 119, mainly herbaceous, taxa are considered to have been under-recorded and

TABLE 1.—Abundance ratings used in Henderson surveys, SAPIA and this study

Rating	Henderson surveys			Rating	SAPIA	This study
	Roadsides and veld	No.*	Streambanks		All habitats†	All habitats#
9	A virtually continuous, almost pure stand	1 000+	Any number, with cover more than 75% of the reference area	7	Very abundant	1 000
8	The commonest species in a generally continuous tree or shrub layer	500–999	Any number, with 50–75% cover	6	Very abundant	1 000
7	Less abundant than above but > 20 individuals or groups per km	200–499	Any number, with 25–50% cover	5	Abundant	200
6	10–20 individuals or groups per km	100–199	Any number with 5–25% cover	4	Abundant	200
5	5–10 individuals or groups per km	50–99	Numerous, but < 5% cover or scattered, with cover up to 5%	3	Frequent	50
4	2–5 individuals or groups per km	20–49	Few, with small cover	2	Frequent	50
3	$\pm 1$ individual or group per km	5–19	Solitary, with small cover	1	Occasional	10
2	Less abundant than above but more than 1 individual or group per 5 km	2–4			Occasional	10
1	$\pm 1$ plant or group per 5–10 km	1			Rare	1

\*, approximate numbers of individuals or groups per 10 km transect.

†, very abundant extensive stands; abundant; many clumps or stands: frequent, many sightings of single plants or small groups: occasional, a few sightings of one or a few plants: rare, one sighting of one or a few plants.

#, weighted abundance, numbers of individuals or groups per 10 km transect/recording.

the results presented are not a true reflection of their status (see asterisked species in Appendix 4). A further 45 species were recorded in the study area after 2000 and are asterisked in the species checklist (Appendix 5). A total of 601 species are listed in the full checklist given in Appendix 5—this is estimated to be about half the total number of naturalized and casual alien plant species in southern Africa. The most comprehensive listing of naturalized species in southern Africa, compiled by Wells *et al.* (1986), contains approximately 965 species, predominantly herbaceous. The SAPIA database, with a bias towards trees and shrubs, has an additional 231 species not listed by Wells *et al.* (1986).

### Geographical extent of invasion

Alien plant invasion was recorded almost throughout the study area. Figure 1A shows invasion in terms of species numbers per QDS and Figure 1B shows the severity of invasion per QDS based on the total weighted abundance of all species per QDS. Most invasion, in terms of both species numbers and total species abundance, was recorded along the southern, southwestern and eastern coastal belts and in the adjacent interior. This corresponds with the regions of highest rainfall (Schulze 1997), urban development, and cultivation of agricultural and silvicultural crops. It also includes the whole of the Fynbos and Forest, and the moister eastern parts of the Grassland and Savanna Biomes (Figure 1C). Distribution maps of 234 species, which include all declared species under the Conservation of Agricultural Resources Act, Act 43 of 1983, and amended in 2001, are given in the field guide *Alien weeds and invasive plants* (Henderson 2001).

### Prominent invasive species

There were 97 prominent invasive species in the study area and each of the biomes (Appendices 1–3). All these species were invading natural and semi-natural habitats.

#### Study area

Fifty species account for most invasion (the upper 80% of the summed prominence values) in the study area (Appendix 1). *Acacia mearnsii* (black wattle) was the most prominent species by far, with a value of 18.37 (out of a maximum of 200) which is more than double the value of the second-ranked species, *A. saligna* (Port Jackson). The remaining top ten most prominent invaders in the study area were in order, *Lantana camara* (lantana), *A. cyclops* (rooikrans), *Opuntia ficus-indica* (sweet prickly-pear), *Solanum mauritianum* (bugweed), *Populus alba* × *canescens* (white/grey poplars—values of these two taxa were combined where they were difficult to distinguish at a distance during roadside surveys), *Melia azedarach* (seringa), *A. dealbata* (silver wattle) and *Prosopis* spp. (*P. glandulosa* var. *torreyana*, *P. velutina* and their hybrids) (mesquite trees). Together these species cover almost the entire study area (Figures 2, 3).

#### Savanna Biome

Forty-eight species were the most prominent invaders in the Savanna Biome (Appendix 2). *Lantana camara*

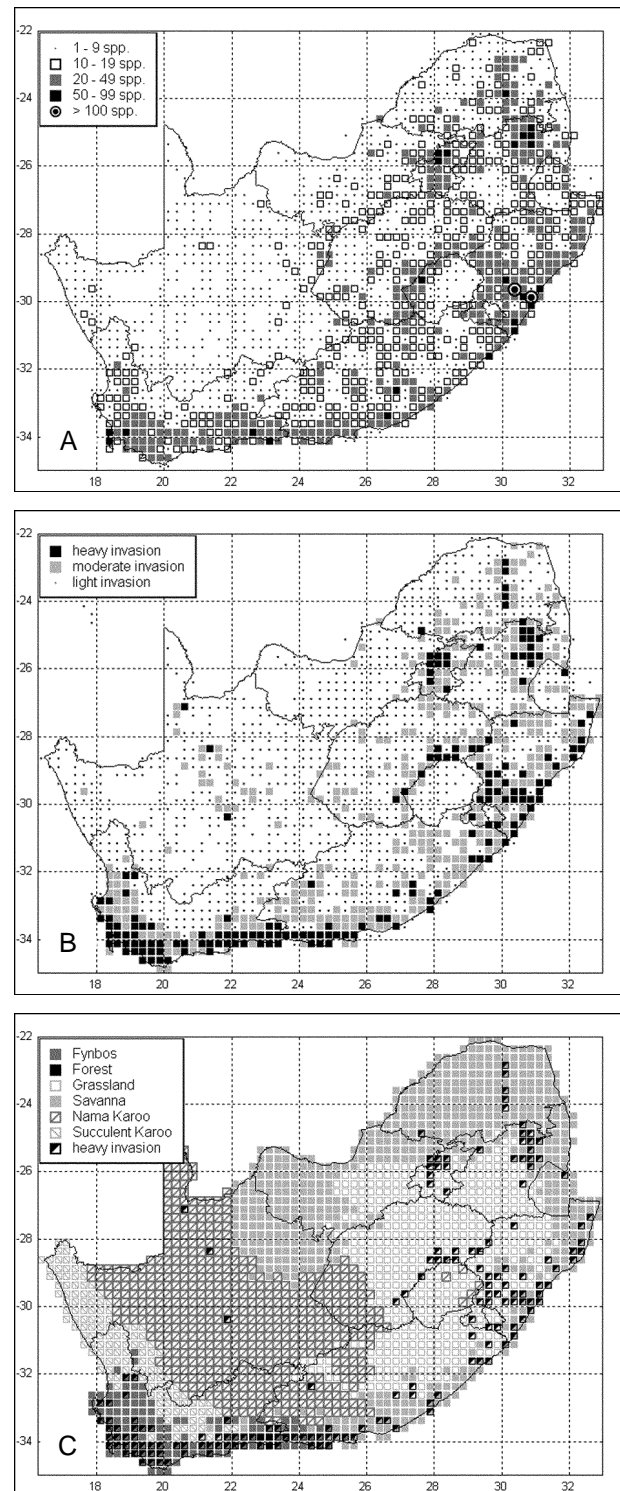


FIGURE 1.—A, species numbers per quarter-degree square in study area; B, severity of invasion per quarter-degree square. Light invasion: < 1 individual or group per km. Moderate invasion: up to 5 individuals or groups per km; some species forming stands. Heavy invasion: up to 50 individuals or groups per km; many species forming stands; some completely dominating landscape. C, heavy invasion in relation to biomes in study area.

was the most prominent species with a prominence value of 20.6, followed by *Chromolaena odorata* (triffid weed) with a value of 14.2 and *Melia azedarach* with a value of 12. The remaining top ten invaders were, in order, *Solanum mauritianum*, *Acacia mearnsii*, *Opuntia ficus-indica*, *Ricinus communis* (castor-oil plant), *Psidium*

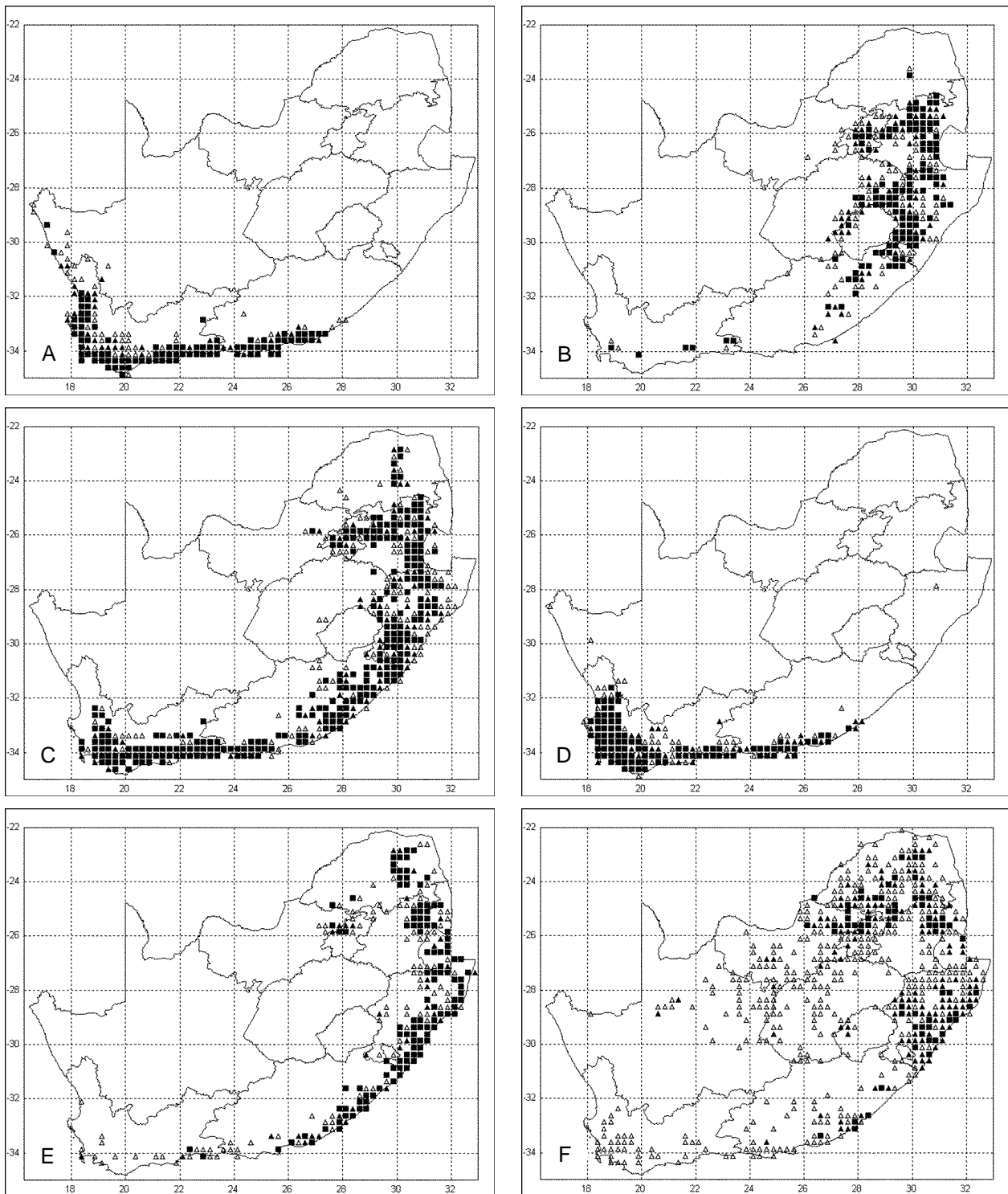


FIGURE 2.—Distribution and severity of invasion in study area: A, *Acacia cyclops*; B, *Acacia dealbata*; C, *Acacia mearnsii*; D, *Acacia saligna*; E, *Lantana camara*; F, *Melia azedarach*. Light invasion,  $\Delta$ ; moderate invasion,  $\blacktriangle$ ; heavy invasion,  $\blacksquare$ .

*guajava* (guava), *Eichhornia crassipes* (water hyacinth) and *Jacaranda mimosifolia* (jacaranda).

#### Fynbos Biome

Twenty species were the most prominent invaders in the Fynbos Biome (Appendix 2). *Acacia mearnsii* was the most prominent species with a prominence value of 31.5, followed by *A. saligna* and *A. cyclops* with values of 30.4 and 27.2, respectively. The remaining top ten most prominent invaders in order, were, *Pinus pinaster* (cluster pine), *Acacia melanoxylon* (Australian

blackwood), *A. longifolia* (long-leaved wattle), *Populus ×canescens* (grey poplar), *Paraserianthes lophantha* (stinkbean), *Rubus fruticosus* (European blackberry) and *Opuntia ficus-indica*. *Hakea sericea* (silky hakea) and *Pinus radiata* (radiata pine), both invaders of mountain fynbos, were most likely under-recorded because of the inaccessibility and under-sampling of this habitat.

#### Forest habitats

Forty species were the most prominent invaders in forest habitats (Appendix 2). *Chromolaena odorata* was

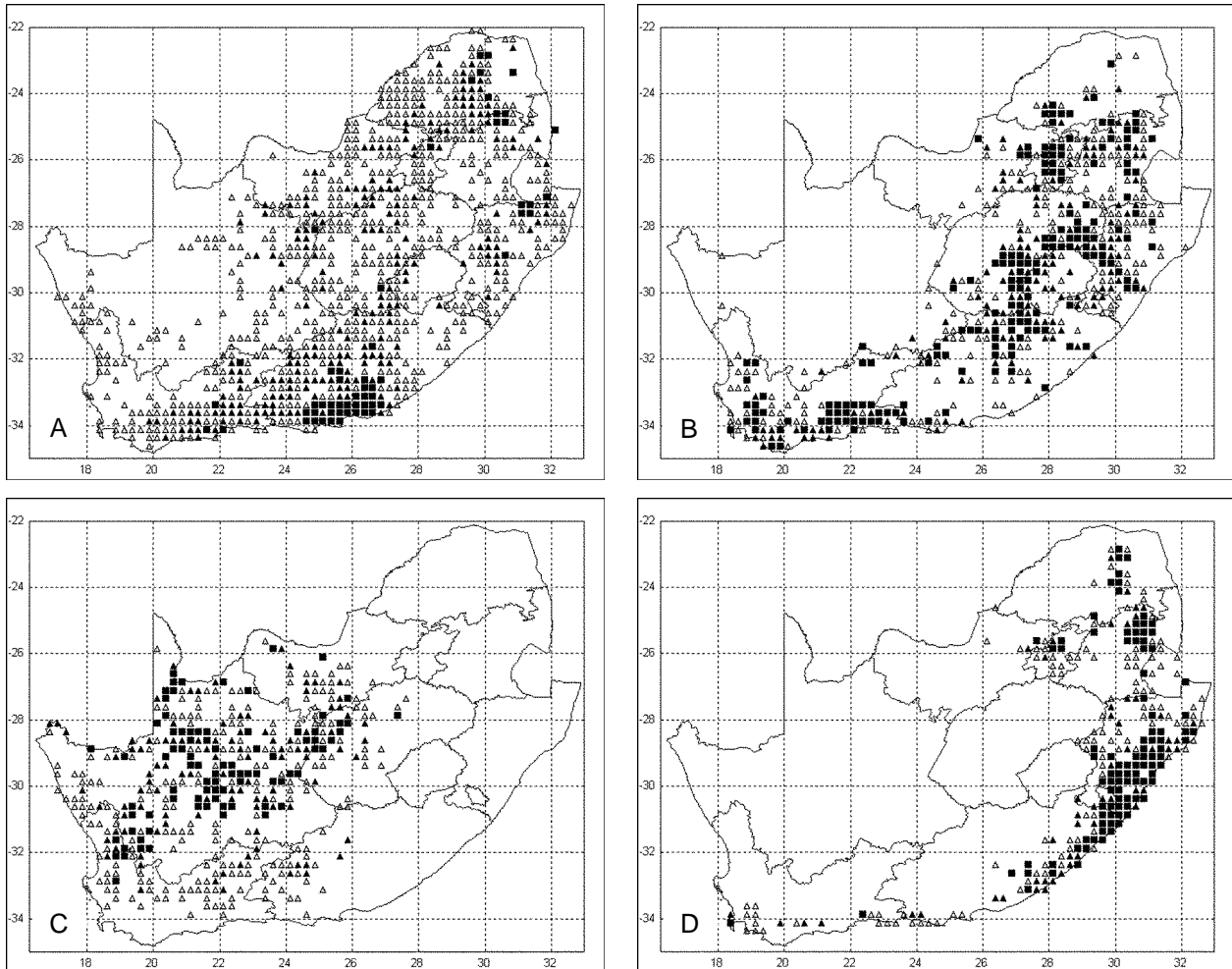


FIGURE 3.—Distribution and severity of invasion in study area: A, *Opuntia ficus-indica*; B, *Populus alba/canescens*; C, *Prosopis* spp.; D, *Solanum mauritianum*. Light invasion,  $\triangle$ ; moderate invasion,  $\blacktriangle$ ; heavy invasion,  $\blacksquare$ .

the most prominent species with a prominence value of 23.9, followed by *Solanum mauritianum* and *Acacia mearnsii* with values of 19 and 16.7, respectively. The remaining top ten prominent invaders were, in order, *Acacia melanoxylon*, *Lantana camara*, *Cestrum laevigatum* (inkberry), *Caesalpinia decapetala* (Mauritius/Mysore thorn), *Melia azedarach*, *Pinus pinaster* and *Psidium guajava*. *Pereskia aculeata* (pereskia) ranked eleventh and could have been vastly underestimated because of the difficulty of observing this forest canopy, climbing species.

#### Grassland Biome

Thirty-two species were the most prominent invaders in the Grassland Biome (Appendix 3). *Acacia mearnsii* was the most prominent species with a prominence value of 21.3, followed by *A. dealbata* and *Salix babylonica* (weeping willow) with values of 20.9 and 17.3, respectively. The remaining top ten most prominent invaders were, in order, *Populus alba/canescens* (white/grey poplars), *Solanum mauritianum*, *Rubus* spp. (mainly *R. cuneifolius*) (brambles), *Pyracantha angustifolia* and *P. crenulata* (yellow and Himalayan firethorns), *Eucalyptus* spp. (eucalypts), *Melia azedarach* and *Opuntia ficus-indica*. *Campuloclinium macrocephalum* (pompom weed) which did not feature as a prominent invader in this study showed an explosive rate of increase after

2000 and currently would be rated as one of the most prominent invaders in the Grassland Biome (Henderson *et al.* 2003).

#### Nama-Karoo Biome

Fourteen species were the most prominent invaders in the Nama-Karoo Biome (Appendix 3). *Prosopis* spp. (*P. glandulosa* var. *torreyana*, *P. velutina* and their hybrids) were the most prominent species with a prominence value of 60.6, followed by *Atriplex inflata* (sponge-fruit saltbush) and *Opuntia ficus-indica* with values of 21 and 14 respectively. The remaining top ten prominent invaders were, in order, *Salsola kali/tragus* (Russian tumbleweed), *Azolla filiculoides* (red water fern), *Nicotiana glauca* (wild tobacco), *Atriplex nummularia* (old man saltbush), *Schinus molle* (pepper tree), *Agave americana* (American agave) and *Solanum elaeagnifolium* (silver-leaf bitter-apple).

#### Succulent Karoo Biome

Twelve species were the most prominent invaders in the Succulent Karoo Biome (Appendix 3). *Nicotiana glauca* was the most prominent invader with a prominence value of 26.8, followed by *Acacia cyclops* and *Prosopis* spp. (*P. glandulosa* var. *torreyana*, *P. velutina* and their hybrids) with values of 26.3 and 25.9, respec-

tively. The remaining top ten most prominent invaders were, in order, *Acacia mearnsii*, *A. saligna*, *Atriplex inflata*, *Arundo donax* (giant reed), *Atriplex nummularia*, *Opuntia ficus-indica* and *Populus ×canescens*.

#### Riparian and wetland habitats

Fifty-five species had more than 50 records in riparian and wetland habitats (Appendix 4). *Salix babylonica* was the most frequently recorded riparian and wetland species with 1 323 records, followed by *Populus alba/×canescens* with 1 176 records and *Acacia mearnsii* with 953 records. The remaining top ten riparian and wetland invaders were, in order, *Melia azedarach*, *Ricinus communis*, *Arundo donax*, *Acacia dealbata*, *Sesbania punicea* (red sesbania), *Prosopis* spp. and *Nicotiana glauca*.

#### Biome comparison

The Savanna Biome, which occupies the largest number of QDS (645) in the study area, had the greatest number of species (358) and the most invasion in terms of total abundance of all species (Table 2). The Fynbos Biome, however, which occupies the least QDS (139), was the most heavily invaded in terms of average abundance of all species per QDS, average abundance of individual species per QDS and % QDS heavily invaded. The Grassland Biome ranks third after Fynbos for total abundance of all species, followed by Forest, Nama-Karoo and the Succulent Karoo Biome was the least invaded.

#### Biome profiles

Appendix 6 provides species characteristics of the prominent invasive species. Table 3 analyses the promi-

TABLE 2.—Biome comparison in terms of extent, numbers and abundance of species and severity of invasion

	FB	Fh	SB	GB	NKB	SKB
Extent in QDS	139	157	645	521	548	141
Total species	216	172	358	319	105	69
Prominent invasive species	20	40	48	32	14	12
Total abundance*	986	222	1165	811	211	67 524
	653	419	895	723	589	
Ave abundance per QDS	7 098	1 417	1 808	1 558	386	479
Ave abundance per species	4 568	1 293	3 257	2 545	2 015	979
% QDS light#	17	15	51	49	51	66
% QDS moderate#	30	44	20	33	13	9
% QDS heavy#	47	41	8	9	1	1

QDS, quarter-degree squares in Fynbos, Savanna, Grassland, Nama-Karoo and Succulent Karoo according to Rutherford (1997); QDS in forest habitats according to SAPIA database.

\*, total weighted abundance of all species (see text).

Prominent invasive species: species with highest prominence values adding up to ± upper 80% of summed values (see text).

#, % QDS lightly invaded: less than 1 individual or group per km; #, % QDS moderately invaded: up to 5 individuals or groups per km; some species forming stands; #, % QDS heavily invaded: up to 50 individuals or groups per km; many species forming stands; some completely dominating landscape.

FB, Fynbos Biome; Fh, Forest habitats; SB, Savanna Biome; GB, Grassland Biome; NKB, Nama-Karoo Biome; SKB, Succulent Karoo Biome.

nent invasive species in each of the biomes and the study area in terms of region of origin, taxonomy, growth form, perennation, type of reproduction, dispersal mechanism and cultivated use.

*Savanna Biome* species are predominantly of tropical origin; members of the Fabaceae, Solanaceae, Asteraceae and Rosaceae; woody trees and shrubs, followed by herbs and climbers; perennial evergreen and evergreen/deciduous; seed-producers; water and bird dispersed; ornamentals and agricultural crops.

*Fynbos Biome* species are predominantly of temperate origin (particularly southern temperate); members of the Fabaceae, Myrtaceae, Pinaceae and Salicaceae; woody trees and shrubs; perennial evergreen; seed-producers; water, bird and wind dispersed; silvicultural crops, ornamentals and cover/binders.

*Forest habitat* species are predominantly of tropical origin; members of the Fabaceae, Asteraceae, Myrtaceae, Solanaceae, Pinaceae and Zingiberaceae; woody trees and shrubs, followed by herbs and climbers; perennial evergreen; seed-producers; bird and water dispersed; ornamentals, barriers and silvicultural crops.

*Grassland Biome* species are predominantly of northern temperate origin and the tropics; members of the Rosaceae, Fabaceae and Salicaceae; woody trees and shrubs, followed by herbs; perennial evergreen/deciduous and deciduous; seed-producers, but a greater percentage of species coppice and sucker than in other vegetation categories; water and bird dispersed; barriers, ornamentals and agricultural crops.

*Nama-Karoo Biome* species are predominantly of northern temperate origin and the tropics; members of the Chenopodiaceae, Salicaceae, Cactaceae, Fabaceae, Solanaceae and Tamaricaceae; woody trees and shrubs, followed by herbs and succulent trees and shrubs; perennial evergreen/deciduous and deciduous; seed-producers, but a greater percentage of species reproduce by vegetative division than in other vegetation categories; water and wind dispersed; agricultural crops and ornamentals.

*Succulent Karoo Biome* species are predominantly of temperate origin; members of the Fabaceae, Chenopodiaceae and Tamaricaceae; woody trees and shrubs; perennial evergreen and evergreen/deciduous; seed-producers and reproduce vegetatively by coppicing; water and wind dispersed; agricultural crops, ornamentals and cover/binders.

#### DISCUSSION

##### Biome comparison: extent of invasion

No previous studies have enabled a direct comparison of the extent of invasion in the different biomes using the same parameters. This study reinforces previous studies that the Fynbos Biome is the most extensively invaded vegetation type in South Africa (Richardson *et al.* 1997) but it also shows that parts of Savanna and Grassland are

TABLE 3.—Analysis of region of origin, taxonomy, growth forms, perennation, reproduction, dispersal mechanisms and cultivated uses of prominent invasive species in each of the biomes, forest habitats and study area

Characteristics	Savanna Biome (49 spp.)	Fynbos Biome (24 spp.)	Forest habitats (53 spp.)	Grassland Biome (35 spp.)	Nama-Karoo Biome (18 spp.)	Succulent Karoo Biome (16 spp.)	Study area (97 spp.)
<b>Region of origin</b>							
Northern temperate spp.	10 (20%)	7 (29%)	14 (26%)	18 (51%)	9 (50%)	6 (38%)	32 (33%)
Southern temperate spp.	4 (8%)	10 (42%)	6 (11%)	3 (9%)	3 (17%)	5 (31%)	15 (15%)
Tropical spp.	34 (69%)	7 (29%)	33 (62%)	13 (37%)	6 (33%)	5 (31%)	49 (51%)
Hybrid	1 (2%)			1 (3%)			1 (1%)
<b>Taxonomy</b>							
Families	18	12	24	14	10	10	32
Families with 50% or more of total species (no. spp. in brackets)	Fabaceae (9); Solanaceae (7); Asteraceae (5); Rosaceae (4)	Fabaceae (8); Myrtaceae (3); Pinaceae (2); Salicaceae (2)	Fabaceae (7); Asteraceae (5); Myrtaceae (4); Solanaceae (4); Pinaceae (3); Zingiberaceae (3)	Rosaceae (9); Fabaceae (6); Salicaceae (6)	Chenopodiaceae (3); Salicaceae (3); Cactaceae (2); Fabaceae (2); Solanaceae (2); Tamaricaceae (2)	Fabaceae (5); Chenopodiaceae (2); Tamaricaceae (2)	Fabaceae (15); Rosaceae (9); Solanaceae (9); Asteraceae (6); Salicaceae (6); Cactaceae (5); Myrtaceae (5)
<b>Growth form (spp.)</b>							
Woody tree & shrub	26 (53%)	21 (88%)	33 (62%)	26 (74%)	9 (50%)	12 (75%)	60 (62%)
Succulent tree & shrub	5 (10%)	1 (4%)	1 (2%)	1 (3%)	3 (17%)	1 (6%)	6 (6%)
Climber	7 (14%)	0	8 (15%)	1 (3%)	0	0	9 (9%)
Herbaceous	10 (20%)	1 (4%)	10 (19%)	6 (17%)	5 (28%)	2 (13%)	20 (21%)
Grass/reed	1 (2%)	1 (4%)	1 (2%)	1 (3%)	1 (6%)	1 (6%)	2 (2%)
<b>Perennation (spp.)</b>							
Perennial evergreen	20 (41%)	18 (75%)	33 (62%)	13 (37%)	6 (33%)	8 (50%)	51 (53%)
Perennial evergreen/deciduous	11 (22%)	3 (13%)	9 (17%)	8 (23%)	5 (28%)	5 (31%)	19 (20%)
Perennial deciduous	7 (14%)	2 (8%)	5 (9%)	9 (26%)	5 (28%)	2 (13%)	14 (14%)
Variable	3 (6%)	1 (4%)	2 (4%)	2 (6%)	1 (6%)	1 (6%)	3 (3%)
Germinative (annual/biennial)	8 (16%)	0	4 (8%)	3 (9%)	1 (6%)	0	10 (10%)
<b>Reproduction (spp.) by:</b>							
Seeds/spores	44 (90%)	21 (88%)	50 (94%)	29 (83%)	14 (78%)	14 (88%)	91 (94%)
Coppicing	23 (47%)	11 (46%)	25 (47%)	22 (63%)	8 (44%)	11 (69%)	44 (45%)
Suckering	9 (18%)	3 (13%)	6 (11%)	9 (26%)	4 (22%)	2 (13%)	14 (14%)
Division	6 (12%)	4 (17%)	3 (6%)	6 (17%)	5 (28%)	2 (13%)	10 (10%)
Rhizomes	1 (2%)	1 (4%)	4 (8%)	1 (3%)	2 (11%)	1 (6%)	6 (6%)
Stolons/runners	1 (2%)	0	3 (6%)	1 (3%)	0	0	3 (3%)
Bulbils	1 (2%)	0	0	0	0	0	1 (1%)
<b>Dispersal (spp.) by:</b>							
Wind	13 (27%)	7 (29%)	19 (36%)	4 (11%)	7 (39%)	6 (38%)	31 (32%)
Water	27 (55%)	16 (66%)	22 (42%)	19 (54%)	10 (56%)	11 (69%)	47 (48%)
Birds	17 (35%)	8 (33%)	25 (47%)	17 (49%)	5 (28%)	4 (25%)	40 (41%)
Mammals	9 (18%)	5 (21%)	7 (13%)	3 (9%)	4 (22%)	5 (31%)	16 (16%)
Humans	14 (29%)	5 (21%)	8 (15%)	10 (29%)	3 (17%)	3 (19%)	21 (22%)
Ants	8 (16%)	3 (13%)	4 (8%)	6 (17%)	0	2 (13%)	10 (10%)
<b>Cultivated uses (spp.)</b>							
Ornamental	20 (41%)	6 (25%)	21 (40%)	7 (20%)	5 (28%)	4 (25%)	35 (36%)
Cover/binder	4 (8%)	5 (21%)	6 (11%)	4 (11%)	2 (11%)	3 (19%)	9 (9%)
Barrier	5 (10%)	2 (8%)	9 (17%)	8 (23%)	2 (11%)	0	17 (18%)
Silvicultural crop	2 (4%)	7 (29%)	8 (15%)	4 (11%)	0	2 (13%)	10 (10%)
Agricultural crop	11 (22%)	4 (17%)	7 (13%)	7 (20%)	7 (39%)	7 (44%)	16 (16%)
Species with no uses	7 (14%)	0	2 (4%)	5 (14%)	2 (11%)	0	11 (11%)

as heavily invaded as parts of the Fynbos. These findings have important implications for the management of alien plant invasions in South Africa. Without intervention we can expect invasion to increase in all parts of South Africa and particularly in the Grassland and Savanna Biomes where large areas are yet to be invaded and many species are only starting to invade.

### Biome comparison: prominent invaders

Each biome has a different suite of prominent invaders. In part, this can be explained by their pre-adaptation to the prevailing environmental conditions, but also to their history of planting. Most of these species were deliberately introduced and cultivated on a grand scale as silvicultural and agricultural crops e.g. *Acacia mearnsii*, *A. melanoxylon*, *Pinus pinaster* and species of *Prosopis*, as barriers e.g. *Acacia dealbata*, *Hakea sericea* and *Pyracantha angustifolia*, as cover/binders e.g. *Acacia cyclops*, *A. saligna* and *Populus ×canescens*, and ornamentals e.g. *Melia azedarach* and *Lantana camara*.

Some species which have become prominent invaders were not cultivated widely or on a grand scale e.g. *Solanum mauritianum*, *Chromolaena odorata* and *Nicotiana glauca*. Although the latter species have on occasion been cultivated as ornamentals they have managed to disperse very efficiently without human assistance—*C. odorata* by wind, *S. mauritianum* by birds and *N. glauca* by wind, soil and water.

Some species, although widely planted, have become prominent invaders in only one biome, indicating that environmental factors have limited their distribution. Examples are members of the family Rosaceae, such as *Pyracantha angustifolia*, *P. crenulata*, *Cotoneaster franchetii* and *C. pannosus* that are virtually restricted to high-altitude grasslands where it appears that freezing winter temperatures are needed to trigger seed germination (Henderson 1989). *Jacaranda mimosifolia* is another species that has been planted throughout South Africa yet is only invasive in the moister parts of the Savanna and Forest Biomes. In its native northeastern Argentina, *J. mimosifolia* occurs mainly on river banks under warmer-temperate, subhumid conditions (Poynton 1973)—environmental conditions which are similar to those in its naturalized range in southern Africa. A previous study by Henderson (2006b) showed that the current distributions of invasive plants in southern Africa are a reflection of the climatic zones of their origin.

There are considerable differences in the species profiles of the biomes but shared features are the prominence of the family Fabaceae, woody trees and shrubs, reproduction by seed and water dispersal. Within the Fabaceae the *Acacia* species are the most numerous with 17 listed species and account for a very large proportion of all plant invasion in South Africa. They are important invaders of all the major vegetation types except for those in the arid interior, where other leguminous invaders take over, namely species of *Prosopis*. The most widespread and abundant acacias are *Acacia mearnsii*, *A. cyclops* and *A. saligna*. *Acacia mearnsii* has invaded the widest range of vegetation types in South

Africa and is the most widespread riverine invader, occurring almost continuously from Louis Trichardt in the Limpopo Province down the eastern seaboard to Cape Town, a distance of  $\pm 2\,500$  km. *Acacia cyclops* stretches along almost the entire Cape coastline from Port Nolloth in the northwest to beyond East London in the east, a distance exceeding 2 000 km. *Acacia saligna* stretches along the Cape coastline from Saldanha Bay in the west to the Kei River in the east, a distance of  $\pm 1\,500$  km.

Sixty-eight per cent of prominent invaders are perennial trees or shrubs. There are only two grasses listed as prominent invaders and only 14 species as nonperennial (annual, biennial or variable). Grasses and herbaceous species are under-represented in the SAPIA database largely as a consequence of biased recording of the larger, more conspicuous species. In southern Africa the Poaceae is one of the largest plant families with 847 indigenous species and 115 (12%) naturalized species (Gibbs Russell *et al.* 1990). However, only 30 grass species are listed in this publication. There is definitely a lack of expertise in identifying grasses in South Africa and this is one of the reasons for the under-representation of alien grasses in weed surveys. There is similarly an under-representation of the alien herbaceous Asteraceae. The South African National Biodiversity Institute's online species checklist at <http://posa.sanbi.org/searchspp.php> lists 125 alien herbaceous species in South Africa, yet only 44 alien herbaceous species have been listed in this publication.

### Comparison with other studies

Versfeld *et al.* (1998) provide the only other assessment of the extent and importance of invasive plants on a national level. This study combined expert knowledge of local landowners and managers with existing databases such as those of provincial conservation authorities and national departments. The SAPIA database was used as a means of data verification particularly for areas where expert knowledge was lacking. Overall the assessment by Versfeld *et al.* (1998) relating to importance rankings and the distribution of dense infestations concurs with this study. Eight of the top ten invading species or groups of species, ranked by condensed invaded area, also appear within the top ten ranking in this study—these are: *Acacia cyclops*, *Prosopis* spp., *A. mearnsii*, *A. saligna*, *Solanum mauritianum*, *Opuntia* spp., *Melia azedarach* and *Lantana camara*. Versfeld *et al.* (1998) include *Pinus* spp. and *Hakea* spp. within the top ten ranking, whereas this study includes *Populus alba/×canescens* and *Acacia dealbata*. The lower ranking of *Pinus* spp. and *Hakea* spp. in this study can be explained by the under-sampling of mountain habitats, which are largely inaccessible by road, in which these species are invasive.

Abundance data presented in this study suggests that Versfeld *et al.* (1998) may have underestimated the area of invasion of *Salix babylonica* and *Populus alba/×canescens*. In the present study these species were not only the most frequently recorded invaders in riparian and wetland habitats but their total weighted abundance



was in both instances more than *Melia azedarach* and *Eucalyptus* spp. (Appendix 1) which were rated above *Salix* spp. and *Populus* spp. by Versfeld *et al.* (1998). Other riparian species which may also have been underestimated include *Arundo donax* (giant reed), *Morus alba* (common mulberry) and *Ricinus communis*.

### Looking to the future

#### *The Working for Water Programme (WfW) and biological control*

Alien plant invasion is a dynamic process and there will undoubtedly be changes in species composition and prominence of invaders in the future. Many of the large tree species—mainly *Acacia*, *Eucalyptus*, *Pinus*, *Populus*, *Prosopis* species and *Melia azedarach* have been targeted by a national clearing programme, Working for Water (WfW), which started in October 1995 (Marais *et al.* 2004). To date there has not been an assessment of the effects of the WfW programme on the status of invasive alien infestations. The programme has been proposed for 20 years but Marais *et al.* (2004) indicate that even with the existing generous levels of funding, it is unlikely that the problem will be contained within the next half century.

Biological control of invasive plants using introduced insects and pathogens is the only sustainable, effective and inexpensive solution to the most intractable of the invasive alien plant problems (Marais *et al.* 2004). When they are successful, the damage inflicted by biological control agents causes a decline in population densities, distribution and, or, rates of spread of invasive plants, and reduces the costs of other management practices (Zimmermann *et al.* 2004). There have been some outstanding successes with biocontrol in South Africa, dating back to the early and mid-1900s with *Opuntia monacantha* (drooping prickly pear) and *O. ficus-indica*, and in more recent years with several of the *Acacia* spp. (Zimmermann *et al.* 2004). Population monitoring of *A. saligna* in the Western Cape has shown marked decreases in population densities caused by the gall-forming rust fungus, *Uromycladium tepperianum* (Morris 1997; Wood & Morris 2007).

#### *New invaders*

Since 2000 a further 45 species have been added to the SAPIA database for the study area (Appendix 5). Another eight species, two of which are indigenous to South Africa, are naturalized in neighbouring Zimbabwe and Malawi (Appendix 5). All but three of the additional species have been listed as weeds in *A global compendium of weeds* (Randall 2002) and 28 species are environmental weeds elsewhere in the world and therefore have the potential to become invasive in South Africa. Fourteen of the new species are 'noxious weeds' or restricted in California, Florida, Hawaii, New Zealand and Australia—places with similar climates and with which South Africa has many invasive species in common. We should be especially wary of these species which include some of the most damaging and costly invaders such as *Hydrilla verticillata* (hydrilla), a sub-

merged aquatic plant that has invaded much of the USA since the 1960s, and *Chondrilla juncea* (skeleton weed), a terrestrial herb that has become a major agricultural weed in the USA, Canada and Australia.

### CONCLUSION

The main objective of this paper was to provide a historical overview of the extent and species composition of alien plant invasion in southern Africa from 1979 until the end of 2000. This snapshot of invasion will provide a yardstick by which we can measure our progress or failure in the management of invasive alien plants in southern Africa.

This publication will also contribute to the global knowledge of invasive alien plants. One of the most useful predictors of invasiveness is whether a species is invasive elsewhere in the world (Richardson *et al.* 2004a). The lists of prominent invaders and other naturalized species provided here will serve as a warning to neighbouring countries and to those as far afield as Australia, New Zealand and the USA of potentially invasive species in their regions.

The results presented here are but a summary of the more than 50 000 records of invasive alien plants in the SAPIA database. Much more can be gleaned from the SAPIA data. SAPIA has provided the raw data for analyses that have been used to prioritize invasive alien species for management (Robertson *et al.* 2003; Nel *et al.* 2004), to map the potential spread of invasive plants (Rouget *et al.* 2004), to look at broad-scale distribution patterns of invasive species (Richardson *et al.* 2004b), to correlate patterns of alien plant species richness with the environment and indigenous species richness (Richardson *et al.* 2005), to correlate patterns of invasion with interactions between environment, species traits and human uses (Thuiller *et al.* 2006) and to look at potential range and residence time (Wilson *et al.* 2007). SAPIA has also played a crucial role in providing information on invasive plants for the revision of the Conservation of Agricultural Resources Act, Act 43 of 1983, and the drafting of the National Environmental Management: Biodiversity Act, Act 10 of 2004.

Alien plant invasion is a dynamic process and therefore it is essential that the SAPIA database be kept up-to-date with current information. From October 2006 a second phase of the SAPIA mapping project was launched and all the SAPIA data will be available online at the Weeds and Invasive Plants (WIP) website, [www.agis.agric.za/wip](http://www.agis.agric.za/wip) (Henderson 2006a).

### ACKNOWLEDGEMENTS

I thank all the people who have contributed in many different ways to the compilation of the SAPIA database and have made it one of the most comprehensive databases on invasive alien plants in southern Africa. Les Powrie and Mike Rutherford of the South African National Biodiversity Institute are thanked for the QDS

coverage of the biomes of South Africa which was used to subdivide the SAPIA dataset into the six biome datasets for this publication. Special tribute is made to Mike Wells of the Botanical Research Institute for his inspiration and mentorship during the development of roadside survey techniques from 1979 to the mid-1980s, and to Helmuth Zimmermann of the Plant Protection Research Institute for his motivation and support of the SAPIA mapping project. SAPIA is an initiative of the Agricultural Research Council (ARC): Plant Protection Research Institute which has provided the infrastructure, basal funding and support since the mid 1980s to the present. External funding of SAPIA has been gratefully received from the Departments of Agriculture, Environmental Affairs and Tourism, and Water Affairs and Forestry (Working for Water Programme).

## REFERENCES

- GIBBS RUSSELL, G.E., WATSON, L., KOEKEMOER, M., SMOOK, L., BARKER, N.P., ANDERSON, H.M. & DALLWITZ, M.J. 1990. Grasses of southern Africa. *Memoirs of the Botanical Survey of South Africa* No. 58.
- HENDERSON, L. 1989. Invasive alien woody plants of Natal and the north-eastern Orange Free State. *Bothalia* 19: 237–261.
- HENDERSON, L. 1991a. Invasive alien plants of the Orange Free State. *Bothalia* 21: 73–89.
- HENDERSON, L. 1991b. Invasive alien woody plants of the northern Cape. *Bothalia* 21: 177–189.
- HENDERSON, L. 1992. Invasive alien woody plants of the eastern Cape. *Bothalia* 22: 119–143.
- HENDERSON, L. 1995. *Plant invaders of southern Africa*. Plant Protection Research Institute Handbook No. 5. Agricultural Research Council, Pretoria.
- HENDERSON, L. 1998a. Invasive alien woody plants of the southern and southwestern Cape region, South Africa. *Bothalia* 28: 91–112.
- HENDERSON, L. 1998b. Southern African Plant Invaders Atlas (SAPIA). *Applied Plant Sciences* 12: 31, 32.
- HENDERSON, L. 2001. *Alien weeds and invasive plants*. Plant Protection Research Institute Handbook No. 12. Agricultural Research Council, Pretoria.
- HENDERSON, L. 2006a. Plant Protection Research Institute initiatives: Southern African Plant Invaders Atlas (SAPIA) phase II. *Plant Protection News* 68: 5.
- HENDERSON, L. 2006b. Comparisons of invasive plants in southern Africa originating from southern temperate, northern temperate and tropical regions. *Bothalia* 36: 201–222.
- HENDERSON, L., GOODALL, J.M. & KLEIN, H. 2003. *Pompom weed—an invader of grasslands that threatens conservation and agriculture in South Africa*. Pamphlet produced by Gauteng Department of Agriculture, Conservation, Environment and Land Affairs (DACEL) in collaboration with the Agricultural Research Council (ARC).
- HENDERSON, L. & MUSIL, K.J. 1984. Exotic woody plant invaders of the Transvaal. *Bothalia* 15: 297–313.
- MARAIS, C., VAN WILGEN, B.W. & STEVENS, D. 2004. The clearing of invasive alien plants in South Africa: a preliminary assessment of costs and progress. *South African Journal of Science* 100: 97–103.
- MORRIS, M.J. 1997. Impact of the gall-forming rust fungus *Uromycladium tepperianum* on the invasive tree *Acacia saligna* in South Africa. *Biological Control* 10: 75–82.
- NEL, J.L., RICHARDSON, D.M., ROUGET, M., MGIDI, T.N., MDZEKE, N., LE MAITRE, D.C., VAN WILGEN, B.W., SCHONEGEVEL, L., HENDERSON, L. & NESER, S. 2004. A proposed classification of alien invasive plant species in South Africa: towards prioritizing species and areas for management action. *South African Journal of Science* 100: 53–64.
- POYNTON, R.J. 1973. Trees in South Africa—two hundred selected indigenous and exotic species: how to recognise and grow them. In W.F.E. Immelman, C.L. Wicht & D.P. Ackerman, *Our green heritage*. Tafelberg, Cape Town.
- PYŠEK, P., RICHARDSON, D.M., REJMÁNEK, M., GRADY, L., WILLIAMSON, M. & KIRSCHNER, J. 2004. Alien plants in checklists and floras: towards better communication between taxonomists and ecologists. *Taxon* 53: 131–143.
- RANDALL, R.P. 2002. *A global compendium of weeds* (Draft). Hawaiian ecosystems at risk. Available at www.hear.org/gcw.
- RICHARDSON, D.M., MACDONALD, I.A.W., HOFFMANN, J.H. & HENDERSON, L. 1997. Alien plant invasions. In R.M. Cowling, D.M. Richardson & S.M. Pierce, *Vegetation of southern Africa*. Cambridge University Press, Cambridge.
- RICHARDSON, D.M., PYŠEK, P., REJMÁNEK, M., BARBOUR, M.G., PANETTA, F.D. & WEST, C.J. 2000. Naturalization and invasion of alien plants: concepts and definitions. *Diversity and Distributions* 6: 93–107.
- RICHARDSON, D.M., MORAN, V.C., LE MAITRE, D.C., ROUGET, M. & FOXCROFT, L.C. 2004a. Recent developments in the science and management of invasive alien plants: connecting the dots of research knowledge, and linking disciplinary boxes. *South African Journal of Science* 100: 126–128.
- RICHARDSON, D.M., ROUGET, M., HENDERSON, L. & NEL, J.L. 2004b. Invasive alien plants in South Africa: macroecological patterns, with special emphasis on the Cape Floristic region. In M. Arianoutsou & V. Papanastasis, *Proceedings of the 10th MEDECOS Conference, April 25–May 1, 2004, Rhodes, Greece*. Millpress, Rotterdam.
- RICHARDSON, D.M., ROUGET, M., RALSTON, S.J., COWLING, R.M., VAN RENSBURG, B.J. & THULLER, W. 2005. Species richness of alien plants in South Africa: environmental correlates and the relationship with indigenous plant species richness. *Ecoscience* 12: 391–402.
- ROBERTSON, M.P., VILLET, M.H., FAIRBANKS, D.H.K., HENDERSON, L., HIGGINS, S.I., HOFFMANN, J.H., LE MAITRE, D.C., PALMER, A.R., RIGGS, I., SHACKLETON, C.M. & ZIMMERMANN, H.G. 2003. A proposed prioritization system for the management of invasive alien plants in South Africa. *South African Journal of Science* 99: 37–43.
- ROUGET, M., RICHARDSON, D.M., NEL, J.L., LE MAITRE, D.C., EGOH, B. & MGIDI, T. 2004. Mapping the potential spread of major plant invaders in South Africa using climatic suitability. *Diversity and Distributions* 10: 475–484.
- RUTHERFORD, M.C. 1997. Categorization of biomes. In R.M. Cowling, D.M. Richardson & S.M. Pierce, *Vegetation of southern Africa*. Cambridge University Press, Cambridge.
- SCHULZE, R.E. 1997. Climate. In R.M. Cowling, D.M. Richardson & S.M. Pierce, *Vegetation of southern Africa*. Cambridge University Press, Cambridge.
- THULLER, W., RICHARDSON, D.M., ROUGET, M., PROCHEŞ, Ş. & WILSON, J.R.U. 2006. Interactions between environment, species traits, and human uses describe patterns of plant invasions. *Ecology* 87: 1755–1769.
- VERSFELD, D.B., LE MAITRE, D.C. & CHAPMAN, R.A. 1998. *Alien invading plants and water resources in South Africa: a preliminary assessment*. WRC Report No. TT 99/98. Water Research Commission, Pretoria.
- WELLS, M.J., BALSINHAS, A.A., JOFFE, H., ENGELBRECHT, V.M., HARDING, G. & STIRTON, C.H. 1986. A catalogue of problem plants in southern Africa. *Memoirs of the Botanical Survey of South Africa* No. 53.
- WELLS, M.J., DUGGAN, K.J. & HENDERSON, L. 1980. Woody plant invaders of the central Transvaal. *Proceedings of the third National Weeds Conference of South Africa, 1979*. Balkema, Cape Town.
- WILSON, J.R.U., RICHARDSON, D.M., ROUGET, M., PROCHEŞ, Ş., AMIS, M.A., HENDERSON, L. & THULLER, W. 2007. Residence time and potential range: crucial considerations in modelling plant invasions. *Diversity and Distributions* 13: 11–22.
- WOOD, A.R. & MORRIS, M.J. 2007. Impact of the gall-forming rust fungus *Uromycladium tepperianum* on the invasive tree *Acacia saligna* in South Africa: 15 years of monitoring. *Biological Control* 41: 68–77.
- ZIMMERMANN, H.G., MORAN, V.C. & HOFFMANN, J.H. 2004. Biological control in the management of invasive alien plants in South Africa, and the role of the Working for Water Programme. *South African Journal of Science* 100: 34–40.

## APPENDIX 1.—Prominent invaders in study area

Scientific name	QSp	QSa	Tr	A	Pv	R	Scientific name	QSp	QSa	Tr	A	Pv	R
<i>Acacia</i>							<i>Lantana camara</i>	247	116	2 111	140 496	<b>8.92</b>	3
<i>cyclops</i>	166	91	1 097	203 636	<b>8.66</b>	4	<i>Leptospermum laevigatum</i>	38	15	102	15 916	0.71	
<i>dealbata</i>	256	115	1 079	133 146	<b>6.45</b>	9	<i>Litsea glutinosa</i>	8	3	10	2 713	0.11	
<i>decurrens</i>	101	31	232	23 456	<b>1.23</b>		<i>Macfadyena unguis-cati</i>	22	9	52	9 531	0.41	
<i>longifolia</i>	94	34	363	53 080	<b>2.43</b>		<i>Melia azedarach</i>	551	65	2 119	65 735	<b>6.64</b>	8
<i>mearnsii</i>	428	251	2 620	410 950	<b>18.37</b>	1	<i>Morus alba</i>	129	8	304	5 983	0.85	
<i>melanoxylon</i>	134	29	482	43 926	<b>2.40</b>		<i>Nephrolepis exaltata</i>	13	1	19	459	0.06	
<i>pycnantha</i>	35	15	135	13 864	<b>1.77</b>		<i>Nicotiana glauca</i>	383	14	957	22 132	<b>2.76</b>	
<i>saligna</i>	158	93	1 030	219 223	<b>9.00</b>	2	<i>Opuntia</i>						
<i>Achyranthes aspera</i>	77	3	85	1 262	0.22		<i>ficus-indica</i>	861	57	2 445	72 477	<b>7.55</b>	5
<i>Agave</i>							<i>robusta</i>	225	2	337	3 244	0.83	
<i>americana</i>	431	8	761	9 136	<b>1.94</b>		<i>stricta</i>	106	14	193	5 412	0.59	
<i>sisalana</i>	170	12	293	8 924	<b>0.91</b>		<i>Paraserianthes lophantha</i>	54	9	286	20 042	<b>1.24</b>	
<i>Ageratum</i>							<i>Passiflora edulis</i>	32	0	55	261	0.13	
<i>conyzoides</i>	37	8	50	5 141	0.27		<i>Pennisetum clandestinum</i>	48	12	53	8 884	0.39	
<i>conyzoides/houstonianum</i>	31	8	49	2 994	0.20		<i>Pereskia aculeata</i>	44	8	102	5 788	0.40	
<i>houstonianum</i>	26	2	31	1 728	0.12		<i>Pinus</i>						
<i>Argemone</i>							<i>patula</i>	85	13	238	11 636	0.88	
<i>mexicana</i>	27	5	36	2 134	0.14		<i>pinaster</i>	85	44	401	48 229	<b>2.36</b>	
<i>ochroleuca</i>	154	20	206	12 115	<b>0.82</b>		<i>radiata</i>	70	15	206	9 243	0.73	
sp.	14	2	15	1 338	0.07		<i>Populus</i>						
<i>Arundo donax</i>	371	82	855	50 158	<b>3.41</b>		<i>alba</i>	15	2	22	915	<b>0.08</b>	7
<i>Atriplex</i>							<i>alba/canescens</i>	185	47	460	33 871	<b>2.04</b>	7
<i>inflata</i>	164	77	213	58 878	<b>2.28</b>		<i>×canescens</i>	371	130	939	87 397	<b>4.74</b>	7
<i>nummularia</i>	172	18	333	10 248	<b>1.04</b>		<i>Prosopis</i>						
<i>Azolla filiculoides</i>	194	92	354	47 220	<b>2.23</b>		<i>glandulosa</i>	40	10	50	4 988	<b>0.26</b>	10
<i>Caesalpinia decapetala</i>	127	41	413	33 868	<b>1.94</b>		<i>glandulosa/velutina</i>	390	78	1 107	92 751	<b>5.27</b>	10
<i>Cardiospermum</i>							<i>velutina</i>	48	6	53	3 108	<b>0.21</b>	10
<i>grandiflorum</i>	43	12	57	4 905	0.28		<i>Prunus persica</i>	319	1	728	7 401	<b>1.81</b>	
<i>grandiflorum/halicacabum</i>	16	5	20	2 427	0.12		<i>Psidium guajava</i>	160	50	732	55 791	<b>3.31</b>	
<i>Cereus jamacaru</i>	124	11	193	13 042	0.82		<i>Pyracantha angustifolia</i>	142	3	285	3 735	0.74	
<i>Cestrum laevigatum</i>	70	16	167	11 039	0.70		<i>Pyracantha angustifolia/crenolata</i>	40	3	51	1 183	0.15	
<i>Chromolaena odorata</i>	93	64	558	137 654	<b>5.46</b>		<i>Ricinus communis</i>	456	56	1 701	48 855	<b>5.21</b>	
<i>Cinnamomum camphora</i>	10	1	19	352	0.05		<i>Robinia pseudoacacia</i>	110	14	178	8 828	0.66	
<i>Cirsium vulgare</i>	188	20	345	14 022	<b>1.18</b>		<i>Rosa rubiginosa</i>	119	12	276	11 494	<b>0.95</b>	
<i>Datura</i>							<i>Rubus</i>						
<i>ferox</i>	175	14	201	8 685	0.71		<i>cuneifolius</i>	75	35	236	49 313	<b>2.03</b>	
<i>innoxia</i>	29	3	36	1 897	0.14		<i>fruticosus</i>	89	32	244	22 810	<b>1.23</b>	
sp.	84	1	110	1 710	0.29		<i>pascuus</i>	3	2	3	450	<b>0.02</b>	
<i>stramonium</i>	286	24	373	12 932	<b>1.21</b>		sp.	86	30	179	29 694	<b>1.30</b>	
<i>Eichhornia crassipes</i>	87	72	431	79 893	<b>3.40</b>		<i>×proteus</i>	4	3	4	650	<b>0.03</b>	
<i>Eucalyptus</i>							<i>Salix</i>						
<i>camaldulensis</i>	121	22	182	13 259	<b>0.80</b>		<i>babylonica</i>	475	89	1 381	85 116	<b>5.63</b>	
<i>diversicolor</i>	49	8	153	5 562	<b>0.50</b>		<i>fragilis</i>	75	24	176	15 710	0.87	
<i>grandis</i>	100	16	190	14 475	<b>0.86</b>		<i>Salsola kali/tragus</i>	155	31	187	14 080	0.84	
sp.	505	30	1 103	23 523	<b>3.12</b>		<i>Schinus molle</i>	231	2	407	5 355	<b>1.05</b>	
<i>Hakea sericea</i>	77	17	230	15 959	<b>0.99</b>		<i>Senna didymobotrya</i>	139	29	339	16 342	<b>1.24</b>	
<i>Ipomoea</i>							<i>Sesbania punicea</i>	323	68	830	52 078	<b>3.41</b>	
<i>indica</i>	23	3	27	740	0.08		<i>Solanum</i>						
<i>indica/purpurea</i>	74	7	120	2 284	0.33		<i>elaegnifolium</i>	51	11	60	14 136	0.57	
<i>purpurea</i>	37	3	46	1 801	0.16		<i>mauritanium</i>	265	99	1 364	135 219	<b>7.14</b>	6
sp.	3	0	3	52	0.01		<i>seaforthianum</i>	30	3	77	2 656	0.25	
<i>Jacaranda mimosifolia</i>	195	16	613	17 430	<b>1.87</b>		<i>Tithonia diversifolia</i>	49	5	123	4 085	0.39	
							<i>Xanthium strumarium</i>	149	21	212	12 633	0.85	

Combined taxa e.g. *Ageratum conyzoides/houstonianum* indicate uncertainty of identification.

QSp, quarter-degree squares present; QSa, quarter-degree squares abundant; Tr, total records; A, total weighted abundance (see text); Pv, prominence value (bold numbers: highest prominence values which add up to ± upper 80% of summed values—see text); R, ranking of top ten taxa (taxa that are difficult to distinguish are grouped together).

## APPENDIX 2.—Prominent invaders in Savanna Biome, Fynbos Biome and Forest habitats

Scientific name	Savanna Biome					Fynbos Biome					Forest Habitats				
	QSp	QSa	R	A	Pv	QSp	QSa	R	A	Pv	QSp	QSa	R	A	Pv
<i>Acacia</i>															
<i>cyclops</i>	31	20	181	28 557	<b>3.40</b>	102	63	810	174 964	<b>27.20</b>	5	0	9	214	0.73
<i>dealbata</i>	39	13	132	12 207	<b>1.74</b>	7	3	23	4 887	0.76	12	3	12	3 361	<b>2.36</b>
<i>decurrens</i>	19	7	38	1 779	0.35						4	1	4	1 061	0.76
<i>longifolia</i>	27	7	66	9 183	1.14	47	24	264	39 533	<b>7.09</b>	13	3	13	1 642	<b>1.65</b>
<i>mearnsii</i>	134	59	710	75 210	<b>10.20</b>	88	70	871	210 388	<b>31.50</b>	36	22	91	22 825	<b>16.70</b>
<i>melanoxylon</i>	33	2	73	1 274	0.49	50	23	298	38 206	<b>7.35</b>	25	12	85	18 186	<b>14.20</b>

Combined taxa e.g. *Ageratum conyzoides/houstonianum* indicate uncertainty of identification. QSp, quarter-degree squares present; QSa, quarter-degree squares abundant; R, records; A, total weighted abundance (see text); Pv, prominence value (bold numbers: highest prominence values which add up to ± upper 80% of summed values—see text).

APPENDIX 2.—Prominent invaders in Savanna Biome, Fynbos Biome and Forest habitats (cont.)

Scientific name	Savanna Biome					Fynbos Biome					Forest Habitats				
	QSp	QSa	R	A	Pv	QSp	QSa	R	A	Pv	QSp	QSa	R	A	Pv
<i>Acacia</i> (cont.)															
<i>  pycnantha</i>	3	1	4	203	0.04	32	14	131	13 661	<b>2.92</b>					
<i>  saligna</i>	27	11	96	12 170	<b>1.55</b>	105	74	860	200 582	<b>30.40</b>	4	2	8	1 313	<b>1.15</b>
<i>Achyranthes aspera</i>	40	3	44	1 078	0.32	5	0	5	5	0.06	10	2	12	468	<b>1.05</b>
<i>Agave</i>															
<i>  americana</i>	146	3	267	3 986	<b>1.75</b>	39	0	84	427	1.02	2	0	2	51	0.16
<i>  sisalana</i>	132	12	251	8 801	<b>2.08</b>	10	0	10	46	0.12	3	0	4	22	0.29
<i>Ageratum</i>															
<i>  conyzoides</i>	32	8	44	4 979	<b>0.66</b>						1	0	1	1	0.07
<i>  conyzoides/houstonianum</i>	27	6	45	2 583	<b>0.46</b>	1	0	1	1	0.01	12	3	13	726	<b>1.24</b>
<i>  houstonianum</i>	22	2	26	1 625	<b>0.28</b>						8	2	8	1 261	<b>1.13</b>
<i>Argemone</i>															
<i>  mexicana</i>	23	4	32	1 082	<b>0.26</b>	1	1	1	1 000	0.11	1	0	1	50	0.09
<i>  ochroleuca</i>	86	13	119	7 190	<b>1.24</b>	2	1	2	201	0.04	1	0	1	50	0.09
<i>  sp.</i>	6	2	7	1 272	<b>0.15</b>										
<i>Arundo donax</i>	132	34	372	20 126	<b>3.69</b>	71	25	172	16 721	<b>3.70</b>	3	1	3	1 020	0.67
<i>Atriplex</i>															
<i>  inflata</i>	13	9	16	7 701	0.75	19	10	25	7 148	1.02					
<i>  nummularia</i>	11	3	18	2 336	0.30	24	1	45	851	0.61					
<i>Azolla filiculoides</i>	43	16	75	4 979	0.83	16	10	37	7 491	1.19	2	2	2	400	0.32
<i>Caesalpinia decapetala</i>	80	22	239	20 966	<b>3.06</b>						17	7	25	6 053	<b>4.48</b>
<i>Cardiospermum</i>															
<i>  grandiflorum</i>	40	11	54	4 703	<b>0.69</b>						5	3	7	1 511	<b>1.17</b>
<i>  grandiflorum/halicacabum</i>	14	5	18	2 416	<b>0.30</b>						4	2	4	1 251	0.84
<i>Cereus jamacaru</i>	100	11	169	12 857	<b>1.99</b>	6	0	6	6	0.07	1	0	1	10	0.07
<i>Cestrum laevigatum</i>	48	12	138	7 551	<b>1.38</b>	6	0	9	58	0.11	22	9	30	6 457	<b>5.01</b>
<i>Chromolaena odorata</i>	79	57	529	133 524	<b>14.20</b>						33	25	77	41 029	<b>23.90</b>
<i>Cinnamomum camphora</i>	7	1	13	346	0.10	2	0	3	3	0.04	7	1	14	347	<b>1.14</b>
<i>Cirsium vulgare</i>	43	4	68	1 708	0.51	8	0	8	75	0.10					
<i>Datura</i>															
<i>  ferox</i>	69	3	87	2 676	<b>0.69</b>	3	0	3	3	0.04	2	0	2	11	0.15
<i>  innoxia</i>	23	1	30	1 435	<b>0.28</b>	1	0	1	50	0.02	1	0	1	50	0.09
<i>  sp.</i>	34	0	41	581	<b>0.27</b>	1	1	1	200	0.03					
<i>  stramonium</i>	104	9	131	4 082	<b>1.04</b>	15	1	19	1 357	0.36	6	1	6	1 170	0.95
<i>Eichhornia crassipes</i>	46	44	279	60 302	<b>6.64</b>	20	7	46	5 591	1.10					
<i>Eucalyptus</i>															
<i>  camaldulensis</i>	23	4	36	1 993	0.36	41	13	81	6 318	1.59	3	2	3	2 050	<b>1.13</b>
<i>  diversicolor</i>	1	0	1	1	0.01	44	7	148	5 349	<b>2.27</b>	12	4	28	1 897	<b>2.82</b>
<i>  grandis</i>	54	8	111	9 827	<b>1.43</b>	1	0	1	10	0.01	15	2	19	974	<b>1.77</b>
<i>  sp.</i>	122	8	299	7 242	<b>2.20</b>	72	10	147	4 838	<b>2.21</b>	8	2	17	687	<b>1.51</b>
<i>Hakea sericea</i>	7	2	14	537	0.12	61	14	204	14 344	<b>3.84</b>	3	0	3	61	0.24
<i>Ipomoea</i>															
<i>  indica</i>	18	3	22	735	<b>0.18</b>	3	0	3	3	0.04	3	0	3	3	0.21
<i>  indica/purpurea</i>	49	3	86	1 101	<b>0.55</b>	10	1	18	409	0.25	11	2	16	1 308	<b>1.71</b>
<i>  purpurea</i>	18	1	23	410	<b>0.16</b>	7	2	10	1 271	0.25	7	1	9	1 102	<b>1.13</b>
<i>  sp.</i>	2	0	2	51	<b>0.01</b>										
<i>Jacaranda mimosifolia</i>	139	16	497	16 767	<b>4.06</b>						17	2	21	1 589	<b>2.19</b>
<i>Lantana camara</i>	162	90	1 843	126 418	<b>20.60</b>	25	2	60	3 462	1.05	40	28	63	17 136	<b>12.10</b>
<i>Leptospermum laevigatum</i>	3	3	6	701	0.09	35	12	96	15 215	<b>2.66</b>	2	0	3	21	0.22
<i>Litsea glutinosa</i>	8	3	10	2 713	0.29						4	2	6	2 451	<b>1.52</b>
<i>Macfadyena unguis-cati</i>	17	6	47	8 880	<b>1.01</b>						6	5	13	4 912	<b>3.12</b>
<i>Melia azedarach</i>	291	53	1 394	54 100	<b>12.00</b>	44	0	82	181	0.98	17	5	29	4 856	<b>4.22</b>
<i>Morus alba</i>	72	6	192	3 986	<b>1.35</b>	2	1	2	11	0.02	6	1	10	481	0.92
<i>Nephrolepis exaltata</i>	10	1	12	318	0.09	2	0	6	131	0.08	9	1	13	337	<b>1.07</b>
<i>Nicotiana glauca</i>	126	7	274	7 812	<b>2.11</b>	51	2	168	3 657	<b>2.33</b>	1	0	1	50	0.09
<i>Opuntia</i>															
<i>  ficus-indica</i>	330	39	1 159	47 136	<b>10.10</b>	73	5	267	7 242	<b>3.85</b>	8	5	8	4 261	<b>2.48</b>
<i>  robusta</i>	50	0	61	191	0.34	12	1	13	1 048	0.26					
<i>  stricta</i>	82	13	168	5 112	<b>1.32</b>	1	0	1	50	0.02					
<i>Paraserianthes lophantha</i>	5	0	10	104	0.06	47	9	274	19 936	<b>5.22</b>	7	0	7	34	0.51
<i>Passiflora edulis</i>	22	0	40	192	0.23	5	0	6	24	0.07	13	0	19	64	<b>1.37</b>
<i>Pennisetum clandestinum</i>	10	3	12	2 414	0.27	26	4	28	2 106	0.54	3	3	3	3 000	<b>1.56</b>
<i>Pereskia aculeata</i>	34	7	91	5 569	0.96	4	0	4	13	0.05	14	4	39	2 963	<b>4.08</b>
<i>Pinus</i>															
<i>  patula</i>	30	7	90	6 154	1.00						14	5	18	1 194	<b>1.80</b>
<i>  pinaster</i>	13	5	34	6 549	0.74	66	36	355	39 368	<b>8.14</b>	9	4	29	4 586	<b>4.10</b>
<i>  radiata</i>	3	0	4	53	0.03	53	15	186	8 902	<b>3.08</b>	4	3	20	1 235	<b>1.96</b>
<i>Populus</i>															
<i>  alba</i>	6	0	11	350	<b>0.09</b>	1	0	1	50	0.02					
<i>  alba/canescens</i>	51	22	171	15 598	<b>2.24</b>	1	0	1	50	0.02	8	2	8	611	0.84
<i>  ×canescens</i>	36	8	76	5 390	<b>0.86</b>	82	34	279	24 456	<b>5.74</b>	3	0	4	22	0.29
<i>Prosopis</i>															
<i>  glandulosa</i>	7	5	13	1 421	<b>0.19</b>	2	0	2	51	0.03					

Combined taxa e.g. *Ageratum conyzoides/houstonianum* indicate uncertainty of identification. QSp, quarter-degree squares present; QSa, quarter-degree squares abundant; R, records; A, total weighted abundance (see text); Pv, prominence value (bold numbers: highest prominence values which add up to ± upper 80% of summed values—see text).

APPENDIX 2.—Prominent invaders in Savanna Biome, Fynbos Biome and Forest habitats (cont.)

Scientific name	Savanna Biome					Fynbos Biome					Forest Habitats				
	QSp	QSa	R	A	Pv	QSp	QSa	R	A	Pv	QSp	QSa	R	A	Pv
<i>Prosopis</i> (cont.)															
<i>glandulosa/velutina</i>	64	5	168	4 869	<b>1.30</b>	22	2	63	1 657	0.90					
<i>velutina</i>	6	1	7	257	<b>0.06</b>	3	0	3	52	0.04					
<i>Prunus persica</i>	53	0	115	933	0.69	41	0	65	191	0.78	1	0	1	1	0.07
<i>Psidium guajava</i>	124	45	662	53 388	<b>8.07</b>	6	0	9	45	0.11	14	8	25	5 174	<b>4.09</b>
<i>Pyracantha</i>															
<i>angustifolia</i>	6	0	13	40	0.07	5	0	6	15	0.07	2	0	2	2	0.14
<i>angustifolia/crenulata</i>	5	0	5	5	0.03	2	0	2	2	0.02	1	0	1	50	0.09
<i>Ricinus communis</i>	256	46	1 230	40 996	<b>10.00</b>	87	7	250	4 189	<b>3.35</b>	25	5	30	1 618	<b>2.84</b>
<i>Robinia pseudoacacia</i>	10	0	13	80	0.08	6	0	6	15	0.07	1	0	1	1	0.07
<i>Rosa rubiginosa</i>	8	0	12	128	0.07	4	0	6	162	0.09	2	0	2	51	0.16
<i>Rubus</i>															
<i>cuneifolius</i>	18	4	45	10 711	<b>1.16</b>						5	3	6	2 451	<b>1.52</b>
<i>fruticosus</i>	15	4	24	2 146	<b>0.31</b>	55	21	188	16 874	<b>3.91</b>	7	3	14	1 701	<b>1.75</b>
<i>pascuus</i>	2	1	2	250	<b>0.03</b>										
sp.	31	7	88	8 076	<b>1.16</b>	5	2	5	430	0.10	10	1	12	443	<b>1.04</b>
<i>xproteus</i>	2	2	2	400	<b>0.05</b>										
<i>Salix</i>															
<i>babylonica</i>	67	5	140	3 609	<b>1.05</b>	38	3	74	1 838	1.05	6	0	6	211	0.52
<i>fragilis</i>	2	0	5	121	0.04	1	1	1	200	0.03					
<i>Salsola kali/tragus</i>	22	2	27	1 027	0.23	12	1	13	511	0.20					
<i>Schinus molle</i>	52	0	82	463	0.47	24	0	49	358	0.61	1	0	1	10	0.07
<i>Senna didymobotrya</i>	103	25	261	14 239	<b>2.60</b>	3	0	3	3	0.04	12	1	15	406	<b>1.24</b>
<i>Sesbania punicea</i>	139	26	405	21 438	<b>3.97</b>	60	19	175	17 026	<b>3.77</b>	7	0	8	66	0.59
<i>Solanum</i>															
<i>elaeagnifolium</i>	18	0	18	183	0.11	3	1	3	251	0.06					
<i>mauritanum</i>	123	52	748	77 619	<b>10.60</b>	28	2	86	2 035	1.21	66	32	97	27 090	<b>19.00</b>
<i>seaforthianum</i>	28	3	75	2 636	0.62	1	0	1	10	0.01	9	0	31	263	<b>2.30</b>
<i>Tithonia diversifolia</i>	46	5	120	4 033	<b>0.98</b>						8	0	10	313	0.84
<i>Xanthium strumarium</i>	74	16	126	8 577	<b>1.40</b>	2	1	3	251	0.06	4	0	4	62	0.31

Combined taxa e.g. *Ageratum conyzoides/houstonianum* indicate uncertainty of identification. QSp, quarter-degree squares present; QSa, quarter-degree squares abundant; R, records; A, total weighted abundance (see text); Pv, prominence value (bold numbers: highest prominence values which add up to ± upper 80% of summed values—see text).

APPENDIX 3.—Prominent invaders in Grassland Biome, Nama-Karoo Biome and Succulent Karoo Biome

Scientific name	Grassland Biome					Nama-Karoo Biome					Succulent Karoo Biome				
	QSp	QSa	R	A	Pv	QSp	QSa	R	A	Pv	QSp	QSa	R	A	Pv
<i>Acacia</i>															
<i>cyclops</i>						1	0	1	10	0.04	32	8	105	12 150	<b>26.30</b>
<i>dealbata</i>	206	99	922	116 050	<b>20.90</b>	2	0	2	2	0.06					
<i>decurrens</i>	82	24	194	21 677	<b>4.06</b>						1	0	2	2	0.16
<i>longifolia</i>	19	3	31	4 362	0.76						9	6	36	10 373	<b>18.20</b>
<i>mearnsii</i>	197	116	1 003	114 979	<b>21.30</b>						2	0	2	11	0.18
<i>melanoxydon</i>	49	4	109	4 435	1.33						24	8	72	6 471	<b>15.30</b>
<i>saligna</i>	2	0	2	11	0.02										
<i>Achyranthes aspera</i>	30	0	34	128	0.26	2	0	2	51	0.09					
<i>Agave</i>															
<i>americana</i>	148	2	219	2 507	1.87	81	3	160	1 961	<b>5.90</b>	17	0	31	255	2.84
<i>sisalana</i>	21	0	25	52	0.19	3	0	3	21	0.10	4	0	4	4	0.32
<i>Ageratum</i>															
<i>conyzoides</i>	5	0	6	162	0.06										
<i>conyzoides/houstonianum</i>	3	2	3	410	0.07										
<i>houstonianum</i>	4	0	5	103	0.05										
<i>Argemone</i>															
<i>mexicana</i>	3	0	3	52	0.03										
<i>ochroleuca</i>	38	2	56	1 155	0.54	26	4	27	3 549	2.52	2	0	2	20	0.19
sp.	1	0	1	10	0.01	1	0	1	1	0.03	6	0	6	55	0.56
<i>Arundo donax</i>	89	8	188	5 068	<b>1.97</b>	51	8	77	2 927	<b>3.80</b>	28	7	46	5 316	<b>11.50</b>
<i>Atriplex</i>															
<i>inflata</i>	3	1	4	460	0.09	83	42	107	37 882	<b>21.00</b>	46	15	61	5 687	<b>13.30</b>
<i>nummularia</i>	4	0	6	153	0.06	88	11	181	4 732	<b>7.90</b>	45	3	83	2 176	<b>9.81</b>
<i>Azolla filiculoides</i>	88	41	172	21 806	<b>3.92</b>	47	25	70	12 944	<b>8.30</b>					
<i>Caesalpinia decapetala</i>	47	19	174	12 902	<b>2.83</b>										
<i>Cardiospermum</i>															
<i>grandiflorum</i>	3	1	3	202	0.05										
<i>grandiflorum/halicacabum</i>	2	0	2	11	0.02										
<i>Cereus jamacaru</i>	12	0	12	106	0.10	6	0	6	73	0.22					
<i>Cestrum laevigatum</i>	16	4	20	3 430	0.57										

Combined taxa e.g. *Ageratum conyzoides/houstonianum* indicate uncertainty of identification. QSp, quarter-degree squares present; QSa, quarter-degree squares abundant; R, records; A, total weighted abundance (see text); Pv, prominence value (bold numbers: highest prominence values which add up to ± upper 80% of summed values—see text).

APPENDIX 3.—Prominent invaders in Grassland Biome, Nama-Karoo Biome and Succulent Karoo Biome (cont.)

Scientific name	Grassland Biome					Nama-Karoo Biome					Succulent Karoo Biome				
	QSp	QSa	R	A	Pv	QSp	QSa	R	A	Pv	QSp	QSa	R	A	Pv
<i>Chromolaena odorata</i>	14	7	29	4 130	0.72										
<i>Cinnamomum camphora</i>	1	0	3	3	0.02										
<i>Cirsium vulgare</i>	126	14	253	10 776	<b>3.14</b>	11	2	16	1 463	1.19					
<i>Datura</i>															
<i>ferox</i>	82	9	85	3 429	<b>1.03</b>	21	2	26	2 566	2.03					
<i>innoxia</i>	3	2	3	401	<b>0.68</b>	2	0	2	11	0.07					
sp.	46	0	65	877	<b>0.57</b>	2	0	2	2	0.06	1	0	1	50	0.15
<i>stramonium</i>	126	12	174	6 224	<b>2.01</b>	40	2	48	1 259	2.10	1	0	1	10	0.09
<i>Eichhornia crassipes</i>	21	21	106	14 000	<b>2.48</b>										
<i>Eucalyptus</i>															
<i>camaldulensis</i>	16	3	17	2 406	0.42	14	2	14	2 195	1.48	27	0	34	347	3.21
<i>diversicolor</i>	2	1	2	210	0.04						2	0	2	2	0.16
<i>grandis</i>	45	8	78	4 638	<b>1.13</b>										
sp.	276	12	614	11 153	<b>5.76</b>	21	0	27	188	0.93	14	0	16	102	1.42
<i>Hakea sericea</i>	1	0	1	50	0.01						8	1	11	1 028	2.40
<i>Ipomoea</i>															
<i>indica</i>	2	0	2	2	0.01										
<i>indica/purpurea</i>	15	3	16	774	0.21										
<i>purpurea</i>	12	0	13	120	0.11										
sp.	1	0	1	1	0.01										
<i>Jacaranda mimosifolia</i>	55	0	115	662	0.90	1	0	1	1	0.03					
<i>Lantana camara</i>	59	24	207	10 606	<b>2.79</b>						1	0	1	10	0.09
<i>Macfadyena unguis-cati</i>	5	3	5	651	0.12										
<i>Melia azedarach</i>	177	12	588	11 198	<b>5.58</b>	36	0	49	250	1.65	3	0	6	6	0.49
<i>Morus alba</i>	54	2	109	1 985	1.02	1	0	1	1	0.03					
<i>Nephrolepis exaltata</i>	1	0	1	10	0.01										
<i>Nicotiana glauca</i>	48	1	72	1 266	0.67	92	2	206	3 980	<b>8.30</b>	66	2	237	5 417	<b>26.80</b>
<i>Opuntia</i>															
<i>ficus-indica</i>	257	10	570	11 437	<b>5.48</b>	161	3	368	5 688	<b>14.00</b>	40	0	81	974	<b>7.87</b>
<i>robusta</i>	72	1	120	927	0.97	80	0	130	1 029	<b>4.60</b>	11	0	13	49	1.10
<i>stricta</i>	12	1	12	229	0.11	9	0	9	18	0.29	2	0	3	3	0.24
<i>Paraserianthes lophantha</i>											2	0	2	2	0.16
<i>Passiflora edulis</i>	5	0	9	45	0.07										
<i>Pennisetum clandestinum</i>	10	4	11	3 354	0.49	2	1	2	1 010	0.54					
<i>Pereskia aculeata</i>	6	1	7	206	0.08										
<i>Pinus</i>															
<i>patula</i>	55	6	148	5 482	<b>1.73</b>										
<i>pinaster</i>	4	1	4	230	0.06						2	2	8	2 082	3.72
<i>radiata</i>	8	0	10	86	0.08						6	0	6	202	0.78
<i>Populus</i>															
<i>alba</i>	8	2	10	515	<b>0.13</b>										
<i>alba/canescens</i>	128	25	283	18 169	<b>4.26</b>	5	0	5	54	0.18					
× <i>canescens</i>	198	75	486	51 371	<b>9.80</b>	40	8	67	4 537	<b>4.20</b>	15	5	31	1 643	<b>4.89</b>
<i>Prosopis</i>															
<i>glandulosa</i>	3	0	3	61	0.03	25	4	29	2 395	<b>2.00</b>	3	1	3	1 060	1.81
<i>glandulosa/velutina</i>	29	6	54	4 738	0.97	214	55	666	73 664	<b>56.00</b>	61	10	156	7 823	<b>24.00</b>
<i>velutina</i>	1	0	1	1	0.01	37	5	41	2 788	<b>2.60</b>	1	0	1	10	0.09
<i>Prunus persica</i>	211	1	530	6 232	<b>4.56</b>	13	0	15	33	0.49	1	0	3	12	0.26
<i>Psidium guajava</i>	29	5	60	2 357	0.72	1	0	1	1	0.08					
<i>Pyracantha</i>															
<i>angustifolia</i>	122	3	256	3 661	<b>6.07</b>	9	0	10	19	0.32					
<i>angustifolia/crenulata</i>	33	3	44	1 176	<b>0.46</b>										
<i>Ricinus communis</i>	80	3	166	3 149	1.57	13	0	24	208	0.85	20	0	31	313	2.92
<i>Robinia pseudoacacia</i>	83	14	145	8 576	<b>2.09</b>	11	0	14	157	0.51					
<i>Rosa rubiginosa</i>	104	12	255	11 201	<b>3.20</b>	3	0	3	3	0.10					
<i>Rubus</i>															
<i>cuneifolius</i>	57	31	191	38 602	<b>6.12</b>										
<i>fruticosus</i>	15	5	24	3 219	<b>0.57</b>						4	2	8	571	1.48
<i>pascuus</i>	1	1	1	200	<b>0.03</b>										
sp.	50	21	86	21 188	<b>3.23</b>										
× <i>proteus</i>	2	1	2	250	<b>0.05</b>										
<i>Salix</i>															
<i>babylonica</i>	310	79	1 069	78 092	<b>17.30</b>	54	2	90	1 555	3.55	6	0	8	26	0.67
<i>fragilis</i>	71	23	169	15 388	<b>3.10</b>	1	0	1	1	0.03					
<i>Salsola kali/tragus</i>	20	1	23	610	0.24	95	26	117	12 309	<b>9.50</b>	6	1	7	233	0.90
<i>Schinus molle</i>	54	0	73	360	0.57	75	2	156	3 952	<b>6.80</b>	26	0	47	222	<b>4.06</b>
<i>Senna didymobotrya</i>	33	4	75	2 100	0.79										
<i>Sesbania punicea</i>	117	22	238	13 269	<b>3.34</b>	4	0	4	13	0.13	3	1	8	332	1.13
<i>Solanum</i>															
<i>elaeagnifolium</i>	18	4	21	3 498	0.58	10	6	16	10 202	<b>5.30</b>	2	0	2	2	0.16
<i>mauritianum</i>	114	45	530	55 565	<b>10.60</b>										
<i>seafortianum</i>	1	0	1	10	0.01										
<i>Tithonia diversifolia</i>	3	0	3	52	0.03										
<i>Xanthium strumarium</i>	64	2	72	2 364	0.81	9	2	11	1 441	1.03					

Combined taxa e.g. *Ageratum conyzoides/houstonianum* indicate uncertainty of identification. QSp, quarter-degree squares present; QSa, quarter-degree squares abundant; R, records; A, total weighted abundance (see text); Pv, prominence value (bold numbers: highest prominence values which add up to ± upper 80% of summed values—see text).

APPENDIX 4.—Summary of results for all naturalized and casual alien plants in the study area, Savanna Biome, Fynbos Biome, Forest habitats, Grassland Biome, Nama-Karoo Biome, Succulent Karoo Biome and watercourse/wetland habitats

Plant name	QSp	QSa	Study area records	Savanna Biome records	Fynbos Biome records	Forest habitat records	Grassland Biome records	Nama-Karoo Biome records	Succulent Karoo Biome records	Watercourse/wetland records
<i>Acacia</i>										
<i>baileyana</i>	86		135	20	<b>39</b>	1	<b>75</b>		1	10
<i>cultriformis</i> #	1		1				1			
<i>cyclops</i>	166	91	1 097	181	<b>810</b>	9		1	105	206
<i>dealbata</i>	256	115	1 079	132	23	12	<b>922</b>	2	4	542
<i>decurrens</i>	101	31	232	38		4	<b>194</b>			30
<i>elata</i>	35	1	60	4	<b>51</b>	4	3		2	4
<i>fimbriata</i>	1	1	1	1						
<i>implexa</i>	2		2		2					2
<i>longifolia</i>	94	34	363	<b>66</b>	<b>264</b>	13	31		2	132
<i>mearnsii</i>	428	251	2 620	<b>710</b>	<b>871</b>	91	<b>1 003</b>		36	953
<i>melanoxylon</i>	134	29	482	73	<b>298</b>	85	<b>109</b>		2	130
<i>paradoxa</i>	1		2		2					
<i>podalyriifolia</i>	57	2	101	<b>49</b>	<b>27</b>	1	<b>25</b>			6
<i>pycnantha</i>	35	15	135	4	<b>131</b>					6
<i>saligna</i>	158	93	1 030	96	<b>860</b>	8	2		72	363
<i>viscidula</i>	1		1		1					
<i>Acanthocereus</i> ? <i>tetragonus</i>	1	1	1	1						
<i>Acanthospermum</i>										
<i>australe</i> *	1		1				1			
<i>hispidum</i> *	1		1	1						
<i>Acanthus polystachyus</i> var. <i>pseudopubescens</i> #	1		1	1						
<i>Acer</i>										
<i>negundo</i>	1		1			1	1			1
? sp.	1		1			1	1			1
<i>Achyranthes aspera</i> *	77	3	85	<b>44</b>	5	12	<b>34</b>	2		23
<i>Acorus calamus</i> *	1		1				1			1
<i>Acrocarpus fraxinifolius</i> #	1		1			1	1			
<i>Adiantum raddianum</i> #	1		1	1		1				
<i>Agave</i>										
<i>americana</i>										
var. <i>americana</i>	431	8	761	<b>267</b>	84	2	<b>219</b>	<b>160</b>	31	118
var. <i>expansa</i>	1		1		1					
<i>decipiens</i> #	1		1				1			
<i>sisalana</i>	170	12	293	<b>251</b>	10	4	25	3	4	13
sp.	31	1	60	<b>53</b>	4		3			12
<i>Ageratina</i>										
<i>adenophora</i>	11	4	26	<b>11</b>	<b>10</b>	3	5			10
<i>riparia</i> ?#	1		1	1						
<i>Ageratum</i>										
<i>conyzoides</i>	37	8	50	<b>44</b>		1	6			32
<i>conyzoides/houstonianum</i>	31	8	49	<b>45</b>	1	13	3			24
<i>houstonianum</i>	26	2	31	<b>26</b>		8	5			7
<i>Agrimonia</i> cf. <i>parviflora</i> #	1		1				1			1
<i>Agrostemma githago</i> *	1		1				1			1
<i>Ailanthus altissima</i>	32	2	40	<b>11</b>	<b>6</b>		<b>19</b>	3	1	9
<i>Albizia</i>										
<i>chinensis</i> #	1		1	1						
<i>lebbeck</i>	4	2	5	5						
<i>procera</i>	1		1	1						
<i>Alhagi maurorum</i>	10		11	<b>8</b>	<b>1</b>			<b>1</b>	<b>1</b>	3
<i>Alisma plantago-aquatica</i>	8	1	9	2			7			9
<i>Alnus glutinosa</i>	1		1		1					1
<i>Alpinia zerumbet</i>	5		7	2	4	1	1			2
<i>Alternanthera pungens</i> *	4		4	1			3			1
<i>Amaranthus</i>										
<i>hybridus</i> *	3		3				3			1
sp.*	1		1	1						
<i>Ambrosia artemisiifolia</i> *	2		2	1			1			1
<i>Ammi majus</i> *	1		1				1			
<i>Anigozanthos flavidus</i> #	1	1	1		1					
<i>Anredera cordifolia</i>	24	2	25	<b>17</b>	3	7	<b>5</b>			4
<i>Antigonon leptopus</i>	3		5	5						1
<i>Apium graveolens</i> *	1		1	1						

Combined taxa e.g. *Ageratum conyzoides/houstonianum* indicate uncertainty of identification.

#, casual alien plants: occurring outside cultivation; some species flourishing but less than 10 years of records in SAPIA precludes being categorized as 'naturalized' (Pyšek *et al.* 2004).

\*, mainly herbaceous species that are suspected of being under-estimated in this survey.

QDSp, quarter-degree squares present; QDSa, quarter-degree squares abundant.

Bold numbers in biome categories add up to upper 80% or more of total records.

APPENDIX 4.—Summary of results for all naturalized and casual alien plants in the study area, Savanna Biome, Fynbos Biome, Forest habitats, Grassland Biome, Nama-Karoo Biome, Succulent Karoo Biome and watercourse/wetland habitats (cont.)

Plant name	QSp	QSa	Study area records	Savanna Biome records	Fynbos Biome records	Forest habitat records	Grassland Biome records	Nama-Karoo Biome records	Succulent Karoo Biome records	Watercourse/wetland records
<i>Araujia sericifera</i>	36	1	53	<b>15</b>	2	4	<b>35</b>	1		12
<i>Ardisia crenata</i>	2	1	3	3		2				3
<i>Argemone</i>										
<i>mexicana</i>	27	5	36	<b>32</b>	1	1	3			20
<i>ochroleuca</i> subsp. <i>ochroleuca</i>	154	20	206	<b>119</b>	2	1	<b>56</b>	27	2	50
sp.	14	2	15	<b>7</b>			1	1	<b>6</b>	9
<i>Aristolochia elegans</i>	6	1	8	7		2	1			4
<i>Arundo donax</i>	371	82	855	<b>372</b>	<b>172</b>	3	<b>188</b>	77	46	548
<i>Astartea fascicularis</i> #	1		1		1					
<i>Atriplex</i>										
<i>inflata</i>	164	77	213	16	25		4	<b>107</b>	<b>61</b>	16
<i>muelleri</i> *	1		1					1		
<i>nummularia</i> subsp. <i>nummularia</i>	172	18	333	18	45		6	<b>181</b>	<b>83</b>	107
<i>semibaccata</i> *	4		5				3	2		1
sp.	10		10					8	2	2
<i>Azolla</i>										
<i>filiculoides</i>	194	92	354	<b>75</b>	37	2	<b>172</b>	<b>70</b>		354
? <i>pinnata</i> var. <i>imbricata</i>	3	1	6	6						4
sp.	4		8	8						8
<i>Baeckia</i> sp. #	1		1		1					
<i>Bambusa</i>										
<i>balcooa</i>	32		50	<b>42</b>	5	1	3			43
sp. #	1		1	1						
Bambuseae sp.	8		9	7	1		1			3
<i>Banksia</i>										
<i>ericifolia</i> #	1		1		1					
<i>integrifolia</i> #	1	1	1		1					
<i>Bauhinia</i>										
<i>purpurea</i>	1		1	1						
sp.	1		2	2						
<i>variegata</i>	9		11	<b>11</b>						1
<i>Begonia cucullata</i> #	1		2	1		1				
<i>Bidens</i>										
<i>bipinnata</i> *	23		23				<b>23</b>			7
<i>bitemata</i> *	1		1	1						
<i>pilosa</i> *	39	3	65	<b>17</b>		1	<b>47</b>			12
<i>Billardiera heterophylla</i> #	1		1		1					
<i>Boerhavia erecta</i> *	1		1				1			
<i>Briza maxima</i> *	1		1	1						
<i>Bromus</i>										
<i>catharticus</i> *	2		2				1	1		1
<i>diandrus</i> *	1		1					1		1
<i>pectinatus</i> *	1		1					1		1
<i>Brugmansia</i> × <i>candida</i>	6		7	1	6	1				
<i>Bryophyllum delagoense</i>	4	1	6	6						
? <i>Buddleja madagascariensis</i> #	1		1				1			
<i>Caesalpinia</i>										
<i>decapetala</i>	127	41	413	<b>239</b>		25	<b>174</b>			153
<i>gilliesii</i>	18		19	<b>6</b>			<b>3</b>	<b>8</b>	2	2
<i>Callistemon</i>										
<i>citrinus</i> #	1		1		1					
<i>glaucus</i> #	1		1	1						
<i>rigidus</i>	1		1	1						
sp.	1		1				1			1
<i>viminalis</i>	1		1		1					1
<i>Calotropis procera</i> #	1		1	1						
<i>Campuloclinium macrocephalum</i>	14	5	25	<b>16</b>		1	<b>9</b>			3
<i>Canna</i>										
<i>glauca</i> #	1		1	1		1				
<i>indica</i>	26	1	34	<b>19</b>	<b>7</b>	6	<b>8</b>			11
sp.	13		17	<b>10</b>	<b>4</b>	1	<b>3</b>			10
× <i>generalis</i>	7		8	8		1				5
<i>Capsella bursa-pastoris</i> *	1		1				1			
<i>Cardiospermum</i>										
<i>grandiflorum</i>	43	12	57	<b>54</b>		7	3			29

Combined taxa e.g. *Ageratum conyzoides/houstonianum* indicate uncertainty of identification.

#, casual alien plants: occurring outside cultivation; some species flourishing but less than 10 years of records in SAPIA precludes being categorized as 'naturalized' (Pyšek *et al.* 2004).

\*, mainly herbaceous species that are suspected of being under-estimated in this survey.

QDsp, quarter-degree squares present; QDSa, quarter-degree squares abundant.

Bold numbers in biome categories add up to upper 80% or more of total records.



APPENDIX 4.—Summary of results for all naturalized and casual alien plants in the study area, Savanna Biome, Fynbos Biome, Forest habitats, Grassland Biome, Nama-Karoo Biome, Succulent Karoo Biome and watercourse/wetland habitats (cont.)

Plant name	QSp	QSa	Study area records	Savanna Biome records	Fynbos Biome records	Forest habitat records	Grassland Biome records	Nama-Karoo Biome records	Succulent Karoo Biome records	Watercourse/wetland records
<i>Cardiospermum</i> (cont.)										
<i>grandiflorum/halicacabum</i>	16	5	20	<b>18</b>		4	2			5
<i>halicacabum</i>	27		35	<b>34</b>		5	1			26
<i>Carica papaya</i>	6		6	6						2
<i>Castanea dentata</i> ?#	1		1		1	1				
<i>Castanospermum australe</i> ?#	1		1	1						
<i>Casuarina</i>										
<i>cunninghamiana</i>	9		12	<b>8</b>	<b>2</b>		<b>2</b>			8
<i>cunninghamiana/equisetifolia</i>	42	2	63	<b>46</b>	6	1	<b>11</b>			23
<i>equisetifolia</i>	24	1	57	<b>55</b>		6	2			7
<i>Catharanthus roseus</i>	38	1	53	<b>49</b>	1	2	3			11
<i>Cedrus deodara</i> ?#	5		5				5			
<i>Celtis</i>										
<i>australis</i> †	?		?							?
<i>occidentalis</i> †	?		?							?
<i>sinensis</i> †	1		1				1			?
<i>Cenchrus brownii</i> *	1		1	1						
<i>Centranthus ruber</i> ?#	2	2	2		2					
<i>Cereus jamacaru</i>	124	11	193	<b>169</b>	6	1	12	6		6
<i>Cestrum</i>										
<i>aurantiacum</i>	8	1	10	<b>7</b>	1	6	<b>2</b>			2
<i>aurantiacum/laevigatum</i>	7	3	8	5		4	3			1
<i>elegans</i>	2	2	2			2	2			
<i>laevigatum</i>	70	16	167	<b>138</b>	9	30	<b>20</b>			41
<i>parqui</i>	3		5	4			1			
sp.	1		1	1						1
<i>Chamaesyce</i>										
<i>prostrata</i> *	3		3	1			2			
<i>serpens</i> *	1		1				1			
<i>Chenopodium album</i> *	3		3				3			
<i>Chorizema cordatum</i> #	1		1		1					
<i>Chromolaena odorata</i>	93	64	558	<b>529</b>		77	29			220
<i>Cichorium intybus</i>	12	1	16				<b>14</b>	2		2
<i>Cinnamomum camphora</i>	10	1	19	<b>13</b>	<b>3</b>	14	<b>3</b>			3
<i>Cirsium</i>										
<i>arvense</i> *	2		2				2			
<i>vulgare</i>	188	20	345	<b>68</b>	8		<b>253</b>	16		40
<i>Citrus</i>										
<i>limon</i>	1		1	1						
sp.	5		5	1		1	4			2
<i>Coix lacryma-jobi</i> *	1		2	1		1				
<i>Colocasia esculenta</i>	11	3	19	<b>14</b>	<b>5</b>	1				19
<i>Commelina benghalensis</i> *	9		15	<b>7</b>	<b>3</b>	5	<b>3</b>	2		1
<i>Convolvulus arvensis</i>	23	1	23	<b>4</b>	<b>4</b>		<b>11</b>	<b>4</b>		2
<i>Conyza</i>										
<i>bonariensis</i> *	4		4	1			3			1
<i>canadensis</i> *	3		3	2			1			1
<i>primulifolia</i> *	1		1	1						
sp.*	3		3	2			1			2
<i>sumatrensis</i> *	1		1				1			
<i>Coreopsis lanceolata</i>	11		15	<b>11</b>			<b>4</b>			
<i>Cortaderia</i>										
<i>jubata</i>	7		7		2		5			1
<i>jubata/selloana</i>	23	2	28	<b>11</b>		1	<b>16</b>		1	4
<i>selloana</i>	54	1	104	<b>15</b>	<b>77</b>	5	<b>10</b>	1	1	21
<i>Corymbia ficifolia</i> ?#	3		3	1	2					
<i>Cosmos bipinnatus</i> *	48	10	122	3			<b>119</b>			2
<i>Cotoneaster</i>										
<i>coriaceus</i> ?#	1		1				1			
<i>franchetii</i>	7	1	7	2		1	5			1
<i>glaucophyllus</i>	2		2	1			1			
<i>franchetii/pannosus</i>	19		27	1	2	1	<b>23</b>	1		3
<i>pannosus</i>	25		30	2	1		<b>25</b>	2		3

Combined taxa e.g. *Ageratum conyzoides/houstonianum* indicate uncertainty of identification.

#, casual alien plants: occurring outside cultivation; some species flourishing but less than 10 years of records in SAPIA precludes being categorized as 'naturalized' (Pyšek *et al.* 2004).

\*, mainly herbaceous species that are suspected of being under-estimated in this survey.

†, *Celtis australis* (probably naturalized), *C. occidentalis* (probably naturalized) and *C. sinensis* (naturalized) easily mistaken for indigenous *C. africana* and suspected of being under-estimated in this survey.

QDSp, quarter-degree squares present; QDSa, quarter-degree squares abundant.

Bold numbers in biome categories add up to upper 80% or more of total records.

APPENDIX 4.—Summary of results for all naturalized and casual alien plants in the study area, Savanna Biome, Fynbos Biome, Forest habitats, Grassland Biome, Nama-Karoo Biome, Succulent Karoo Biome and watercourse/wetland habitats (cont.)

Plant name	QSp	QSa	Study area records	Savanna Biome records	Fynbos Biome records	Forest habitat records	Grassland Biome records	Nama-Karoo Biome records	Succulent Karoo Biome records	Watercourse/wetland records
<i>Cotoneaster</i> (cont.)										
sp.	21		23	1	1		<b>21</b>			4
<i>Crataegus</i>										
sp. #	2		2				2			
× <i>lavallei</i>	4		4			1	4			
<i>Crotalaria agatiflora</i> subsp.	18		29	<b>24</b>			8			1
<i>agatiflora</i>										
<i>Cryptomeria japonica</i> #	1		1	1						1
<i>Cryptostegia grandiflora</i>	1		3	3						3
<i>Cuphea ignea</i> #	1		1				1			
<i>Cupressus</i>										
<i>arizonica</i>	47		68		1		<b>62</b>	5		1
<i>lusitanica</i>	2		2	1			1			1
sp.	18		24	<b>3</b>	1	1	<b>19</b>	1		2
<i>Cuscuta</i>										
<i>campestris</i>	82	1	103	<b>22</b>	3	2	<b>73</b>	5		23
<i>campestris/suaveolens</i>	34		40	<b>22</b>	<b>6</b>	7	<b>6</b>	<b>6</b>		5
<i>suaveolens</i>	7		7	2		2	4	1		1
<i>Cydonia oblonga</i>	7		7		3		3	1		1
<i>Cytisus scoparius</i>	10		15	1			<b>14</b>			1
<i>Dahlia imperialis</i> ?#	1		2	2						
<i>Datura</i>										
<i>ferox</i>	175	14	201	<b>87</b>	3	2	<b>85</b>	26		55
<i>inoxia</i>	29	3	36	<b>30</b>	1	1	3	2		18
sp.	84	1	110	<b>41</b>	1		<b>65</b>	2	1	7
<i>stramonium</i>	286	24	373	<b>131</b>	19	6	<b>174</b>	48	1	73
<i>Delonix regia</i>	5		5	5		2				
<i>Desmanthus virgatus</i> *	1		1	1						
<i>Dracocephalum canariense</i>	1		1		1					
<i>Duranta erecta</i>	32		35	<b>33</b>		8	2			8
<i>Dysphania ambrosioides</i> *	2		2	1			1			1
<i>Echinopsis spachiana</i>	57	2	83	<b>29</b>	2		<b>14</b>	<b>37</b>	1	
<i>Echium</i>										
<i>plantagineum</i>	51	6	64	<b>11</b>	<b>31</b>		<b>19</b>	3		4
<i>plantagineum/vulgare</i>			19	2	<b>17</b>					1
<i>vulgare</i>	29	2	31	1	<b>9</b>		<b>21</b>			2
<i>Egeria densa</i>	2		2	2						1
<i>Eichhornia crassipes</i>	87	72	431	<b>279</b>	46		<b>106</b>			431
<i>Eragrostis pilosa</i> *	1		1	1						
<i>Eriobotrya japonica</i>	3		3	1	2	1				1
<i>Eucalyptus</i>										
<i>camaldulensis</i>	121	22	182	<b>36</b>	<b>81</b>	3	17	14	<b>34</b>	137
<i>cinerea</i>	11		13	2			11			
<i>cladocalyx</i>	37	4	83	2	<b>71</b>				10	26
<i>cloeziana</i>	1		1	1						
<i>conferruminata</i>	41	10	117	10	<b>106</b>				1	12
<i>diversicolor</i>	49	8	153	1	<b>148</b>	28	2		2	32
<i>?exserta</i>	1	1	1		1					1
<i>fastigata</i>	1		1	1						
<i>globulus</i>	12		16		<b>16</b>	5				1
<i>gomphocephala</i>	6		11		<b>11</b>					
<i>grandis</i>	100	16	190	<b>111</b>	1	19	<b>78</b>			67
<i>leucoxydon</i> ?#	2		2		2					2
<i>microcorys</i>	1		2		2					
<i>microtheca</i>	1		1					1		1
<i>paniculata</i>	1		1	1						
<i>regnans</i>	6		7		7					3
<i>robusta</i> ?#	1		1	1						1
<i>sideroxydon</i> ?#	1		1				1			
sp.	505	30	1 103	<b>299</b>	<b>147</b>	17	<b>614</b>	27	16	266
<i>tereticornis</i> ?#	1		1				1			1
<i>Eugenia uniflora</i>	2		2	2						
<i>Euphorbia</i>										
<i>heterophylla</i>	3		3	2			1			2
<i>peplus</i> *	1		1				1			
<i>pulcherrima</i> ?#	6		9	9						1

Combined taxa e.g. *Ageratum conyzoides/houstonianum* indicate uncertainty of identification.

#, casual alien plants: occurring outside cultivation; some species flourishing but less than 10 years of records in SAPIA precludes being categorized as 'naturalized' (Pyšek *et al.* 2004).

\*, mainly herbaceous species that are suspected of being under-estimated in this survey.

QDsp, quarter-degree squares present; QDSa, quarter-degree squares abundant.

Bold numbers in biome categories add up to upper 80% or more of total records.

APPENDIX 4.—Summary of results for all naturalized and casual alien plants in the study area, Savanna Biome, Fynbos Biome, Forest habitats, Grassland Biome, Nama-Karoo Biome, Succulent Karoo Biome and watercourse/wetland habitats (cont.)

Plant name	QSp	QSa	Study area records	Savanna Biome records	Fynbos Biome records	Forest habitat records	Grassland Biome records	Nama-Karoo Biome records	Succulent Karoo Biome records	Watercourse/wetland records
<i>Fallopia convolvulus</i> *	1		1				1			
<i>Ficus</i>										
<i>carica</i>	18		26	1	<b>19</b>		2	1	<b>3</b>	13
<i>elastica</i> #	1		1	1						
<i>macrophylla</i> #	1		1	1						
<i>pumila</i>	2		2	1			1			
<i>Flaveria bidentis</i> *	12		12	<b>11</b>		1	1			6
<i>Foeniculum vulgare</i> *	9		10	<b>3</b>	<b>5</b>		1	1		1
<i>Fraxinus</i>										
<i>americana</i>	13		15				<b>11</b>	<b>4</b>		3
<i>angustifolia</i>	3		3	1	1				1	
sp.	13		14				<b>11</b>	<b>3</b>		4
<i>Fuchsia</i> sp. #	1		1		1	1				
<i>Genista monspessulana</i>	2		2		2					
<i>Glandularia</i>										
<i>aristigera</i> *	14		27	1			<b>26</b>			1
× <i>hybrida</i> ?#	1		1				1			
<i>Glebionis coronaria</i>	2	1	4	2	2					
<i>Gleditsia triacanthos</i>	111	1	162	12	1		<b>136</b>	12	1	41
<i>Gnaphalium luteoalbum</i> *	1		1	1						1
<i>Gomphrena celosioides</i> *	2		2				2			1
<i>Grevillea</i>										
<i>robusta</i>	53		80	<b>68</b>	2	9	10			22
<i>rosmarinifolia</i> #	1		1		1					
<i>sericea</i> #	1		1		1					
<i>Guilleminea densa</i> *	2		2				2			
<i>Hakea</i>										
<i>drupacea</i>	28	2	58	4	<b>53</b>				1	
<i>gibbosa</i>	18	3	34	2	<b>31</b>				1	
<i>salicifolia</i>	5	1	5		2		3			1
<i>sericea</i>	77	17	230	14	<b>204</b>	3	1		11	5
<i>victoriae</i> #	1		1		1					
<i>Harrisia martinii</i>	21	10	33	<b>32</b>				1		3
<i>Hedychium</i>										
<i>coccineum</i>	3	1	6	6		2				2
<i>coronarium</i>	14	1	19	<b>18</b>		2	1			2
<i>flavescens</i>	5	2	5	3	2	1				2
<i>gardnerianum</i>	12		18	<b>11</b>		4	<b>7</b>			1
sp.	7	2	8	4	3	2	1			4
<i>Helianthus annuus</i> *	5		8	8						
<i>Heliotropium amplexicaule</i> *	2		3	2			1			
<i>Hibiscus trionum</i> *	2		2				2			
<i>Homalanthus populifolius</i>	2		2		2	2				
<i>Hordeum murinum</i> *	1		1					1		1
<i>Hylocereus undatus</i>	8		8	7	1					
<i>Hypericum</i>										
<i>patulum</i>	1	1	2			1	2			1
<i>perforatum</i>	13	1	19		<b>16</b>		3			3
<i>Hypochaeris radicata</i> *	1		1				1			
<i>Ipomoea</i>										
<i>alba</i>	22	1	32	<b>28</b>		5	4			19
<i>carnea</i> subsp. <i>fistulosa</i>	21	1	36	<b>35</b>			1			7
<i>indica</i>	23	3	27	<b>22</b>	3	3	2			8
<i>indica/purpurea</i>	74	7	120	<b>86</b>	<b>18</b>	16	<b>16</b>			34
<i>nil</i>	1		1		1					1
<i>purpurea</i>	37	3	46	<b>23</b>	<b>10</b>	9	<b>13</b>			12
sp.	3		3	2			1			1
<i>Jacaranda mimosifolia</i>	195	16	613	<b>497</b>		21	<b>115</b>	1		105
<i>Jasminum</i>										
<i>humile</i>	2		3				3			
<i>mesnyi</i> ?#	1		1				1			
<i>Jatropha</i>										
<i>gossypifolia</i>	4		10	<b>10</b>						1
sp.	2		2	1			1			

Combined taxa e.g. *Ageratum conyzoides/houstonianum* indicate uncertainty of identification.

#, casual alien plants: occurring outside cultivation; some species flourishing but less than 10 years of records in SAPIA precludes being categorized as 'naturalized' (Pyšek *et al.* 2004).

\*, mainly herbaceous species that are suspected of being under-estimated in this survey.

QDsp, quarter-degree squares present; QDSa, quarter-degree squares abundant.

Bold numbers in biome categories add up to upper 80% or more of total records.

APPENDIX 4.—Summary of results for all naturalized and casual alien plants in the study area, Savanna Biome, Fynbos Biome, Forest habitats, Grassland Biome, Nama-Karoo Biome, Succulent Karoo Biome and watercourse/wetland habitats (cont.)

Plant name	QSp	QSa	Study area records	Savanna Biome records	Fynbos Biome records	Forest habitat records	Grassland Biome records	Nama-Karoo Biome records	Succulent Karoo Biome records	Watercourse/wetland records
<i>Juniperus pinchoffii</i> #	1		1				1			
sp.	4		5				5			3
<i>virginiana</i>	17	2	28	1			27			8
<i>Lactuca serriola</i> *	1		1				1			
<i>Lagerstroemia indica</i>	6		7	6			1			
<i>Lantana camara</i>	247	116	2 111	<b>1 843</b>	60	63	207		1	289
<i>Lemna gibba</i>	3	2	3	2	1					3
sp.	3	1	3	1			1	1		3
<i>Lepidium didymum</i> *	1		1	1						
<i>draba</i>	4		4				1	3		
<i>Leptospermum laevigatum</i>	38	15	102	6	<b>96</b>	3				10
<i>Leucaena leucocephala</i>	36	3	123	<b>115</b>		11	8			43
<i>Ligustrum japonicum</i>	7		8	2		2	6			4
<i>lucidum</i>	12	1	16	<b>5</b>		2	<b>11</b>			6
<i>ovalifolium</i>	3	1	3	2		1	1			1
<i>sinense</i>	8		11	1			<b>10</b>			5
sp.	12	2	13	<b>6</b>		1	7			7
<i>vulgare</i>	3	1	5	3			2			5
<i>Lilium formosanum</i>	15	3	30	<b>18</b>			<b>12</b>			
<i>Limonium sinuatum</i>	10	1	10		<b>5</b>			<b>4</b>	1	2
<i>Linaria genistifolia</i> *	1		1				1			
<i>maroccana</i> *	1		3				3			
<i>Litsea glutinosa</i>	8	3	10	<b>10</b>		6				5
<i>Lonicera japonica</i> var. <i>halliana</i>	5		5	2		1	3			4
<i>Lygodium japonicum</i> #	1		1	1		1				
<i>Lythrum salicaria</i>	1		1		1					1
<i>Macfadyena unguis-cati</i>	22	9	52	<b>47</b>		13	5			14
<i>Maireana brevifolia</i> ?#	1		1	1						
<i>Malus pumila</i> var. <i>paradisica</i> ?#	5		7		2		5			1
<i>Malva dendromorpha</i>	16	1	24	1	<b>19</b>			1	<b>3</b>	3
<i>linnaei</i> *	1		1		1					
<i>parviflora</i> *	2		2		1		1			
<i>Malvastrum coromandelianum</i> *	2		2	1			1			
<i>Mangifera indica</i>	12	1	30	<b>30</b>		1				16
<i>Manihot esculenta</i>	8		10	<b>9</b>			1			1
<i>grahamii</i> #	6		7	7		1				1
<i>Medicago sativa</i> *	2		2	1			1			
<i>Melaleuca hypericifolia</i>	1		2		2					
<i>wilsonii</i> #	1		1		1					
<i>Melia azedarach</i>	551	65	2 119	<b>1 394</b>	82	29	<b>588</b>	49	6	674
<i>Melilotus alba</i> *	15		26	2			<b>24</b>			2
<i>Metasequoia glyptostroboides</i> #	1		1				1			1
<i>Metrosideros excelsa</i>	2	1	5		5					3
<i>Mimosa pigra</i>	6	1	8	7			1			7
<i>pudica</i> var. <i>hispida</i> *	2		2	2						
<i>Mirabilis jalapa</i> *	7		7	3			4			
<i>Momordica charantia</i> *	1		1	1						
<i>Monstera deliciosa</i> #	1		1	1						1
<i>Montanoa hibiscifolia</i>	24	2	46	<b>41</b>		6	5			13
<i>Moringa oleifera</i> #	2		2	2						
<i>Morus alba</i>	129	8	304	<b>192</b>	2	10	<b>109</b>	1		164
<i>Musa</i> sp. #	8		15	<b>15</b>						10
<i>Myoporum tenuifolium</i> subsp. <i>montanum</i>	30		49	2	<b>44</b>	1			3	4

Combined taxa e.g. *Ageratum conyzoides/houstonianum* indicate uncertainty of identification.

#, casual alien plants: occurring outside cultivation; some species flourishing but less than 10 years of records in SAPIA precludes being categorized as 'naturalized' (Pyšek *et al.* 2004).

\*, mainly herbaceous species that are suspected of being under-estimated in this survey.

QDSp, quarter-degree squares present; QDSa, quarter-degree squares abundant.

Bold numbers in biome categories add up to upper 80% or more of total records.

APPENDIX 4.—Summary of results for all naturalized and casual alien plants in the study area, Savanna Biome, Fynbos Biome, Forest habitats, Grassland Biome, Nama-Karoo Biome, Succulent Karoo Biome and watercourse/wetland habitats (cont.)

Plant name	QSp	QSa	Study area records	Savanna Biome records	Fynbos Biome records	Forest habitat records	Grassland Biome records	Nama-Karoo Biome records	Succulent Karoo Biome records	Watercourse/wetland records
<i>Myriophyllum aquaticum</i>	48	10	81	<b>39</b>	<b>17</b>		<b>25</b>			81
<i>spicatum</i>	20		23	<b>11</b>	2		<b>9</b>	1		23
<i>Nassella tenuissima</i>	1		2				2			1
<i>trichotoma</i>	12	3	16	<b>12</b>	1		<b>10</b>	1	1	
<i>Nasturtium officinale</i>	50	1	64	<b>19</b>	4	1	<b>38</b>	3		64
<i>Nephrolepis exaltata</i>	13	1	19	<b>12</b>	<b>6</b>	13	1			2
<i>Nerium oleander</i>	23	2	46	<b>16</b>	<b>21</b>		1	4	4	36
<i>Nicandra physalodes</i> *	1		1	1						
<i>Nicotiana glauca</i>	383	14	957	<b>274</b>	<b>168</b>	1	72	<b>206</b>	<b>237</b>	441
<i>tabacum</i> ?#	3		3	3						3
<i>Nymphaea ×marliacea</i>	1		1				1			1
<i>mexicana</i>	2	2	4	1			3			4
<i>Oenothera biennis</i> *	19	1	19	<b>5</b>			<b>13</b>	1		10
<i>glazioviana</i> *	1	1	1				1			
<i>indecora</i> *	1		1				1			
<i>jamesii</i> *	15	2	17	<b>7</b>	1		<b>9</b>			10
<i>laciniata</i> *	1		1				1			
<i>rosea</i> *	4		4				4			1
sp.	4		4				4			
<i>tetraptera</i> *	1		1				1			
<i>Olyra latifolia</i> *	1		1	1		1				
<i>Opuntia aurantiaca</i>	61	3	84	<b>50</b>			<b>28</b>	4	2	4
<i>engelmannii</i> (= <i>O. lindheimeri</i> )	10	3	15	<b>6</b>			2	<b>7</b>		1
<i>exaltata</i>	6		6	2			3			
<i>ficus-indica</i>	861	57	2 445	<b>1 159</b>	267	8	<b>570</b>	<b>368</b>	81	129
<i>fulgida</i>	11	2	12	<b>7</b>			2	<b>3</b>		
<i>humifusa</i>	25	3	32	<b>18</b>	2		<b>10</b>	2		2
? <i>humifusa/engelmannii</i>	48	4	49	<b>23</b>			<b>17</b>	9		1
<i>imbricata</i>	131	15	151	<b>49</b>	8	3	<b>48</b>	<b>43</b>	3	6
<i>microdasys</i>	9		10	<b>4</b>	<b>3</b>			<b>3</b>		
<i>monacantha</i>	48	1	114	<b>90</b>	<b>22</b>	5	2			17
<i>robusta</i>	225	2	337	<b>61</b>	13		<b>120</b>	<b>130</b>	13	4
sp.	37		39	<b>21</b>	5		<b>10</b>	3		2
<i>spinulifera</i> ?#	1		1	1						
<i>stricta</i>	106	14	193	<b>168</b>	1		12	9	3	4
? <i>stricta</i> × <i>humifusa</i>	1		1	1						
<i>Orobancha minor</i>	4		5	2	3					
<i>Oxalis corniculata</i> *	4		4	1			3			1
<i>Pandanus</i> sp. #	1		1	1						1
<i>Paraserianthes lophantha</i>	54	9	286	10	<b>274</b>	7			2	82
<i>Parkinsonia aculeata</i>	15		18	12				6		4
<i>Parthenium hysterophorus</i>	15	3	29	<b>29</b>						8
<i>Parthenocissus quinquefolia</i> #	1		1	1						
<i>Paspalum dilatatum</i> *	6		6	1	2	2	3			1
<i>quadrifarium</i> *	1		1				1			1
<i>urvillei</i> *	1		1	1						
<i>Passiflora caerulea</i>	12		20	<b>10</b>	<b>9</b>	2	1			12
<i>edulis</i>	32		55	<b>40</b>	6	19	<b>9</b>			12
sp.	19	1	22	<b>13</b>	<b>6</b>	11	3			7
<i>suberosa</i>	6		7	6		2	1			
<i>subpeltata</i>	21	1	26	<b>22</b>		3	4			3
<i>tripartita</i> var. <i>mollissima</i>	4		4		3	1	1			1
<i>Pennisetum clandestinum</i>	48	12	56	<b>12</b>	<b>28</b>	3	<b>14</b>	2		6
<i>purpureum</i>	40	6	87	<b>82</b>			5			30
<i>setaceum</i>	66	17	84	<b>39</b>	<b>20</b>		8	<b>17</b>		2
<i>setaceum/villosum</i>	15	1	15	<b>4</b>	<b>4</b>		<b>6</b>		1	1
sp.	11	4	15				11			
<i>villosum</i>	22	5	26	2	3		14	7		1

Combined taxa e.g. *Ageratum conyzoides/houstonianum* indicate uncertainty of identification.

#, casual alien plants: occurring outside cultivation; some species flourishing but less than 10 years of records in SAPIA precludes being categorized as 'naturalized' (Pyšek *et al.* 2004).

\*, mainly herbaceous species that are suspected of being under-estimated in this survey.

QDSp, quarter-degree squares present; QDSa, quarter-degree squares abundant.

Bold numbers in biome categories add up to upper 80% or more of total records.

APPENDIX 4.—Summary of results for all naturalized and casual alien plants in the study area, Savanna Biome, Fynbos Biome, Forest habitats, Grassland Biome, Nama-Karoo Biome, Succulent Karoo Biome and watercourse/wetland habitats (cont.)

Plant name	QSp	QSa	Study area records	Savanna Biome records	Fynbos Biome records	Forest habitat records	Grassland Biome records	Nama-Karoo Biome records	Succulent Karoo Biome records	Watercourse/wetland records
<i>Pereskia aculeata</i>	44	8	102	<b>91</b>	4	39	7			8
<i>Persea americana</i> #	2		2				2			1
<i>Persicaria lapathifolia</i> *	1		1				1			1
<i>Phoenix</i>										
<i>canariensis</i>	3		3		2				1	3
<i>dactylifera</i>	4		4		3			1		4
<i>Phormium tenax</i> #	2		2		2					2
<i>Physalis</i>										
<i>peruviana</i> *	3		3	2			1			
<i>viscosa</i> *	3		3	1			2			2
<i>Phytolacca</i>										
<i>dioica</i>	30		38	<b>17</b>	<b>20</b>	1			1	15
<i>icosandra</i> *	4		5		5					1
<i>Pinus</i>										
<i>canariensis</i>	6	1	9	2	7					
<i>elliottii</i>	34	6	59	<b>35</b>		3	<b>23</b>	1		7
<i>elliottii/taeda</i>	30	1	59	<b>41</b>		2	<b>18</b>			9
<i>halepensis</i>	85	3	136	<b>45</b>	<b>53</b>		<b>33</b>	4	1	9
<i>patula</i>	85	13	238	<b>90</b>		18	<b>148</b>			59
<i>pinaster</i>	85	44	401	<b>34</b>	<b>355</b>	29	4		8	36
<i>pinea</i>	18		35	1	<b>30</b>		4			1
<i>radiata</i>	70	15	206	4	<b>186</b>	20	10		6	16
<i>roxburghii</i>	2		2				2			
sp.	126	14	169	<b>47</b>	<b>47</b>	3	<b>70</b>	3	2	18
<i>taeda</i>	7		11	<b>6</b>			<b>5</b>			3
<i>Pistia stratiotes</i>	24	6	63	<b>60</b>	2		1			63
<i>Pittosporum undulatum</i>	3		7		7	1				3
<i>Pityrogramma calomelanos</i> *	1		1	1		1				
<i>Plantago</i>										
<i>lanceolata</i> *	4		4				4			1
<i>major</i> *	2		2	1			1			
<i>virginica</i> *	1		1				1			
<i>Platanus</i> sp. #	1		1		1					
<i>Plectranthus comosus</i>	19		22	<b>8</b>	<b>11</b>	1	<b>3</b>			2
<i>Polygonum aviculare</i> *	1		1				1			1
<i>Polypogon monspeliensis</i> *	1		1	1						
<i>Pomaderris kumeraho</i> #	1		1		1					
<i>Pontederia cordata</i>	2		2	2						2
<i>Populus</i>										
<i>alba</i>	15	2	22	<b>11</b>	1		<b>10</b>			17
<i>alba</i> × <i>canescens</i>	185	47	460	<b>171</b>	1	8	<b>283</b>	5		336
<i>deltoides</i>	100	6	169	<b>37</b>	3	1	<b>114</b>	15		117
<i>nigra</i> var. <i>italica</i>	90		120	2	7		<b>94</b>	<b>17</b>		100
× <i>canescens</i>	371	130	939	76	<b>279</b>	4	<b>486</b>	67	31	823
<i>Portulaca oleracea</i> *	2		2	1			1			
<i>Prosopis</i>										
<i>glandulosa</i> var. <i>torreyana</i>	40	10	50	<b>13</b>	2		3	<b>29</b>	3	13
<i>glandulosa/velutina</i>	390	78	1 108	<b>168</b>	63		54	<b>666</b>	<b>156</b>	443
<i>velutina</i>	48	6	53	<b>7</b>	3		1	<b>41</b>	1	18
<i>Prunus</i>										
<i>armeniaca</i>	32		44	1	<b>6</b>		<b>34</b>	2	1	9
<i>persica</i>	319	1	728	<b>115</b>	65	1	<b>530</b>	15	3	148
<i>serotina</i>	1		1				1			1
<i>Psidium</i>										
<i>cattleianum</i>	5		8	7		4	1			1
<i>guajava</i>	160	50	732	<b>662</b>	9	25	60		1	179
<i>guineense</i>	2		2	2		1				
sp.	36	7	47	<b>44</b>		6	3			12
× <i>durbanensis</i>	2		3	3		2				
<i>Pterocarya stenoptera</i> #	1		1	1		1				1
<i>Pueraria montana</i> var. <i>lobata</i>	3		3	2			1			2
<i>Punica granatum</i>	8		11	1	<b>4</b>		<b>3</b>	<b>3</b>		2
<i>Pyracantha</i>										
<i>angustifolia</i>	142	3	285	13	6	2	<b>256</b>	10		78
<i>angustifolia/crenulata</i>	40	3	51	5	2	1	<b>44</b>			5

Combined taxa e.g. *Ageratum conyzoides/houstonianum* indicate uncertainty of identification.

#, casual alien plants: occurring outside cultivation; some species flourishing but less than 10 years of records in SAPIA precludes being categorized as 'naturalized' (Pyšek *et al.* 2004).

\*, mainly herbaceous species that are suspected of being under-estimated in this survey.

QDSp, quarter-degree squares present; QDSa, quarter-degree squares abundant.

Bold numbers in biome categories add up to upper 80% or more of total records.

APPENDIX 4.—Summary of results for all naturalized and casual alien plants in the study area, Savanna Biome, Fynbos Biome, Forest habitats, Grassland Biome, Nama-Karoo Biome, Succulent Karoo Biome and watercourse/wetland habitats (cont.)

Plant name	QSp	QSa	Study area records	Savanna Biome records	Fynbos Biome records	Forest habitat records	Grassland Biome records	Nama-Karoo Biome records	Succulent Karoo Biome records	Watercourse/wetland records
<i>Pyracantha</i> (cont.)										
<i>coccinea</i>	6		7				7			2
<i>crenulata</i>	22		31	2		1	<b>29</b>			2
<i>Pyrus</i> sp. ?#	5		5		4		1			1
<i>Quercus</i>										
<i>canariensis</i> ?#	1		1		1					
<i>cerris</i> ?#	2		2		2					
<i>palustris</i>	5		5		2		3			1
<i>robur</i>	50	2	88	3	<b>57</b>	5	<b>26</b>		2	53
sp.	4		6	1	4		1			3
<i>suber</i> ?#	1		1		1					
<i>Richardia</i>										
<i>brasiliensis</i> *	1		1	1						1
<i>humistrata</i> *	1		1				1			
<i>Ricinus communis</i>	456	56	1 701	<b>1 230</b>	<b>250</b>	30	<b>166</b>	24	31	582
<i>Rivina humilis</i>	7	1	10	10		4				1
<i>Robinia pseudoacacia</i>	110	14	178	13	6	1	<b>145</b>	14		66
<i>Rosa</i>										
<i>multiflora</i>	5		5	3			2			1
? × <i>odorata</i> #	1		1	1						1
<i>rubiginosa</i>	119	12	276	12	6	2	<b>255</b>	3		59
sp. #	3		3	2			1			
<i>Rubus</i>										
<i>cuneifolius</i>	75	35	236	45		6	<b>191</b>			71
<i>flagellaris</i>	3		4		4					1
<i>fruticosus</i>	89	32	244	<b>24</b>	<b>188</b>	14	<b>24</b>		8	71
? <i>pascuus</i>	3	2	3	2			1			
<i>phoenicolasius</i>	4		4			1	4			
<i>rosifolius</i>	14	1	14	<b>9</b>	2	3	<b>3</b>			3
sp.	86	30	179	<b>88</b>	5	12	<b>86</b>			54
× <i>proteus</i>	4	3	4	2			2			3
<i>Rumex</i>										
<i>acetosella</i> subsp. <i>pyrenaicus</i> *	1		1				1			1
<i>crispus</i> *	2		2	1			1			
<i>usambarensis</i>	4	1	4	3			1			
<i>Saccharum officinarum</i>	15	1	26	25			1			8
<i>Salix</i>										
<i>babylonica</i>	475	89	1 381	<b>140</b>	74	6	<b>1 069</b>	90	8	1 323
<i>caprea</i>	9		12				12			10
<i>fragilis</i>	75	24	176	5	1		<b>169</b>	1		175
<i>Salsola kali</i> / <i>tragus</i>	155	31	187	<b>27</b>	13		<b>23</b>	<b>117</b>	7	2
<i>Salvinia molesta</i>	29	7	44	<b>25</b>	<b>14</b>		5			44
<i>Sambucus</i>										
<i>canadensis</i>	3	1	3	1			2			3
sp.	10		11	2			<b>9</b>			6
<i>Schefflera actinophylla</i> #	1		1	1						
<i>Schinus</i>										
<i>molle</i>	231	2	407	<b>82</b>	<b>49</b>	1	<b>73</b>	<b>156</b>	<b>47</b>	136
<i>terebinthifolius</i>	30	2	90	<b>85</b>	2	9	3			54
<i>Schizolobium parahyba</i> var. <i>parahyba</i> #	1		1	1						
<i>Schkuhria pinnata</i> *	4		4	1			3			1
<i>Senna</i>										
<i>bicapsularis</i>	16	1	45	<b>45</b>						31
<i>corymbosa</i>	4		4	2			2			1
<i>didymobotrya</i>	139	29	339	<b>261</b>	3	15	<b>75</b>			115
<i>hirsuta</i>	9		10	10						1
<i>multiglandulosa</i>	11	1	12	<b>6</b>	<b>4</b>	1	2			3
<i>obtusifolia</i>	4		5	5						3
<i>occidentalis</i>	56	4	75	<b>74</b>		1	1			27
<i>pendula</i> var. <i>glabrata</i>	19	2	21	<b>19</b>		2	2			6
<i>septemtrionalis</i>	63		102	<b>84</b>	1	8	17			31
sp.	16		23	<b>12</b>	<b>6</b>	2	<b>5</b>			12
<i>Sesbania</i>										
<i>bispinosa</i> *	1		1				1			1
<i>punicea</i>	323	68	830	<b>405</b>	<b>175</b>	8	<b>238</b>	4	8	500

Combined taxa e.g. *Ageratum conyzoides/houstonianum* indicate uncertainty of identification.

#, casual alien plants: occurring outside cultivation; some species flourishing but less than 10 years of records in SAPIA precludes being categorized as 'naturalized' (Pyšek *et al.* 2004).

\*, mainly herbaceous species that are suspected of being under-estimated in this survey.

QDSp, quarter-degree squares present; QDSa, quarter-degree squares abundant.

Bold numbers in biome categories add up to upper 80% or more of total records.

APPENDIX 4.—Summary of results for all naturalized and casual alien plants in the study area, Savanna Biome, Fynbos Biome, Forest habitats, Grassland Biome, Nama-Karoo Biome, Succulent Karoo Biome and watercourse/wetland habitats (cont.)

Plant name	QSp	QSa	Study area records	Savanna Biome records	Fynbos Biome records	Forest habitat records	Grassland Biome records	Nama-Karoo Biome records	Succulent Karoo Biome records	Watercourse/wetland records
<i>Sigesbeckia orientalis</i> *	1		1	1						
<i>Silybum marianum</i> *	7		9	7			2			
<i>Sisymbrium orientale</i> *	1		1				1			
<i>Sisyrinchium</i> sp. *	2		2		2	2				
<i>Solanum</i>										
<i>betaceum</i>	4		5		4	3	1			
<i>capsicoides</i> *	1		1	1						
<i>chrysotrichum</i>	21		21	<b>21</b>						12
<i>elaeagnifolium</i>	51	11	60	<b>18</b>	3		<b>21</b>	<b>16</b>	2	4
<i>mauritanum</i>	265	99	1 364	<b>748</b>	86	97	<b>530</b>			419
<i>pseudocapsicum</i> *	6		10	1	<b>8</b>	7	1			5
<i>seaforthianum</i>	30	3	77	<b>75</b>	1	31	1			50
<i>sisymbriifolium</i>	40	3	51	<b>18</b>	3	1	<b>30</b>			5
sp.	4		6	5		2	1			1
<i>torvum</i> *	1		1	1						
<i>Sonchus oleraceus</i> *	3		3	1			2			
<i>Sophora</i> cf. <i>dauidii</i> #	1		1				1			1
<i>Sorghum halepense</i>	41	2	46	<b>26</b>	3	2	<b>11</b>	6		17
<i>Spartium junceum</i>	20	3	43	4	<b>35</b>		3		1	2
<i>Spathodea campanulata</i>	3		4	4						
<i>Sphagneticola trilobata</i> *	1		2	2						1
<i>Spiraea cantoniensis</i> #	1		1				1			
<i>Stellaria media</i> *	1		1				1			
<i>Stenocarpus sinuatus</i> ?#	1	1	1		1					
<i>Styphnolobium japonicum</i> ?#	1		1				1			1
<i>Symphotrichum squamatum</i> *	1		1				1			
<i>Syncarpia glomulifera</i>	2		2	2						
<i>Syzygium</i>										
<i>cumini</i>	9	1	14	<b>13</b>		2	1			4
<i>jambos</i>	3		3	2	1					2
<i>paniculatum</i>	3		3	3						
<i>Tabebuia chrysotricha</i> ?#	1		1	1						
<i>Tagetes minuta</i> *	47		78	11		1	<b>66</b>	1		16
<i>Tamarix</i>										
<i>chinensis</i>	4		4				1	3		2
<i>ramosissima</i>	7		8	1	3			4		8
sp.	85	4	110	10	<b>16</b>		8	<b>58</b>	<b>18</b>	85
<i>Taraxacum officinale</i> *	1		1				1			
<i>Tecoma stans</i>	57	4	99	<b>95</b>		2	4			17
<i>Tephrocactus</i>										
? <i>aoracanthus</i>	1		1					1		1
<i>articulatus</i>	1		1					1		
sp.	1		1					1		
<i>Thevetia peruviana</i>	15		23	<b>23</b>						6
<i>Tipuana tipu</i>	24	1	42	<b>33</b>			<b>9</b>			3
<i>Tithonia</i>										
<i>diversifolia</i>	49	5	123	<b>120</b>		10	3			33
<i>diversifolia/rotundifolia</i>	3	1	3	3						
<i>rotundifolia</i>	19	5	28	<b>22</b>		2	<b>6</b>			7
<i>Toona ciliata</i>	23	1	54	<b>51</b>		7	3			10
<i>Torilis arvensis</i> *	1		1	1						
<i>Toxicodendron succedaneum</i>	12	1	14	<b>12</b>		3	2			3
<i>Tragopogon dubius</i> *	1		1				1			
<i>Tridax procumbens</i> *	1		1	1						1
<i>Triplaris americana</i> ?#	1		1	1						
<i>Triticum aestivum</i> *	1		1				1			
<i>Tropaeolum majus</i> *	3		3	2	1	1				1
<i>Ulex europaeus</i>	9		14	<b>2</b>			<b>11</b>	1		3
<i>Ulmus</i>										
<i>parvifolia</i>	2		2				2			1
<i>procera</i> #	1		1				1			1
sp. #	4		4				3	1		1
<i>Verbena</i>										
<i>bonariensis</i> *	58	4	115	22			<b>93</b>			13
<i>brasiliensis/bonariensis</i>	2		4	3			1			
<i>brasiliensis</i> *	2		2	2						

Combined taxa e.g. *Ageratum conyzoides/houstonianum* indicate uncertainty of identification.

#, casual alien plants: occurring outside cultivation; some species flourishing but less than 10 years of records in SAPIA precludes being categorized as 'naturalized' (Pyšek *et al.* 2004).

\*, mainly herbaceous species that are suspected of being under-estimated in this survey.

QDSp, quarter-degree squares present; QDSa, quarter-degree squares abundant.

Bold numbers in biome categories add up to upper 80% or more of total records.



APPENDIX 4.—Summary of results for all naturalized and casual alien plants in the study area, Savanna Biome, Fynbos Biome, Forest habitats, Grassland Biome, Nama-Karoo Biome, Succulent Karoo Biome and watercourse/wetland habitats (cont.)

Plant name	QSp	QSa	Study area records	Savanna Biome records	Fynbos Biome records	Forest habitat records	Grassland Biome records	Nama-Karoo Biome records	Succulent Karoo Biome records	Watercourse/wetland records
<i>Verbena</i> (cont.)										
<i>officinalis</i> *	2		2				2			1
<i>rigida</i> var. <i>rigida</i> *	1		1	1						
<i>Verbesina encelioides</i> *	18		21	<b>14</b>				<b>7</b>		5
<i>Vinca major</i> *	1		1		1					
<i>Vitis</i> sp. #	6		12		<b>11</b>		1			
<i>Washingtonia</i> sp. ?#	3		3	2					1	3
<i>Wigandia urens</i> var. <i>caracasana</i> #	3		4	2	2					
<i>Wisteria floribunda</i> #	1		1				1			
<i>Xanthium</i> sp.	6		7	5				2	1	7
<i>spinosum</i>	83	6	104	<b>30</b>	3		<b>62</b>	8		27
<i>strumarium</i>	149	21	212	<b>126</b>	3	4	<b>72</b>	11		95
<i>Yucca aloifolia</i>	20		22	<b>8</b>	<b>2</b>		<b>9</b>	<b>2</b>		5
<i>Zinnia peruviana</i> *	4		6	5		1	1			

Combined taxa e.g. *Ageratum conyzoides/houstonianum* indicate uncertainty of identification.

#, casual alien plants: occurring outside cultivation; some species flourishing but less than 10 years of records in SAPIA precludes being categorized as 'naturalized' (Pyšek *et al.* 2004).

\*, mainly herbaceous species that are suspected of being under-estimated in this survey.

QDSp, quarter-degree squares present; QDSa, quarter-degree squares abundant.

Bold numbers in biome categories add up to upper 80% or more of total records.

## APPENDIX 5.—Species checklist

The following 601 naturalized and casual alien (#) plant species were catalogued in the SAPIA database up to May 2006. Accepted names in roman type. Synonyms in italics. \*, taxa added to SAPIA after 2000; †, taxa recorded only in Zimbabwe and Malawi. PRE, species records from the Pretoria National Herbarium

Acacia	baileyana <i>F.Muell.</i> , Fabaceae, Bailey's wattle	var. <i>expansa</i> ( <i>Jacobi</i> ) <i>Gentry</i> (= <i>A. expansa</i> <i>Jacobi</i> ), Agavaceae, spreading century plant
	cultriformis <i>A.Cunn. ex G.Don</i> , Fabaceae, knife-leaved wattle #	decipiens <i>Baker</i> (= <i>A. laxifolia</i> <i>Baker</i> ), Agavaceae, false sisal #
	cyclops <i>A.Cunn. ex G.Don</i> , Fabaceae, red eye	sisalana <i>Perrine</i> , Agavaceae, sisal
	dealbata <i>Link.</i> , Fabaceae, silver wattle	sp., Agavaceae
	decurrens <i>Willd.</i> , Fabaceae, green wattle	
	elata <i>A.Cunn. ex Benth.</i> ( <i>A. terminalis</i> ( <i>Salisb.</i> ) <i>J.F.Macbr.</i> misapplied in South Africa), Fabaceae, peppertree wattle	<i>Ageratina</i>
	fimbriata <i>A.Cunn. ex G.Don</i> , Fabaceae, fringed wattle	adenophora ( <i>Spreng.</i> ) <i>R.M.King &amp; H.Rob.</i> (= <i>Eupatorium adenophorum</i> <i>Spreng.</i> ), Asteraceae, crofton weed
	implexa <i>Benth.</i> , Fabaceae, hickory wattle	riparia ( <i>Regel</i> ) <i>R.M.King &amp; H.Rob.</i> (= <i>Eupatorium riparium</i> <i>Regel</i> ), Asteraceae, creeping crofton weed ?#
	longifolia ( <i>Andrews</i> ) <i>Willd.</i> , Fabaceae, long-leaved wattle	<i>Ageratum</i>
	mearnsii <i>De Wild.</i> , Fabaceae, black wattle	conyzoides <i>L.</i> , Asteraceae, invading ageratum
	melanoxydon <i>R.Br.</i> , Fabaceae, Australian blackwood	houstonianum <i>Mill.</i> , Asteraceae, Mexican ageratum
	paradoxa <i>DC.</i> (= <i>A. armata</i> <i>R.Br.</i> ), Fabaceae, kangaroo thorn	<i>Agrimonia</i> cf. <i>parviflora</i> <i>Aiton</i> , Rosaceae, agrimony #
	podalyriifolia <i>A.Cunn. ex G.Don</i> , Fabaceae, pearl acacia	<i>Agrostemma githago</i> <i>L.</i> , Caryophyllaceae, corn cockle
	pycnantha <i>Benth.</i> , Fabaceae, golden wattle	<i>Ailanthus altissima</i> ( <i>Mill.</i> ) <i>Swingle</i> , Simaroubaceae, tree-of-heaven
	saligna ( <i>Labill.</i> ) <i>H.L.Wendl.</i> (= <i>A. cyanophylla</i> <i>Lindl.</i> ), Fabaceae, Port Jackson willow	<i>Albizia</i>
	stricta ( <i>Andrews</i> ) <i>Willd.</i> , Fabaceae, hop wattle ?#, *2004	chinensis ( <i>Osbeck</i> ) <i>Merr.</i> (= <i>A. stipulata</i> ( <i>DC.</i> ) <i>Boivin</i> ), Fabaceae, Chinese false-thorn #
	viscidula <i>Benth.</i> , Fabaceae, sticky wattle	lebbeck ( <i>L.</i> ) <i>Benth.</i> , Fabaceae, lebbeck tree
Acanthocereus ?tetragonus ( <i>L.</i> ) <i>Hummelinck</i> , Cactaceae, barbed-wire cactus		procera ( <i>Roxb.</i> ) <i>Benth.</i> , Fabaceae, false lebbeck
Acanthospermum		Alhagi maurorum <i>Medik.</i> (= <i>A. camelorum</i> <i>Fisch.</i> ), Fabaceae, camelthorn bush
australe ( <i>Loefl.</i> ) <i>Kuntze</i> (= <i>A. brasilum</i> <i>Schrank</i> ), Asteraceae, eight-seeded prostrate starbur		Alisma plantago-aquatica <i>L.</i> , Alismataceae, water plantain
hispidum <i>DC.</i> , Asteraceae, upright starbur		<i>Alnus glutinosa</i> ( <i>L.</i> ) <i>Gaertn.</i> (= <i>A. barbata</i> <i>C.A.Mey.</i> ), Betulaceae, black elder
Acanthus polystachyus <i>Delile</i> var. <i>pseudopubescens</i> <i>Cufod.</i> (= <i>A. pubescens</i> <i>Engl.</i> ), Acanthaceae, bear's breeches #		<i>Alpinia zerumbet</i> ( <i>Pers.</i> ) <i>B.L.Burt &amp; R.M.Sm.</i> (= <i>A. speciosa</i> ( <i>J.C.Wendl.</i> ) <i>K.Schum.</i> ), Zingiberaceae, shell ginger
Acer		<i>Alternanthera pungens</i> <i>Kunth</i> (= <i>A. repens</i> ( <i>L.</i> ) <i>Link.</i> ), Amaranthaceae, khaki bur weed
buergerianum <i>Miq.</i> , Aceraceae, Chinese maple, *2003 #		<i>Amaranthus</i>
negundo <i>L.</i> (= <i>A. californicum</i> <i>D.Dietr.</i> ), Aceraceae, ash-leaved maple		hybridus <i>L.</i> , Amaranthaceae, pigweed
? sp., Aceraceae, ?red-leaved maple		sp., Amaranthaceae
Achyranthes aspera <i>L.</i> (= <i>A. argentea</i> <i>Lam.</i> ), Amaranthaceae, burweed		<i>Ambrosia artemisiifolia</i> <i>L.</i> , Asteraceae, annual ragweed
Acorus calamus <i>L.</i> , Acoraceae, calamus		<i>Ammi majus</i> <i>L.</i> (= <i>A. glaucifolium</i> <i>L.</i> ), Apiaceae, bishop's weed
Acrocarpus fraxinifolius <i>Wight ex Arn.</i> , Fabaceae, shingle tree #		<i>Anigozanthus flavidus</i> <i>DC.</i> , Haemodoraceae, yellow kangaroo paw #
Adiantum raddianum <i>C.Presl</i> , Adiantaceae, maidenhair fern #		<i>Anredera cordifolia</i> ( <i>Ten.</i> ) <i>Steenis</i> , ( <i>A. baselloides</i> ( <i>Kunth</i> ) <i>Baill.</i> misapplied in South Africa), Basellaceae, bridal wreath

## APPENDIX 5.—Species checklist (cont.)

- Antigonon leptopus *Hook. & Arn.*, Polygonaceae, coral creeper  
 Apium graveolens *L.*, Apiaceae, wild celery  
 Araucaria  
   sp., Araucariaceae, monkey puzzle tree, \*2003 #  
   bidwillii *Hook.*, Araucariaceae, bunya-bunya, \*2005 #  
 Araujia sericifera *Brot.*, Asclepiadaceae, moth catcher  
 Ardisia  
   crenata *Sims* (*A. crispa* (Thunb.) A.DC. misapplied in South Africa),  
   Myrsinaceae, coralberry tree  
   elliptica *Thunb.* (= *A. humilis* Vahl), Myrsinaceae, shoebutton ardisia,  
   \*2005 #  
 Argemone  
   mexicana *L.*, Papaveraceae, yellow-flowered Mexican poppy  
   ochroleuca *Sweet* subsp. ochroleuca, Papaveraceae, white-flowered  
   Mexican poppy  
   sp., Papaveraceae  
 Aristolochia elegans *Mast.*, Aristolochiaceae, calico flower  
 Arundo donax *L.*, Poaceae, giant reed  
 Astartea fascicularis (*Labill.*) *DC.*, Myrtaceae #  
 Atriplex  
   inflata *F.Muell.* (= *A. lindleyi* Moq. subsp. *inflata* (F.Muell.) Paul G. Wilson),  
   Chenopodiaceae, sponge-fruit saltbush  
   muelleri *Benth.*, Chenopodiaceae, Mueller's saltbush  
   nummularia *Lindl.* subsp. nummularia, Chenopodiaceae, old-man  
   saltbush  
   semibaccata *R.Br.*, Chenopodiaceae, Australian saltbush  
   sp., Chenopodiaceae  
 Azolla  
   azoloides *Lam.*, Azollaceae, red water fern  
   ?pinnata *R.Br.* subsp. asiatica *R.M.K Saunders & K.Fowler* (= *A.*  
   *imbricata* (Roxb. ex Griff.) Nakai), Azollaceae, mosquito fern  
   sp., Azollaceae  
 Baeckia sp., Myrtaceae #  
 Bambusa  
   balcooa *Roxb.*, Poaceae, common bamboo  
   sp. with tall yellow stems and green leaves, Poaceae, bamboo  
 Bambuseae sp., Poaceae, bamboo  
 Banksia  
   ericifolia *L.f.*, Proteaceae, heath banksia #  
   integrifolia *L.f.*, Proteaceae, coast banksia #  
 Bauhinia  
   purpurea *L.*, Fabaceae, butterfly orchid tree  
   sp., Fabaceae  
   variegata *L.*, Fabaceae, orchid tree  
 Begonia cucullata *Willd.* (= *B. semperflorens* Link & Otto), Begoniaceae,  
   begonia #  
 Bidens  
   bipinnata *L.*, Asteraceae, Spanish black jack  
   biternata (*Lour.*) *Merr. & Sherff*, Asteraceae, five-leaved black jack  
   pilosa *L.*, Asteraceae, black jack  
 Billardiera heterophylla (*Lindl.*) *L.W.Cayzer & Crisp* (= *Sollya*  
   *heterophylla* Lindl.), Pittosporaceae, bluebell creeper #  
 Boerhavia erecta *L.*, Nyctaginaceae, erect boerhavia  
 Bougainvillea glabra *Choisy*, Nyctaginaceae, bougainvillea, \*2004 #  
 Brachychiton populneus (*Schott & Endl.*) *R.Br.*, Sterculiaceae,  
   kurrajong, \*2006 #  
 Briza maxima *L.* (= *B. major* K.Presl), Poaceae, quaking grass  
 Bromus  
   catharticus *Vahl* (= *B. unioloides* Kunth, *B. willdenowii* Kunth),  
   Poaceae, rescue grass  
   diandrus *Roth*, Poaceae, ripgut brome  
   pectinatus *Thunb.* (= *B. adoensis* Hochst. ex Steud.), Poaceae,  
   Japanese brome  
 Brugmansia ×candida *Pers.*, (= *Datura candida* (Pers.) Saff.), Solan-  
   aceae, moonflower bush  
 Bryophyllum  
   delagoense (*Eckl. & Zeyh.*) *Schinz* (= *Kalanchoe tubiflora* (Harv.)  
   Raym.-Hamet), Crassulaceae, chandelier plant  
   pinnatum (*Lam.*) *Oken* (= *Kalanchoe pinnata* (Lam.) Pers.), Crassu-  
   laceae, green mother of millions, \*2005 ?naturalized  
   proliferum *Bowie ex Hook.* (= *Kalanchoe prolifera* (Bowie ex Hook.)  
   Raym.-Hamet, Crassulaceae, \*2005 ?naturalized  
 Buddleja  
   davidii *Franch.*, Buddlejaceae, Chinese sagewood, \*2004 ?naturalized  
   ?Buddleja madagascariensis *Lam.*, Buddlejaceae, Madagascar sage-  
   wood #  
 Caesalpinia  
   decapetala (*Roth*) *Alston* (= *C. sepiaria* Roxb.), Fabaceae, Mauritius  
   thorn  
   gilliesii (*Hook.*) *D.Dietr.*, Fabaceae, bird-of-paradise  
   pulcherrima (*L.*) *Sw.*, Fabaceae, pride of barbados, \*2004 #  
 Callisia repens (*Jacq.*) *L.*, Commelinaceae, creeping inch plant, \*2006 #  
 Callistemon  
   citrinus (*Curtis*) *Skeels*, Myrtaceae, crimson bottlebrush #  
   glaucus (*Curtis*) *Sweet* (= *C. speciosus* auct.), Myrtaceae, Albany  
   bottlebrush #  
   rigidus *R.Br.*, Myrtaceae, stiff bottlebrush  
   sp., Myrtaceae  
   viminalis (*Sol. ex Gaertn.*) *G.Don*, Myrtaceae, weeping bottlebrush  
 Calotropis procera (*Aiton*) *W.T.Aiton* (= *Asclepias procera* Aiton), Ascle-  
   piadaceae, madar #  
 Campuloclinium macrocephalum (*Less.*) *DC.* (= *Eupatorium macro-*  
   *cephalum* Less.), Asteraceae, pom pom weed  
 Canna  
   glauca *L.*, Cannaceae, yellow-flowered glaucous canna #  
   indica *L.* (= *C. edulis* Ker Gawl.), Cannaceae, Indian canna  
   sp., Cannaceae  
   ×generalis *L.H.Bailey*, Cannaceae, garden canna  
 Capsella bursa-pastoris (*L.*) *Medik.*, Brassicaceae, shepherd's purse  
 Cardiospermum  
   grandiflorum *Sw.*, Sapindaceae, balloon vine  
   halicacabum *L.*, Sapindaceae, heart pea  
 Carica papaya *L.* (= *Papaya carica* Gaertn.), Caricaceae, pawpaw  
 Castanea dentata (*Marshall*) *Borkh.*, Fagaceae, American chestnut ?#  
 Castanospermum australe *A.Cunn. & C.Fraser ex Hook.*, Fabaceae,  
   Australian chestnut ?naturalized  
 Casuarina  
   cunninghamiana *Miq.*, Casuarinaceae, beefwood  
   equisetifolia *L.*, Casuarinaceae, horsetail tree  
 Catharanthus roseus (*L.*) *G.Don* (= *Lochnera rosea* (L.) Rchb., *Vinca*  
   *rosea* L.), Apocynaceae, Madagascar periwinkle  
 Cedrus deodara (*Roxb. ex D.Don*) *G.Don*, Pinaceae, deodar ?#  
 Celtis  
   australis *L.*, Ulmaceae, European hackberry ?naturalized  
   occidentalis *L.*, Ulmaceae, common hackberry ?naturalized  
   sinensis *Pers.*, Ulmaceae, Chinese nettle tree  
 Cenchrus brownii *Roem. & Schult.* (= *C. viridis* Spreng.), Poaceae, fine  
   burgrass  
 Centranthus ruber (*L.*) *DC.*, Valerianaceae, red valerian ?naturalized  
 Cereus jamacaru *DC.* (*C. peruvianus* (L.) Mill. misapplied in South  
   Africa), Cactaceae, queen of the night  
 Cestrum  
   aurantiacum *Lindl.*, Solanaceae, yellow or orange cestrum  
   elegans (*Brongn.*) *Schlttdl.* (= *C. purpureum* (Lindl.) Standl.), Solan-  
   aceae, crimson cestrum  
   laevigatum *Schlttdl.*, Solanaceae, inkberry  
   parqui *L'Hér.*, Solanaceae, Chilean cestrum  
   sp., Solanaceae  
 Chamaesyce  
   prostrata (*Aiton*) *Small* (= *Euphorbia prostrata* Aiton), Euphorbiaceae,  
   hairy creeping milkweed  
   serpens (*Kunth*) *Small* (= *Euphorbia serpens* Kunth), Euphorbiaceae,  
   milkweed  
 Chenopodium album *L.*, Chenopodiaceae, white goosefoot  
 Chondrilla juncea *L.*, Asteraceae, skeletonweed, \*2003 #  
 Chorizema cordatum *Lindl.*, Fabaceae, Australian flame pea #  
 Chromolaena odorata (*L.*) *R.M.King & H.Rob.* (= *Eupatorium odoratum*  
   L.), Asteraceae, trifid weed  
 Cichorium intybus *L.*, Asteraceae, chicory  
 Cinnamomum camphora (*L.*) *J.Presl*, Lauraceae, camphor tree  
 Cirsium  
   arvense (*L.*) *Scop.*, Asteraceae, Canada thistle  
   vulgare (*Savi*) *Ten.* (= *C. lanceolatum* (L.) Scop.), Asteraceae, spear  
   thistle  
 Cissus antarctica *Vent.*, Vitaceae, kangaroo vine, \*2002 #  
 Citrus  
   limon (*L.*) *Burm.f.* (= *C. limonum* Risso), Rutaceae, lemon  
   sp., Rutaceae  
 Clusia rosea *Jacq.*, Clusiaceae, balsam fig/apple, \*2003 #  
 Coffea arabica *L.*, Rubiaceae, arabica coffee, †Zimbabwe # abundant  
   locally  
 Coix lacryma-jobi *L.*, Poaceae, Job's tears  
 Colocasia esculenta (*L.*) *Schott*, Araceae, elephant's ear

## APPENDIX 5.—Species checklist (cont.)

- Commelina benghalensis L., Commelinaceae, Benghal wandering Jew  
 Convolvulus arvensis L., Convolvulaceae, field bindweed  
 Conyza  
   bonariensis (L.) Cronquist (= Erigeron bonariensis L.), Asteraceae, flax-leaf fleabane  
   canadensis (L.) Cronquist (= Erigeron canadensis L.), Asteraceae, horseweed fleabane  
   primulifolia (Lam.) Cuatrec. & Lourteig (= C. chilensis Spreng.), Asteraceae, Chilean fleabane  
   sp., Asteraceae  
   sumatrensis (Retz.) E.Walker (= C. albida Willd. ex Spreng.), Asteraceae, tall fleabane  
 Coreopsis lanceolata L., Asteraceae, tickseed  
 Cortaderia  
   jubata (Lemoine ex Carrière) Stapf, Poaceae, purple Pampas grass  
   seloana (Schult.) Asch. & Graebn., Poaceae, common Pampas grass  
 Corymbia ficifolia (F.Muell.) K.D.Hill & L.A.S.Johnson (= Eucalyptus ficifolia F.Muell.), Myrtaceae, red flowering gum #  
 Cosmos bipinnatus Cav. (= Bidens formosa (Bonato) Sch. Bip.), Asteraceae, cosmos  
 Cotoneaster  
   coriaceus Franch. (= C. lacteus W.W.Sm.), Rosaceae #  
   franchetii Bois, Rosaceae, orange cotoneaster  
   glaucophyllus Franch., Rosaceae, late cotoneaster  
   pannosus Franch., Rosaceae, silver-leaf cotoneaster  
   sp., Rosaceae  
 Crataegus  
   sp., Rosaceae #  
   ×lavallei Héring (= C. carrierei Vauvel ex Carrière), Rosaceae, Lavallee thorn  
 Crotalaria agatiflora Schweinf. subsp. agatiflora, Fabaceae, canary-bird bush  
 Cryptomeria japonica (L.f.) D.Don, Cupressaceae, Japanese cedar #  
 Cryptostegia grandiflora R.Br., Asclepiadaceae, rubber vine  
 Cuphea ignea A.DC., Lythraceae, cigarette bush #  
 Cupressus  
   arizonica Greene (= C. glabra Sudw.), Cupressaceae, Arizona cypress  
   lusitanica Mill. (= C. lindleyi Klotzsch ex Endl.), Cupressaceae, Mexican cypress  
   sp., Cupressaceae  
 Cuscuta  
   campestris Yunck., Convolvulaceae, common dodder  
   suaveolens Ser., Convolvulaceae, lucerne dodder  
 Cyathea cooperi (Hook. ex F.Muell.) Domin (= Sphaeropteris cooperi (Hook. ex F. Muell.) R.M.Tryon), Cyatheaceae, Australian tree fern, \*2005 #  
 Cydonia oblonga Mill. (= C. vulgaris Pers.), Rosaceae, quince  
 Cytisus scoparius (L.) Link (= Genista scoparia (L.) Lam.), Fabaceae, Scotch broom  
 Dahlia spp., Asteraceae, garden dahlias ?naturalized  
 Datura  
   ferox L., Solanaceae, large thorn apple  
   innoxia Mill. (D. metel L. misapplied in South Africa), Solanaceae, downy thorn apple  
   sp., Solanaceae  
   stramonium L., Solanaceae, common thorn apple  
 Delonix regia (Bojer ex Hook.) Raf. (= Poinciana regia Bojer ex Hook.), Fabaceae, flamboyant  
 Desmanthus virgatus (L.) Willd. (= D. depressus Humb. & Bonpl. ex Willd.), Fabaceae, ground tamarind  
 Desmodium uncinatum (Jacq.) DC., Fabaceae, silverleaf desmodium, †Zimbabwe # abundant locally  
 Dracocephalum canariense L. (= Cedronella canariensis (L.) Webb & Berthel.), Lamiaceae, hortela de burro  
 Duranta erecta L. (= D. repens L., D. plumieri Jacq.), Verbenaceae, forget-me-not-tree  
 Dysphania ambrosioides (L.) Mosyakin & Clemants (= Chenopodium ambrosioides L.), Chenopodiaceae, American goosefoot  
 Echinopsis spachiana (Lem.) Friedrich & G.D.Rowley (= Trichocereus spachianus (Lem.) Riccob.), Cactaceae, torch cactus  
 Echium  
   plantagineum L. (= E. lycopsis L.), Boraginaceae, Patterson's curse  
   vulgare L., Boraginaceae, blue echium  
 Egeria densa Planch. (= Elodea densa (Planch.) Casp.), Hydrocharitaceae, dense water weed  
 Eichhornia crassipes (Mart.) Solms, Pontederiaceae, water hyacinth  
 Eragrostis pilosa (L.) P.Beauv., Poaceae, Indian love grass  
 Eriobotrya japonica (Thunb.) Lindl., Rosaceae, loquat  
 Eucalyptus  
   camaldulensis Dehnh., Myrtaceae, red river gum  
   cinerea F.Muell. ex Benth., Myrtaceae, florist's gum  
   cladocalyx F.Muell., Myrtaceae, sugar gum  
   cloeziana F.Muell., Myrtaceae, iron gum  
   conferruminata D.J.Carr & S.G.M.Carr (E. lehmannii (Schauer) Benth. misapplied in South Africa), Myrtaceae, bald island marlock or 'spider gum'  
   diversicolor F.Muell., Myrtaceae, karri  
   ?exserta F.Muell., Myrtaceae, Queensland peppermint  
   fastigata H.Deane & Maiden, Myrtaceae, cut-tail gum  
   globulus Labill., Myrtaceae, blue gum  
   gomphocephala DC., Myrtaceae, tuart  
   grandis W.Hill ex Maiden (E. saligna Sm. misapplied in South Africa), Myrtaceae, saligna gum  
   leucoxydon F.Muell., Myrtaceae, white ironbark ?#  
   microcorys F.Muell., Myrtaceae, tallow gum  
   microtheca F.Muell., Myrtaceae, coolabah  
   paniculata Sm., Myrtaceae, grey ironbark  
   regnans F.Muell., Myrtaceae, mountain ash  
   robusta Sm., Myrtaceae, swamp mahogany gum ?#  
   sideroxydon A.Cunn ex Woolls, Myrtaceae, black ironbark ?#  
   sp., Myrtaceae  
   tereticornis Sm., Myrtaceae, forest red gum ?#  
 Eugenia uniflora L., Myrtaceae, pitanga  
 Euphorbia  
   heterophylla L. (= E. geniculata Ortega), Euphorbiaceae, annual poinsettia  
   leucocephala Lott., Euphorbiaceae, white poinsettia, \*2005 ?naturalized  
   peplus L., Euphorbiaceae, stinging milkweed  
   pulcherrima Willd. ex Klotzsch (= Poinsettia pulcherrima (Willd. ex Klotzsch) Graham), Euphorbiaceae, poinsettia ?#  
 Euryops chrysanthemoides (DC.) B.Nord., Asteraceae, †Zimbabwe # but indigenous in South Africa  
 Fallopia  
   convolvulus (L.) Á.Löve (= Bilderdykia convolvulus (L.) Dumort), Polygonaceae, climbing knotweed  
   sachalinensis (F.Schmidt) Ronse Decr. (= Polygonum sachalinense F.Schmidt, Reynoutria sachalinensis (F.Schmidt) Nakai), Polygonaceae, giant knotweed, \*2005 (PRE 1980) naturalized  
 Ficus  
   carica L., Moraceae, fig  
   elastica Roxb. ex Hornem. (= F. decora hort.), Moraceae, rubber fig #  
   macrophylla Desf. ex Pers., Moraceae, Australian banyan #  
   pumila L., Moraceae, ticky creeper  
 Flaveria bidentis (L.) Kuntze (= F. contrayerba (Cav.) Pers.), Asteraceae, smelter's bush  
 Foeniculum vulgare Mill., Apiaceae, fennel  
 Fraxinus  
   americana L., Oleaceae, American ash  
   angustifolia Vahl, Oleaceae, Algerian ash  
   sp., Oleaceae  
 Fuchsia sp., Onagraceae, fuchsia #  
 Fumaria muralis Sond. ex Koch, Fumariaceae, wall fumitory, \*2001 #  
 Genista monspessulana (L.) L.A.S.Johnson (= Cytisus candicans (L.) DC., C. monspessulanus L.), Fabaceae, Montpellier broom  
 Glandularia  
   aristigera (S.Moore) Tronc. (= Verbena tenuisecta Briq.), Verbenaceae, fine-leaved verbena  
   ×hybrida (hort. ex Groenl. & Rümpler) G.L.Nesom & Pruski (= Verbena ×hybrida hort. ex Groenl. ex Rümpler), Verbenaceae, garden verbena ?#  
 Glebionis coronaria (L.) Cass. ex Spach (= Chrysanthemum coronarium L.), Asteraceae, chrysanthemum greens  
 Gleditsia triacanthos L., Fabaceae, honey locust  
 Glyceria maxima (Hartm.) Holmb. (= G. aquatica (L.) Wahlb., Poa aquatica L.), Poaceae, reed meadow grass, \*2002 #  
 Gmelina arborea Roxb., Verbenaceae, white teak, †Malawi # abundant locally  
 Gnaphalium luteoalbum L. (= Pseudognaphalium luteoalbum (L.) Hilliard & B.L.Burt), Asteraceae, Jersey cudweed  
 Gomphrena celosioides Mart. (= G. decumbens Jacq.), Amaranthaceae, prostrate globe amaranth  
 Grevillea  
   banksii R.Br., Proteaceae, Bank's grevillea, \*2004 # very abundant locally  
   robusta A.Cunn. ex R.Br., Proteaceae, Australian silky oak  
   rosmarinifolia A.Cunn., Proteaceae #  
   sericea (Sm.) R.Br., Proteaceae, pink spider flower #  
 Guilleminia densa (Humb. & Bonpl. ex Schult.) Moq. (= Brayulinea densa (Willd.) Small), Amaranthaceae, carrot weed

## APPENDIX 5.—Species checklist (cont.)

- Hakea  
 drupacea (C.F.Gaertn.) Roem. & Schult. (= *H. suaveolens* R.Br.), Proteaceae, sweet hakea  
 gibbosa (Sm.) Cav., Proteaceae, rock hakea  
 salicifolia (Vent.) B.L.Burt (= *H. saligna* (Andrews) Knight), Proteaceae, willow hakea  
 sericea Schrad. & J.C.Wendl., Proteaceae, silky hakea  
 victoriae J.Drumm., Proteaceae #
- Harrisia  
 martinii (Labour.) Britton & Rose (= *Eriocereus martinii* (Labour.) Riccob.), Cactaceae, harrisia
- Hedera  
 helix L. subsp. canariensis (Willd.) Cout., Araliaceae, Algerian or Canary ivy, \*2003 #
- Hedychium  
 coccineum Buch.-Ham. ex Sm., Zingiberaceae, red ginger lily  
 coronarium J.König, Zingiberaceae, white ginger lily  
 flavescens Carey ex Roscoe, Zingiberaceae, yellow ginger lily  
 gardnerianum Sheppard ex Ker Gawl., Zingiberaceae, kahili ginger lily  
 sp., Zingiberaceae
- Helianthus  
 annuus L., Asteraceae, common sunflower  
 Heliotropium amplexicaule Vahl, Boraginaceae, blue heliotrope  
 Hibiscus trionum L., Malvaceae, bladderweed  
 Homalanthus populifolius Graham, Euphorbiaceae, Queensland poplar  
 Hordeum murinum L., Poaceae, wild barley  
 Hydrilla verticillata (L.f.) Royle, Hydrocharitaceae, hydrilla, \*2006 (PRE 1963 but misidentified) naturalized and very abundant at Pongolapoort Dam, KwaZulu-Natal
- Hydrocotyle  
 ranunculoides L.f., Apiaceae, †Zimbabwe # abundant locally
- Hyloteris  
 undatus (Haw.) Britton & Rose, Cactaceae, night-blooming cereus
- Hypericum  
 patulum Thunb. (= *H. patulum* var. *forrestii* Chitt.), Clusiaceae  
 perforatum L., Clusiaceae, St. John's wort
- Hypochoeris  
 radicata L., Asteraceae, hairy wild lettuce
- Hypoestes  
 phyllostachya Baker, Acanthaceae, polka-dot-plant, \*2002 #
- Ipomoea  
 alba L., Convolvulaceae, moonflower  
 carnea Jacq. subsp. fistulosa (Mart. ex Choisy) D.F.Austin (= *I. fistulosa* Mart. ex Choisy), Convolvulaceae, potato bush  
 indica (Burm.) Merr. (= *I. congesta* R.Br.), Convolvulaceae, perennial morning glory  
 nil (L.) Roth, Convolvulaceae, Japanese morning glory  
 purpurea (L.) Roth, Convolvulaceae, common morning glory  
 sp., Convolvulaceae
- Iris  
 pseudacorus L., Iridaceae, yellow flag, \*2004 #
- Jacaranda  
 mimosifolia D.Don, Bignoniaceae, jacaranda
- Jasminum  
 humile L., Oleaceae, yellow bush jasmine  
 mesnyi Hance, Oleaceae, primrose jasmine ?#  
 polyanthum Franch., Oleaceae, creeping jasmine, \*2001 #
- Jatropha  
 curcas L., Euphorbiaceae, physic nut, \*2005 (1979 in Wells *et al.* (1986))  
 gossypifolia L., Euphorbiaceae, coral plant  
 sp., Euphorbiaceae
- Juniperus  
 pinchotii Sudw., Cupressaceae, red-berry juniper #  
 sp., Cupressaceae  
 virginiana L., Cupressaceae, red cedar
- Koeleria  
 paniculata Laxm. (= *K. apiculata* Rehder & E.H.Wilson), Sapindaceae, golden-rain tree \*2001 #
- Lactuca  
 serriola L. (= *L. scariola* L.), Asteraceae, wild lettuce
- Lagerstroemia  
 indica L., Lythraceae, pride-of-India
- Lantana  
 camara L., Verbenaceae, lantana
- Lemna  
 gibba L., Lemnaceae, duckweed  
 sp., Lemnaceae
- Lepidium  
 didymum L. (= *Coronopus didymus* (L.) Sm.), Brassicaceae, swinecress  
 draba L. (= *Cardaria draba* (L.) Desv.), Brassicaceae, hoary cardaria
- Leptospermum  
 laevigatum (Gaertn.) F.Muell., Myrtaceae, Australian myrtle
- Leucaena  
 leucocephala (Lam.) de Wit (= *L. glauca* Benth.), Fabaceae, leucaena
- Ligustrum  
 japonicum Thunb., Oleaceae, Japanese wax-leaved privet  
 lucidum W.T.Aiton, Oleaceae, Chinese wax-leaved privet  
 ovalifolium Hassk., Oleaceae, Californian privet  
 sinense Lour., Oleaceae, Chinese privet  
 sp., Oleaceae  
 vulgare L., Oleaceae, common privet
- Lilium  
 formosanum Wallace (= *L. longiflorum* Thunb. var. *formosanum* Baker, *L. philippinense* Baker), Liliaceae, Saint Joseph's lily
- Limonium  
 sinuatum (L.) Mill. (= *Statice sinuata* L.), Plumbaginaceae, statice
- Linaria  
 genistifolia (L.) Mill. (= *L. dalmatica* (L.) Mill.), Scrophulariaceae, yellow linaria  
 maroccana Hook.f., Scrophulariaceae, baby snapdragon
- Litsea  
 glutinosa (Lour.) C.B.Rob. (= *L. sebifera* Pers.), Lauraceae, Indian laurel
- Lonicera  
 japonica Thunb. 'Halliana', Caprifoliaceae, Japanese honeysuckle
- Lygodium  
 japonicum (Thunb.) Sw., Schizaeaceae, Japanese climbing fern #
- Lythrum  
 salicaria L., Lythraceae, purple loosestrife
- Macfadyena  
 unguis-cati (L.) A.H.Gentry, Bignoniaceae, cat's claw creeper
- Maireana  
 brevifolia (R.Br.) Paul G.Wilson (= *Kochia brevifolia* R.Br.), Chenopodiaceae, small-leaf bluebush #
- Malus  
 pumila Mill. var. *paradisica* C.K.Schneid., Rosaceae, paradise apple ?#
- Malva  
 dendromorpha M.F.Ray (= *Lavatera arborea* L.), Malvaceae, tree mallow  
 linnaei M.F.Ray (= *Lavatera cretica* L.), Malvaceae, Cretan holly-hock  
 parviflora L., Malvaceae, small mallow
- Malvastrum  
 coromandelianum (L.) Garcke, Malvaceae, prickly malvastrum
- Mangifera  
 indica L., Anacardiaceae, mango
- Manihot  
 esculenta Crantz (= *M. utilissima* Pohl), Euphorbiaceae, bitter cassava  
 grahamii Hook. (= *M. dulcis* (J.F.Gmel.) Pax var. *multifida* (Graham) Pax), Euphorbiaceae, hardy cassava #
- Medicago  
 sativa L. (= *M. falcata* L.), Fabaceae, alfalfa
- Melaleuca  
 hypericifolia Sm., Myrtaceae, red-flowering tea tree  
 wilsonii F.Muell., Myrtaceae, violet honey-myrtle #
- Melia  
 azedarach L., Meliaceae, seringa or 'syringa'
- Melilotus  
 alba Medik., Fabaceae, white sweet clover
- Metasequoia  
 glyptostroboides Hu & W.C.Cheng, Cupressaceae, dawn redwood #
- Metrosideros  
 excelsa Sol. ex Gaertn. (= *M. tomentosa* A. Rich.), Myrtaceae, New Zealand bottlebrush
- Michelia  
 champaca L., Magnoliaceae, champac magnolia, †Zimbabwe #
- Mimosa  
 pigra L., Fabaceae, giant sensitive plant  
 pudica L. var. *hispida* Brennan, Fabaceae, sensitive plant
- Mirabilis  
 jalapa L., Nyctaginaceae, four-o'clock
- Momordica  
 charantia L., Cucurbitaceae, bitter cucumber
- Mondia  
 whitei (Hook.f.) Skeels (= *Chlorocodon whitei* Hook.f.), Apocynaceae, †Zimbabwe & Malawi # but indigenous in South Africa
- Monstera  
 deliciosa Liebm., Araceae, Swiss-cheese plant #
- Montanoa  
 hibiscifolia Benth., Asteraceae, tree daisy
- Moringa  
 oleifera Lam. (= *M. pterygosperma* Gaertn.), Moringaceae, horse-radish tree #
- Morus  
 alba L., Moraceae, white or common mulberry
- Musa  
 sp., Musaceae, banana tree #
- Murraya  
 paniculata (L.) Jack. (= *M. exotica* L.), Rutaceae, orange jessamine, \*2005 #
- Myoporum  
 tenuifolium G.Forst. subsp. *montanum* (R.Br.) Chinnock (= *M. montanum* R.Br.)(*M. acuminatum* R.Br. misapplied in South Africa), Myoporaceae, manatoka
- Myriophyllum  
 aquaticum (Vell.) Verdc. (= *M. brasiliense* Cambess.), Haloragaceae, parrot's feather  
 spicatum L., Haloragaceae, spiked water-milfoil
- Nassella  
 tenuissima (Trin.) Barkworth (= *Stipa tenuissima* Trin.), Poaceae, white tussock  
 trichotoma (Nees) Hack. ex Arechav. (= *Stipa trichotoma* Nees), Poaceae, nassella tussock
- Nasturtium  
 officinale R.Br. (= *Rorippa nasturtium-aquaticum* (L.) Hayek), Brassicaceae, watercress
- Nephrolepis  
 exaltata (L.) Schott, Nephrolepidaceae, sword fern

## APPENDIX 5.—Species checklist (cont.)

- Nerium oleander *L.*, Apocynaceae, oleander  
 Nicandra physalodes (*L.*) Gaertn., Solanaceae, apple-of-Peru
- Nicotiana  
 glauca *Graham*, Solanaceae, wild tobacco  
 tabacum *L.*, Solanaceae, tobacco ?#
- Nymphaea  
 mexicana *Zucc.*, Nymphaeaceae, yellow waterlily  
 ×marliacea *W.Watson*, Nymphaeaceae, Marliac hybrid waterlily
- Oenothera  
 biennis *L.*, Onagraceae, evening primrose  
 glazioviana *Micheli* (= *O. erythrosepala* Borbás), Onagraceae, evening primrose  
 indecora *Cambess.*, Onagraceae, evening primrose  
 jamesii *Torr. & A.Gray*, Onagraceae, giant evening primrose  
 laciniata *Hill*, Onagraceae, cutleaf evening primrose  
 rosea *L'Hér. ex Aiton*, Onagraceae, rose evening primrose  
 sp., Onagraceae  
 tetraptera *Cav.*, Onagraceae, white evening primrose
- Olyra latifolia *L.*, Poaceae
- Opuntia  
 aurantiaca *Lindl.*, Cactaceae, jointed cactus  
 engelmannii *Salm-Dyck ex Engelm.* (= *O. lindheimeri* Engelm.), Cactaceae, small round-leaved prickly pear  
 exaltata *A.Berger* (= *Austrocylindropuntia exaltata* (A.Berger) Backeb.), Cactaceae, long-spine cactus  
 ficus-indica (*L.*) *Mill.* (= *O. megacantha* Salm-Dyck), Cactaceae, sweet prickly pear  
 fulgida *Engelm.* (= *Cylindropuntia fulgida* (Engelm.) F.M.Knuth)(*O. rosea* DC. and *Cylindropuntia rosea* (DC.) Backeb. misapplied in South Africa), Cactaceae, chainfruit cholla or 'rosea cactus'  
 humifusa (*Raf.*) *Raf.* (= *O. compressa* auct.), Cactaceae, large-flowered prickly pear  
 imbricata (*Haw.*) *DC.* (= *Cylindropuntia imbricata* (Haw.) F.M.Knuth), Cactaceae, imbricate prickly pear  
 microdasys (*Lehm.*) *Pfeiff.*, Cactaceae, yellow bunny-ears  
 monacantha *Haw.* (= *O. vulgaris* auct.), Cactaceae, cochineal prickly pear  
 robusta *H.L.Wendl. ex Pfeiff.*, Cactaceae, blue-leaf cactus  
 sp., Cactaceae  
 spinulifera *Salm-Dyck*, Cactaceae, large round-leaved prickly pear ?#  
 stricta (*Haw.*) *Haw.* (possibly both var. dillenii and var. stricta), Cactaceae, Australian pest pear  
 stricta ×humifusa?, Cactaceae  
 tomentosa *Salm-Dyck*, Cactaceae, velvet opuntia, \*2003 #
- Orobanchaceae minor *Sm.*, Orobanchaceae, clover broomrape  
 Oxalis corniculata *L.*, Oxalidaceae, creeping oxalis  
 Pandanus sp., Pandanaceae, screw-pine #
- Paraserianthes lophantha (*Willd.*) *I.C.Nielsen* (= *Albizia lophantha* (Willd.) Benth.), Fabaceae, stinkbean  
 Parkinsonia aculeata *L.*, Fabaceae, Jerusalem thorn  
 Parthenium hysterophorus *L.*, Asteraceae, parthenium  
 Parthenocissus quinquefolia (*L.*) *Planch.*, Vitaceae, Virginia creeper #
- Paspalum  
 dilatatum *Poir.*, Poaceae, common paspalum  
 notatum *Flüggé*, Poaceae, \*2006 (PRE 1944)  
 quadrifarium *Lam.*, Poaceae  
 urvillei *Steud.*, Poaceae, tall paspalum
- Passiflora  
 caerulea *L.*, Passifloraceae, blue passion flower  
 edulis *Sims*, Passifloraceae, purple granadilla  
 sp., Passifloraceae  
 suberosa *L.*, Passifloraceae, devil's pumpkin  
 subpeltata *Ortega*, Passifloraceae, granadina  
 tripartita (*Juss.*) *Poir.* var. mollissima (*Kunth*) *Holm-Niels. & P.Jorg.* (= *P. mollissima* (Kunth) L.H.Bailey), Passifloraceae, banana poka
- Pennisetum  
 clandestinum *Hochst. ex Chiov.*, Poaceae, Kikuyu grass  
 purpureum *Schumach.*, Poaceae, Napier grass  
 setaceum (*Forssk.*) *Chiov.*, Poaceae, fountain grass  
 sp., Poaceae  
 villosum *R.Br. ex Fresen.*, Poaceae, feathertop
- Pereskia aculeata *Mill.*, Cactaceae, pereskia  
 Persea americana *Mill.* (= *P. gratissima* C.F.Gaertn.), Lauraceae, avocado pear #
- Persicaria lapathifolia (*L.*) *Gray* (= *Polygonum lapathifolium* *L.*), Polygonaceae, spotted knotweed
- Phoenix  
 canariensis *Hort. ex Chabaud*, Arecaceae, Canary date palm  
 dactylifera *L.*, Arecaceae, real date palm
- Phormium tenax *J.R.Forst. & G.Forst.*, Phormiaceae, New Zealand flax #
- Physalis  
 peruviana *L.*, Solanaceae, Cape gooseberry  
 viscosa *L.*, Solanaceae, sticky gooseberry
- Phytolacca  
 dioica *L.*, Phytolaccaceae, belhambra  
 icosandra *L.* (= *P. octandra* *L.*), Phytolaccaceae, forest inkberry
- Pinus  
 canariensis *C.Sm.*, Pinaceae, Canary pine  
 elliottii *Engelm.*, Pinaceae, slash pine  
 halepensis *Mill.*, Pinaceae, Aleppo pine  
 patula *Schiede ex Schltdl. & Cham.*, Pinaceae, patula pine  
 pinaster *Aiton*, Pinaceae, cluster pine  
 pinea *L.*, Pinaceae, umbrella pine  
 radiata *D.Don*, Pinaceae, radiata pine  
 roxburghii *Sarg.* (= *P. longifolia* Roxb. ex Lamb.), Pinaceae, chir pine  
 sp., Pinaceae  
 taeda *L.*, Pinaceae, loblolly pine
- Pistia stratiotes *L.*, Araceae, water lettuce  
 Pittosporum undulatum *Vent.*, Pittosporaceae, Australian cheesewood  
 Pityrogramma calomelanos (*L.*) *Link.*, Adiantaceae, golden fern
- Plantago  
 lanceolata *L.*, Plantaginaceae, narrow-leaved ribwort  
 major *L.*, Plantaginaceae, broad-leaved ribwort  
 virginica *L.*, Plantaginaceae, dwarf plantain
- Platanus  
 sp., Platanaceae #  
 ×acerifolia (*Aiton*) *Willd.* (= *P. hispanica* auct.), Platanaceae, London planetree, \*2004 #
- Plectranthus comosus *Sims* (= *Coleus grandis* Cramer)(*P. barbatus* Andrews misapplied in South Africa), Lamiaceae, Abyssinian coleus  
 Polygonum aviculare *L.*, Polygonaceae, prostrate knotweed  
 Polygomon monspeliensis (*L.*) *Desf.*, Poaceae, beardgrass  
 Pomaderris kumeraho *A.Cunn.*, Rhamnaceae, kumarahou #  
 Pontederia cordata *L.*, Pontederiaceae, pickerel weed
- Populus  
 alba *L.*, Salicaceae, white poplar  
 deltoides *W.Bartram ex Marshall*, Salicaceae, match poplar  
 nigra *L.* var. italica *Münchh.*, Salicaceae, Lombardy poplar  
 ×canescens (*Aiton*) *Sm.*, Salicaceae, grey poplar
- Portulaca oleracea *L.*, Portulacaceae, purslane
- Prosopis  
 glandulosa *Torr.* var. torreyana (*Benson*) *Johnst.*, Fabaceae, honey mesquite  
 velutina *Wooton*, Fabaceae, velvet mesquite
- Prunus  
 armeniaca *L.*, Rosaceae, apricot  
 cerasoides *D.Don*, Rosaceae, Himalayan flowering cherry, †Zimbabwe # abundant locally  
 persica (*L.*) *Batsch*, Rosaceae, peach  
 serotina *Ehrh.*, Rosaceae, black cherry
- Psidium  
 cattleianum *Sabine* (= *P. littorale* Raddi var. longipes (O.Berg) Fosberg), Myrtaceae, strawberry guava  
 guajava *L.*, Myrtaceae, guava  
 guineense *Sw.*, Myrtaceae, Brazilian guava  
 sp., Myrtaceae  
 ×durbanensis *Bajinath ined.*, Myrtaceae, Durban guava
- Pterocarya stenoptera *C.DC.*, Juglandaceae, Chinese wing-nut #  
 Pueraria montana (*Lour.*) *Merr.* var. lobata (*Willd.*) *Maesen & S.M.Almeida* (= *P. lobata* (Willd.) Ohwi), Fabaceae, kudzu vine  
 Punica granatum *L.*, Punicaceae, pomegranate
- Pyracantha  
 angustifolia (*Franch.*) *C.K.Schneid.*, Rosaceae, yellow firethorn  
 coccinea *M.Roem.*, Rosaceae, red firethorn  
 crenulata (*D.Don*) *M.Roem.*, Rosaceae, Himalayan firethorn  
 sp., Rosaceae
- Pyrus sp., Rosaceae, pear tree ?#
- Quercus  
 canariensis *Willd.* (= *Q. mirbeckii* Durieu), Fagaceae, Algerian oak ?#  
 cerris *L.*, Fagaceae, Turkey oak ?#  
 palustris *Münchh.*, Fagaceae, pin oak  
 robur *L.*, Fagaceae, English oak  
 sp., Fagaceae  
 suber *L.*, Fagaceae, cork oak ?#
- Quisqualis indica *L.*, Combretaceae, Rangoon creeper \*2006 #
- Richardia  
 brasiliensis *Gomes*, Rubiaceae, tropical richardia  
 humistrata *Steud.*, Rubiaceae, Peeltou richardia

## APPENDIX 5.—Species checklist (cont.)

- Ricinus communis *L.*, Euphorbiaceae, castor-oil plant  
 Rivina humilis *L.*, Phytolaccaceae, bloodberry  
 Robinia pseudoacacia *L.*, Fabaceae, black locust
- Rosa  
 multiflora *Thunb.*, Rosaceae, multiflora rose  
 rubiginosa *L.* (= *R. eglanteria* *L.*), Rosaceae, eglantine  
 sp., Rosaceae #  
 ?×odorata (*Andrews*) *Sweet*, Rosaceae, tea rose #
- Rubus  
 cuneifolius *Pursh*, Rosaceae, American bramble  
 flagellaris *Willd.*, Rosaceae  
 fruticosus *L.* agg., Rosaceae, European blackberry  
 ?pascuus *L.H.Bailey*, Rosaceae  
 phoenicolasius *Maxim.*, Rosaceae  
 rosifolius *Sm.*, Rosaceae  
 sp., Rosaceae  
 ×proteus *C.H.Stirt.*, Rosaceae, Bramble, Graskop/Sabie hybrid
- Rumex  
 acetosella *L.* subsp. pyrenaicus (*Pourr. ex Lapeyr.*) *Akeroyd* (= *R. angiocarpus* auct.), Polygonaceae, sheep sorrel  
 crispus *L.*, Polygonaceae, curly dock  
 usambarensis (*Dammer*) *Dammer* (= *R. nervosus* *Vahl* var. *usambarensis* *Dammer*), Polygonaceae, rumex
- Saccharum officinarum *L.*, Poaceae, sugar cane
- Salix  
 babylonica *L.*, Salicaceae, weeping willow  
 caprea *L.*, Salicaceae, pussy willow  
 fragilis *L.*, Salicaceae, crack willow
- Salsola  
 kali *L.*, Chenopodiaceae, common saltwort  
 tragus *L.* (= *S. australis* *R.Br.*), Chenopodiaceae, Russian tumbleweed
- Salvia tiliaefolia *Vahl*, Lamiaceae, Lindenleaf sage, \*2005 (PRE 1943)  
 Salvinia molesta *D.S.Mitch.* (*S. auriculata* *Aubl.* misapplied in South Africa), Salviniaceae, Kariba weed
- Sambucus  
 canadensis *L.* (= *S. nigra* *L.* subsp. *canadensis* (*L.*) *Bolli*), Caprifoliaceae, Canadian elder  
 nigra *L.*, Caprifoliaceae, European elder, \*2004  
 sp., Caprifoliaceae
- Schefflera  
 actinophylla (*Endl.*) *Harms* (= *Brassia actinophylla* *Endl.*), Araliaceae, Australian cabbage tree #  
 arboricola (*Hayata*) *Merr.*, Araliaceae, dwarf umbrella tree, \*2005 #  
 elegantissima (*hort. Veitch. ex Mast.*) *Lowry & Frodin* (= *Dizygotheca elegantissima* (*hort. Veitch. ex Mast.*) *R.Vig. Guillaumin*), Araliaceae, \*2005 #
- Schinus  
 molle *L.*, Anacardiaceae, pepper tree  
 terebinthifolius *Raddi*, Anacardiaceae, Brazilian pepper tree
- Schizolobium parahyba (*Vell.*) *S.F.Blake* var. *parahyba* (= *S. excelsum* *Vogel*), Fabaceae, parasol tree #
- Schkuhria pinnata (*Lam.*) *Kuntze ex Thell.*, Asteraceae, dwarf marigold
- Senna  
 bicapsularis (*L.*) *Roxb.* (= *Cassia bicapsularis* *L.*), Fabaceae, rambling cassia  
 corymbosa (*Lam.*) *H.S.Irwin & Barneby* (= *Cassia corymbosa* *Lam.*), Fabaceae, autumn cassia  
 didymobotrya (*Fresen.*) *H.S.Irwin & Barneby* (= *Cassia didymobotrya* *Fresen.*), Fabaceae, peanut butter cassia  
 hirsuta (*L.*) *H.S.Irwin & Barneby* (= *Cassia hirsuta* *L.*), Fabaceae  
 multiglandulosa (*Jacq.*) *H.S.Irwin & Barneby* (= *Cassia multiglandulosa* *Jacq.*, *C. tomentosa* *L.f.*), Fabaceae  
 obtusifolia (*L.*) *H.S.Irwin & Barneby* (= *Cassia obtusifolia* *L.*), Fabaceae  
 occidentalis (*L.*) *Link* (= *Cassia occidentalis* *L.*), Fabaceae, wild coffee  
 pendula (*Willd.*) *H.S.Irwin & Barneby* var. *glabrata* (*Vogel*) *H.S.Irwin & Barneby* (= *Cassia coluteoides* *Collad.*), Fabaceae  
 septemtrionalis (*Viv.*) *H.S.Irwin & Barneby* (= *Cassia floribunda* *sensu* *Brenan* non *Cav.*), Fabaceae, arsenic bush  
 sp., Fabaceae
- Sesbania  
 bispinosa (*Jacq.*) *W.Wight* var. *bispinosa* (= *S. aculeata* *Pers.*), Fabaceae, spiny sesbania  
 punicea (*Cav.*) *Benth.*, Fabaceae, red sesbania
- Sigesbeckia orientalis *L.*, Asteraceae, St. Paul's wort  
 Silybum marianum (*L.*) *Gaertn.*, Asteraceae, milk thistle  
 Sisymbrium orientale *L.*, Brassicaceae, Indian hedge mustard  
 Sisyrinchium sp., Iridaceae
- Solanum  
 betaceum *Cav.* (= *Cyphomandra betacea* (*Cav.*) *Sendtn.*), Solanaceae, tree tomato  
 capsicoides *All.*, Solanaceae, devil's apple  
 chrysotrichum *Schtdl.* (= *S. hispidum* *auctt. non Pers.*), Solanaceae, giant devil's fig  
 elaeagnifolium *Cav.*, Solanaceae, silver-leaf bitter apple  
 mauritanium *Scop.* (= *S. auriculatum* *Aiton*), Solanaceae, bugweed  
 pseudocapsicum *L.*, Solanaceae, Jerusalem cherry  
 seaforthianum *Andrews*, Solanaceae, potato creeper  
 sisymbriifolium *Lam.*, Solanaceae, dense-thorned bitter apple  
 sp., Solanaceae  
 torvum *Sw.* (= *S. mannii* *C.H.Wright*), Solanaceae  
 viarium *Dunal*, Solanaceae, tropical soda apple, \*2006 (PRE 1962)
- Sonchus oleraceus *L.*, Asteraceae, sowthistle  
 Sophora cf. davidii (*Franch.*) *Skeels*, Fabaceae #  
 Sorghum halepense (*L.*) *Pers.* (= *S. alnum* *Parodi*), Poaceae, Johnson grass  
 Spartium junceum *L.*, Fabaceae, Spanish broom  
 Spathodea campanulata *P.Beauv.*, Bignoniaceae, African flame tree  
 Sphagneticola trilobata (*L.*) *Pruski* (= *Thelechitonia trilobata* (*L.*) *H.Rob. & Cuatrec. Wedelia trilobata* (*L.*) *Hitchc.*), Asteraceae, Singapore daisy  
 Spiraea cantoniensis *Lour.*, Rosaceae, Cape may #  
 Stellaria media (*L.*) *Vill.*, Caryophyllaceae, chickweed  
 Stenocarpus sinuatus *Endl.*, Proteaceae, firewheel tree ?#  
 Styphnolobium japonicum (*L.*) *Schott* (= *Sophora japonica* *L.*), Fabaceae, Japanese pagoda tree ?#  
 Symphyotrichum subulatum (*Michx.*) *G.L.Nesom* var. *squamatum* (*Spreng.*) *S.D.Sundb.* (= *Aster squamatus* (*Spreng.*) *Hieron.*), Asteraceae, swamp aster  
 Syncarpia glomulifera (*Sm.*) *Nied.* (= *S. laurifolia* *Ten.*), Myrtaceae, turpentine tree
- Syzygium  
 cumini (*L.*) *Skeels*, Myrtaceae, jambolan  
 jambos (*L.*) *Alston*, Myrtaceae, rose apple  
 paniculatum *Gaertn.* (= *Eugenia myrtifolia* *Sims*), Myrtaceae, Australian water pear
- Tabebuia chrysotricha (*Mart. ex DC.*) *Standl.* (= *Tecoma chrysotricha* *Mart. ex DC.*), Bignoniaceae, yellow trumpet tree ?#
- Tagetes minuta *L.*, Asteraceae, khaki weed
- Tamarix  
 chinensis *Lour.*, Tamaricaceae, Chinese tamarisk  
 ramosissima *Ledeb.*, Tamaricaceae, pink tamarisk  
 sp., Tamaricaceae
- Taraxacum officinale *F.H.Wigg.* agg., Asteraceae, common dandelion
- Tecoma  
 stans (*L.*) *Juss. ex Kunth*, Bignoniaceae, yellow bells  
 tenuiflora (*A.DC.*) *Fabris*, Bignoniaceae, \*2004
- Tephrocactus  
 articulatus (*Pfeiff.*) *Backeb.*, Cactaceae, paper-spine cholla  
 ?aoracanthus (*Lem.*) (= ?*Opuntia aoracantha* *Lemaire*), Cactaceae  
 sp., Cactaceae
- Thevetia peruviana (*Pers.*) *K.Schum.* (= *T. nerifolia* *Juss. ex Steud.*), Apocynaceae, yellow oleander
- Tipuana tipu (*Benth.*) *Kuntze* (= *T. speciosa* *Benth.*), Fabaceae, tipu tree
- Tithonia  
 diversifolia (*Hemsl.*) *A.Gray*, Asteraceae, Mexican sunflower  
 rotundifolia (*Mill.*) *S.F.Blake*, Asteraceae, red sunflower
- Toona ciliata *M.Roem.* (= *Cedrela toona* *Roxb. ex Willd.*), Meliaceae, toon tree
- Torilis arvensis (*Huds.*) *Link.*, Apiaceae, spreading hedge-parsley
- Toxicodendron succedaneum (*L.*) *Kuntze* (= *Rhus succedanea* *L.*), Anacardiaceae, wax tree
- Tradescantia  
 zebrina *hort. ex Bosse* (= *Zebrina pendula* *Schnizl.*), Commelinaceae, wandering jew, \*2005 #  
 fluminensis *Vell.*, Commelinaceae, wandering Jew, \*2001 (Wells *et al.* 1986)
- Tragopogon dubius *Scop.* (= *T. major* *Jacq.*), Asteraceae, yellow salsify  
 Tridax procumbens *L.*, Asteraceae, tridax daisy  
 Triplaris americana *L.*, Polygonaceae, triplaris ?#  
 Triticum aestivum *L.*, Poaceae, volunteer wheat  
 Tropaeolum majus *L.*, Tropaeolaceae, nasturtium  
 Ulex europaeus *L.*, Fabaceae, European gorse
- Ulmus  
 parvifolia *Jacq.* (= *U. chinensis* *Pers.*), Ulmaceae, Chinese elm  
 procera *Salisb.*, Ulmaceae, English elm #  
 sp., Ulmaceae #
- Verbena  
 bonariensis *L.*, Verbenaceae, wild verbena

## APPENDIX 5.—Species checklist (cont.)

Verbena (cont.)	trifolia L., Verbenaceae, Indian three-leaf vitex, *2004 #
brasiliensis Vell., Verbenaceae, slender wild verbena	sp., Vitaceae, grape #
officinalis L., Verbenaceae, European verbena	
rigida Spreng. var. rigida (= V. venosa Gillies & Hook.), Verbenaceae, veined vervain	Washingtonia sp., Areaceae, petticoat palm ?#
Verbesina encelioides (Cav.) Benth. & Hook.f. ex A.Gray, Asteraceae, golden crownbeard	Wigandia urens (Ruiz & Pav.) Kunth var. caracasana (Kunth) D.N.Gibson (= W. caracasana Kunth), Hydrophyllaceae, wigandia #
Vinca major L., Apocynaceae, greater periwinkle	Wisteria floribunda (Willd.) DC., Fabaceae, Japanese wisteria #
Viola	Xanthium
hederacea Labill. (= Erpetion reniforme Sweet), Violaceae, Australian violet, *2001 #	sp., Asteraceae
priceana Pollard (= V. sororia Willd.), Violaceae, confederate violet, *2005 #	spinusum L., Asteraceae, spiny cocklebur
	strumarium L., Asteraceae, large cocklebur
Vitex	Yucca aloifolia L., Agavaceae, Spanish bayonet
agnus-castus L., Verbenaceae, lilac chastetree, *2004 (PRE 1975)	Zinnia peruviana (L.) L. (= Z. multiflora L.), Asteraceae, redstar zinnia

## APPENDIX 6.—Characteristics of prominent invaders in study area

Plant name	Family	Origin	GF	W	LC	P	SR	VR	Disp. agent	Cult. use	VC
<i>Acacia</i>											
<i>cyclops</i>	Fabaceae	ST (Aus.)	t/s	woo	per	ev	seed		bir, mam	#c/b, bar	sa, fy, sk
<i>dealbata</i>	Fabaceae	ST (Aus.)	t	woo	per	ev	seed	cop	wat, ?ant, ?bir	silc, #bar, orn	sa, fo, gr
<i>decurrens</i>	Fabaceae	ST (Aus.)	t	woo	per	ev	seed	cop	wat, ?ant, ?bir	silc, #bar, orn	gr
<i>longifolia</i>	Fabaceae	ST (Aus.)	t/s	woo	per	ev	seed		wat, bir, ant	#c/b, bar, orn	fy, fo
<i>mearnsii</i>	Fabaceae	ST (Aus.)	t	woo	per	ev	seed	cop	wat, ?ant, ?bir	#silc, bar, orn	sa, fy, fo, gr, sk
<i>melanoxydon</i>	Fabaceae	ST (Aus.)	t	woo	per	ev	seed	suc	bir, wat	#silc, bar, orn	fy, fo
<i>pycnantha</i>	Fabaceae	ST (Aus.)	t	woo	per	ev	seed		wat, mam, ?bir	#silc, c/b, bar, orn	fy
<i>saligna</i>	Fabaceae	ST (Aus.)	t/s	woo	per	ev	seed	cop	wat, mam, ant	silc, agrc, #c/b, bar, orn	sa, fy, fo, sk
<i>Achyranthes aspera</i>											
	Amaranthaceae	T (?Afr.)	h	her	per	ev/d	seed		mam	none	fo
<i>Agave</i>											
<i>americana</i> var. <i>americana</i>	Agavaceae	T (Am.)	s	suc	per	ev	seed	suc	win, hum	orn, #bar, agrc	sa, nk
<i>sisalana</i>	Agavaceae	T (Am.)	s	suc	per	ev		suc, bul	wat, hum	bar, #agrc, orn	sa
<i>Ageratum</i>											
<i>conyzoides</i>	Asteraceae	T (Am.)	h	her	ann	germ	seed		win	#orn	sa, fo
<i>houstonianum</i>	Asteraceae	T (Am.)	h	her	ann	germ	seed		win	#orn	sa, fo
<i>Argemone</i>											
<i>mexicana</i>	Papaveraceae	T (Am.)	h	her	ann	germ	seed		wat, ?hum (soil), ?ant	none	sa
<i>ochroleuca</i> subsp. <i>ochroleuca</i>	Papaveraceae	T (Am.)	h	her	ann	germ	seed		wat, ?hum (soil), ?ant	none	sa
<i>Arundo donax</i>											
	Poaceae	NT (Med. & Asia)	g/r	sem	per	ev		rhz, div	wat, hum	#agrc, orn, bar	sa, fy, gr, nk, sk
<i>Atriplex</i>											
<i>inflata</i>	Chenopodiaceae	ST (Aus.)	h	sem	per	ev/d	seed		win	#?agrc	nk, sk
<i>nummularia</i> subsp. <i>nummularia</i>	Chenopodiaceae	ST (Aus.)	s	woo/sem	per	ev/d	seed		win	#agrc, bar	nk, sk
<i>Azolla filiculoides</i>											
	Azollaceae	T (Am.)	h	her	var	var	spore	div	wat, bir	#orn	gr, nk
<i>Caesalpinia decapetala</i>											
	Fabaceae	TI (Asia)	s/c	woo	per	ev	seed		wat, ?hum, mam (cattle)	#bar, orn	sa, fo, gr
<i>Cardiospermum</i>											
<i>grandiflorum</i>	Sapindaceae	T (Am.)	c	sem	per	ev/d	seed		wat, win	#orn	sa, fo
<i>halicacabum</i>	Sapindaceae	T (?Am.)	c	sem	per	ev/d	seed		wat, win	#orn	sa

Origin: ST, southern temperate, south of or straddling Tropic of Capricorn; NT, northern temperate, north of or straddling Tropic of Cancer; T, tropical, between or straddling Tropics of Capricorn and Cancer. GF, growth form: tree; tree/shrub; shrub; herb; herb/shrub; grass; grass/reed; climber; shrub/climber.

W, woodiness: woody; semi-woody; herbaceous; succulent.

LC, life cycle: perennial, annual, variable, biennial.

P, perennation: evergreen; deciduous; evergreen/deciduous; variable; germinative.

SR, sexual reproduction: seed, spore.

VR, vegetative reproduction: coppice; sucker; division; rhz, rhizome; bulbil; stolon; tuber; runner.

Dispersal agent: wind; water; bird; mammal; human; ant.

Cultivated use: # primary (= major) use; ornamental; barrier; cover/binder; agricultural crop; silvicultural crop; none.

VC, vegetation category: savanna biome; fynbos biome; forest habitats; grassland biome; nama-karoo biome; succulent karoo biome.

Afr., Africa; Am., America; Aus., Australia; Eur., Europe; Med., Mediterranean.

APPENDIX 6.—Characteristics of prominent invaders in study area (cont.)

Plant name	Family	Origin	GF	W	LC	P	SR	VR	Disp. agent	Cult. use	VC
<i>Casuarina</i>											
<i>cunninghamiana</i>	Casuarinaceae	T (Aus.)	t	woo	per	ev	seed		wat, win	orn, c/b, #bar	fo
<i>equisetifolia</i>	Casuarinaceae	T (Pantrop.)	t	woo	per	ev	seed		wat, win	orn, #c/b, bar	fo
<i>Cereus jamacaru</i>	Cactaceae	T (Am.)	t/s	suc	per	ev	seed	div	bir	#orn, bar	sa
<i>Cestrum laevigatum</i>	Solanaceae	T (Am.)	t/s	woo	per	ev	seed		bir	#orn, bar	sa, fo
<i>Chromolaena odorata</i>	Asteraceae	T (Am.)	s	woo	per	ev	seed		win	#orn	sa, fo
<i>Cinnamomum camphora</i>	Lauraceae	NT (Asia)	t	woo	per	ev	seed		bir	#orn, silc, agrc	fo
<i>Cirsium vulgare</i>	Asteraceae	NT (Eur., N Afr. & Asia)	h	her	bie	germ	seed		win	none	gr
<i>Datura</i>											
<i>ferox</i>	Solanaceae	T (Am.)	h	her	ann	germ	seed		wat, ?hum (soil), ?ant	none	sa, gr
<i>innoxia</i>	Solanaceae	T (Am.)	h	her	var	var	seed		wat, ?hum (soil), ?ant	none	sa, gr
<i>stramonium</i>	Solanaceae	T (Am.)	h	her	ann	germ	seed		wat, ?hum (soil), ?ant	#agrc	sa, gr
<i>Eichhornia crassipes</i>	Pontederiaceae	T (Am.)	h	her	per	ev	seed	div	wat, hum	#orn	sa, fy, gr
<i>Eucalyptus</i>											
<i>camaldulensis</i>	Myrtaceae	T (Aus.)	t	woo	per	ev	seed	cop	wat, win	#silc, bar, orn, agrc	fy, fo, sk
<i>diversicolor</i>	Myrtaceae	ST (Aus.)	t	woo	per	ev	seed	cop	win	#silc, bar, agrc, orn	fy, fo
<i>grandis</i>	Myrtaceae	T (Aus.)	t	woo	per	ev	seed	cop	win	#silc, bar, orn, agrc	sa, fo, gr
<i>Hakea sericea</i>	Proteaceae	ST (Aus.)	t/s	woo	per	ev	seed		win	orn, c/b, #bar	fy
<i>Hedychium</i>											
<i>coccineum</i>	Zingiberaceae	NT (Asia)	h	her	per	ev	seed	rhz	bir, wat	#orn	fo
<i>coronarium</i>	Zingiberaceae	NT (Asia)	h	her	per	ev	seed	rhz	bir, wat	#orn	fo
<i>gardnerianum</i>	Zingiberaceae	NT (Asia)	h	her	per	ev	seed	rhz	bir, wat	#orn	fo
<i>Ipomoea</i>											
<i>indica</i>	Convolvulaceae	T (Am.)	c	her	per	ev	seed		?win, wat	#orn	sa, fo
<i>purpurea</i>	Convolvulaceae	T (Am.)	c	her	ann	germ	seed		?win, wat	#orn	sa, fo
<i>Jacaranda mimosifolia</i>	Bignoniaceae	T (Am.)	t	woo	per	d	seed	cop	win	#orn	sa, fo
<i>Lantana camara</i>	Verbenaceae	T (Am.)	s	woo	per	ev/d	seed	cop, ?run	bir	#orn, bar	sa, fo, gr
<i>Leptospermum laevigatum</i>	Myrtaceae	ST (Aus.)	t/s	woo	per	ev	seed		win, wat	orn, #bar, c/b	fy
<i>Ligustrum</i>											
<i>japonicum</i>	Oleaceae	NT (Asia)	t/s	woo	per	ev	seed	cop	bir	orn, #bar	fo
<i>lucidum</i>	Oleaceae	NT (Asia)	t/s	woo	per	ev	seed	cop	bir	orn, #bar	fo
<i>Litsea glutinosa</i>	Lauraceae	T (Asia)	t/s	woo	per	ev	seed	?cop	bir	#orn	fo
<i>Macfadyena unguis-cati</i>	Bignoniaceae	T (Am.)	c	sem	per	ev/d	seed	cop, tub	win	#orn	sa, fo
<i>Melia azedarach</i>	Meliaceae	T (Aus.)	t	woo	per	d	seed	cop	bir, wat	#orn	sa, fo, gr
<i>Morus alba</i>	Moraceae	NT (Asia)	t	woo	per	d	seed	cop	bir	orn, #agrc	sa, fo, gr
<i>Nephrolepis exaltata</i>	Davalliaceae	T (Am.)	h	her	per	ev	sp	sto, tub	win, hum	#orn	fo
<i>Nicotiana glauca</i>	Solanaceae	T (Am.)	t/s	woo	per	ev	seed	cop	win, wat, ?hum (soil)	#orn	sa, fy, nk, sk
<i>Opuntia</i>											
<i>ficus-indica</i>	Cactaceae	T (Am.)	t/s	suc	per	ev	seed	div	mam, bir	#agrc, bar	sa, fy, fo, gr, nk, sk
<i>robusta</i>	Cactaceae	T (Am.)	?t/s	suc	per	ev	seed	div	mam, bir	#agrc, bar	nk
<i>stricta</i>	Cactaceae	T (Am.)	s	suc	per	ev	seed	div	mam, bir	#orn	sa
<i>Paraserianthes lophantha</i>	Fabaceae	ST (Aus.)	t/s	woo	per	ev	seed	?cop	wat	#orn, agrc	fy
<i>Passiflora edulis</i>	Passifloraceae	T (Am.)	c	her	per	ev	seed		mam, bir	orn, #agrc	fo
<i>Pennisetum clandestinum</i>	Poaceae	T (Afr.)	g	her	per	ev/d	seed	rhz, sto	?win, hum	#c/b, agrc	fo
<i>Pereskia aculeata</i>	Cactaceae	T (Am.)	s/c	suc	per	ev	seed	div	bir, ?mam, hum	#bar, orn	fo

Origin: ST, southern temperate, south of or straddling Tropic of Capricorn; NT, northern temperate, north of or straddling Tropic of Cancer; T, tropical, between or straddling Tropics of Capricorn and Cancer. GF, growth form: tree; tree/shrub; shrub; herb; herb/shrub; grass; grass/reed; climber; shrub/climber.

W, woodiness: woody; semi-woody; herbaceous; succulent.

LC, life cycle: perennial, annual, variable, biennial.

P, perennation: evergreen; deciduous; evergreen/deciduous; variable; germinative.

SR, sexual reproduction: seed, spore.

VR, vegetative reproduction: coppice; sucker; division; rhz, rhizome; bulbil; stolon; tuber; runner.

Dispersal agent: wind; water; bird; mammal; human; ant.

Cultivated use: # primary (= major) use; ornamental; barrier; cover/binder; agricultural crop; silvicultural crop; none.

VC, vegetation category: savanna biome; fynbos biome; forest habitats; grassland biome; nama-karoo biome; succulent karoo biome.

Afr., Africa; Am., America; Aus., Australia; Eur., Europe; Med., Mediterranean.



APPENDIX 6.—Characteristics of prominent invaders in study area (cont.)

Plant name	Family	Origin	GF	W	LC	P	SR	VR	Disp. agent	Cult. use	VC
<i>Pinus patula</i>	Pinaceae	T (Am.)	t	woo	per	ev	seed		win	#silc, bar, orn	fo, gr
<i>pinaster</i>	Pinaceae	NT (Med.)	t	woo	per	ev	seed		win	#silc, bar	fy, fo
<i>radiata</i>	Pinaceae	NT (N Am.)	t	woo	per	ev	seed		win	#silc, bar	fy, fo
<i>Populus alba</i>	Salicaceae	NT (Eur., N Afr. & Asia)	t	woo	per	d		suc,cop	wat	silc, #bar, orn	sa, fo, gr, nk
<i>deltoides</i>	Salicaceae	NT (N Am.)	t	woo	per	d	seed	suc, cop	wat, win	#silc, agrc, orn	gr
<i>nigra</i> var. <i>italica</i>	Salicaceae	NT (Eur. & Asia)	t	woo	per	ev/d		suc, cop	wat	orn, #bar, c/b, agrc	gr
<i>×canescens</i>	Salicaceae	NT (Eur. & Asia)	t	woo	per	ev/d		suc, cop	wat	silc, #c/b, bar, orn	sa, fy, fo, gr, nk, sk
<i>Prosopis glandulosa</i> var. <i>torreyana</i>	Fabaceae	NT (N Am.)	t/s	woo	per	d	seed	cop	mam, wat	#agrc, orn	sa, nk, sk
<i>velutina</i>	Fabaceae	NT (N Am.)	t/s	woo	per	d	seed	cop	mam, wat	#agrc, orn	sa, nk, sk
<i>Prunus persica</i>	Rosaceae	NT (Asia)	t	woo	per	d	seed	?cop	hum	#agrc, orn	gr
<i>Psidium guajava</i>	Myrtaceae	T (Am.)	t/s	woo	per	ev	seed	suc, cop	mam, bir, hum	#agrc, orn	sa, fo
<i>Pyracantha angustifolia</i>	Rosaceae	N Temp. (Asia)	s	woo	per	ev	seed	?cop	bir	orn, #bar	gr
<i>coccinea</i>	Rosaceae	N Temp. (Eur. & Asia)	s	woo	per	ev	seed	?cop	bir	orn, #bar	gr
<i>crenulata</i>	Rosaceae	NT (Asia)	s	woo	per	ev	seed	?cop	bir	orn, #bar	gr
<i>Quercus robur</i>	Fagaceae	NT (Eur. & Asia)	t	woo	per	d	seed	?cop	wat, ?mam (squirrels)	#orn, agrc	fy
<i>Ricinus communis</i>	Euphorbiaceae	T (Afr.)	t/s	woo	var	ev/d	seed	cop	wat, hum	#agrc, orn	sa, fy, fo, sk
<i>Robinia pseudoacacia</i>	Fabaceae	NT (N Am.)	t	woo	per	d	seed	suc, cop	wat, hum	orn, #c/b, bar, agrc	gr
<i>Rosa rubiginosa</i>	Rosaceae	NT (Asia)	s	woo	per	d	seed	?cop	mam, bir	#orn, bar, agrc	gr
<i>Rubus cuneifolius</i>	Rosaceae	NT (N Am.)	s	woo	per	ev/d	seed	suc, cop	bir	#agrc	sa, fo, gr
<i>?pascuus</i>	Rosaceae	NT (N Am.)	s	woo	per	ev/d	seed	suc, cop	bir	none	sa, gr
<i>fruticosus</i>	Rosaceae	NT (Eur.)	s	woo	per	ev/d	seed	suc, cop	bir	#agrc	sa, fy, fo, gr
<i>×proteus</i>	Rosaceae	hybrid origin (N Am. × S Afr.)	s	woo	per	ev/d	seed	suc, cop	bir	none	sa, gr
<i>Salix babylonica</i>	Salicaceae	NT (Asia)	t	woo	per	d		div	wat, hum	orn, #c/b, agrc	sa, fy, fo, gr, nk
<i>fragilis</i>	Salicaceae	NT (Eur. & Asia)	t	woo	per	d		div	wat, hum	orn, #c/b, ?agrc	gr
<i>Salsola kali/tragus</i>	Chenopodiaceae	NT (Eur. & Asia)	h	her	ann	germ	seed		win	none	nk
<i>Schinus molle</i>	Anacardiaceae	T (Am.)	t	woo	per	ev	seed	?cop	bir	#orn, bar	nk, sk
<i>terebinthifolius</i>	Anacardiaceae	T (Am.)	t/s	woo	per	ev	seed	?cop	bir	orn, #bar	fo
<i>Senna didymobotrya</i>	Fabaceae	T (Am.)	t/s	woo	per	ev	seed	?cop	wat, hum	orn, #bar	sa, fo
<i>Sesbania punicea</i>	Fabaceae	T (Am.)	t/s	woo	per	ev/d	seed		wat	#orn	sa, fy, gr
<i>Solanum elaeagnifolium</i>	Solanaceae	ST (S Am.)	h/s	sem	per	stems	seed	rhz	?bir	none	nk
<i>mauritanium</i>	Solanaceae	T (Am.)	t/s	woo	per	ev	seed	cop	bir	#orn	sa, fy, fo, gr
<i>pseudocapsicum</i>	Solanaceae	T (Am.)	h/s	sem	per	ev	seed	?cop	bir	#orn	fo
<i>seaforthianum</i>	Solanaceae	T (Am.)	c	her	per	ev/d	seed	cop	bir	#orn	sa, fo

Origin: ST, southern temperate, south of or straddling Tropic of Capricorn; NT, northern temperate, north of or straddling Tropic of Cancer; T, tropical, between or straddling Tropics of Capricorn and Cancer. GF, growth form: **tree**; **tree/shrub**; **shrub**; **herb**; **herb/shrub**; **grass**; **grass/reed**; **climber**; **shrub/climber**.

W, woodiness: **woody**; **semi-woody**; **herbaceous**; **succulent**.

LC, life cycle: **perennial**, **annual**, **variable**, **biennial**.

P, perennation: **evergreen**; **deciduous**; **evergreen/deciduous**; **variable**; **germinative**.

SR, sexual reproduction: **seed**, **spore**.

VR, vegetative reproduction: **coppice**; **sucker**; **division**; **rhz**, **rhizome**; **bulbil**; **stolon**; **tuber**; **runner**.

**Dispersal agent**: **wind**; **water**; **bird**; **mammal**; **human**; **ant**.

**Cultivated use**: # **primary** (= major) use; **ornamental**; **barrier**; **cover/binder**; **agricultural crop**; **silvicultural crop**; **none**.

**VC**, vegetation category: **savanna biome**; **fynbos biome**; **forest habitats**; **grassland biome**; **nama-karoo biome**; **succulent karoo biome**.

Afr., Africa; Am., America; Aus., Australia; Eur., Europe; Med., Mediterranean.

APPENDIX 6.—Characteristics of prominent invaders in study area (cont.)

Plant name	Family	Origin	GF	W	LC	P	SR	VR	Disp. agent	Cult. use	VC
<i>Tamarix chinensis</i>	Tamaricaceae	NT (Asia)	t/s	woo	per	ev/d	seed	?cop	wat, win	#?orn, c/b, agrc	nk, sk
<i>ramosissima</i>	Tamaricaceae	NT (Eur. & Asia)	t/s	woo	per	ev/d	seed	cop, suc	wat, win	#?orn, c/b, agrc	nk, sk
<i>Tithonia diversifolia</i>	Asteraceae	T (Am.)	s	her	var	var	seed		?win	#orn	sa, fo
<i>Xanthium strumarium</i>	Asteraceae	T (Am.)	h	her	ann	germ	seed		wat, mam	none	sa, fo

Origin: ST, southern temperate, south of or straddling Tropic of Capricorn; NT, northern temperate, north of or straddling Tropic of Cancer; T, tropical, between or straddling Tropics of Capricorn and Cancer. GF, growth form: tree; tree/shrub; shrub; herb; herb/shrub; grass; grass/reed; climber; shrub/climber.

W, woodiness: woody; semi-woody; herbaceous; succulent.

LC, life cycle: perennial, annual, variable, biennial.

P, perennation: evergreen; deciduous; evergreen/deciduous; variable; germinative.

SR, sexual reproduction: seed, spore.

VR, vegetative reproduction: coppice; sucker; division; rhz, rhizome; bulbil; stolon; tuber; runner.

Dispersal agent: wind; water; bird; mammal; human; ant.

Cultivated use: # primary (= major) use; ornamental; barrier; cover/binder; agricultural crop; silvicultural crop; none.

VC, vegetation category: savanna biome; fynbos biome; forest habitats; grassland biome; nama-karoo biome; succulent karoo biome.

Afr., Africa; Am., America; Aus., Australia; Eur., Europe; Med., Mediterranean.



2006-12-12

### NOTICE ON CHANGE OF POLICY FOR REPRINTS OF *BOTHALIA*

As from the 12 December 2006, the policy on reprints of *Bothalia* articles has been amended as follows:

The author receives 20 reprints free. If there is more than one author, this number will have to be shared between them. The author will also receive a pdf file free on request (via the email or a CD included with the reprints): if there is more than one author, the co-author(s) should contact the first author for a copy.

The pdf file may only be used by the author in a private capacity as SANBI retains the copyright of the article and it may not be reproduced in another publication.

G. Germishuizen and Mrs B.A. Momberg: Editors, *Bothalia*  
for Director: Research