

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

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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1991a), northern Cape (Henderson 1991b), eastern Cape (Henderson 1992), western and central Cape (completed in 1993 but unpublished), and southern and southwestern Cape (Henderson 1998a).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.

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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:

$$\text{prominence value} = \frac{\frac{\text{total abundance of species } x \text{ in category } y}{\text{sum of the abundances of all species in category } y} \times 100 + \frac{\text{total species records of species } x \text{ in category } y}{\text{sum of the records of all species in category } y} \times 100}{2}$$

The highest prominence values in a given category which add up to ± 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	± 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	± 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*

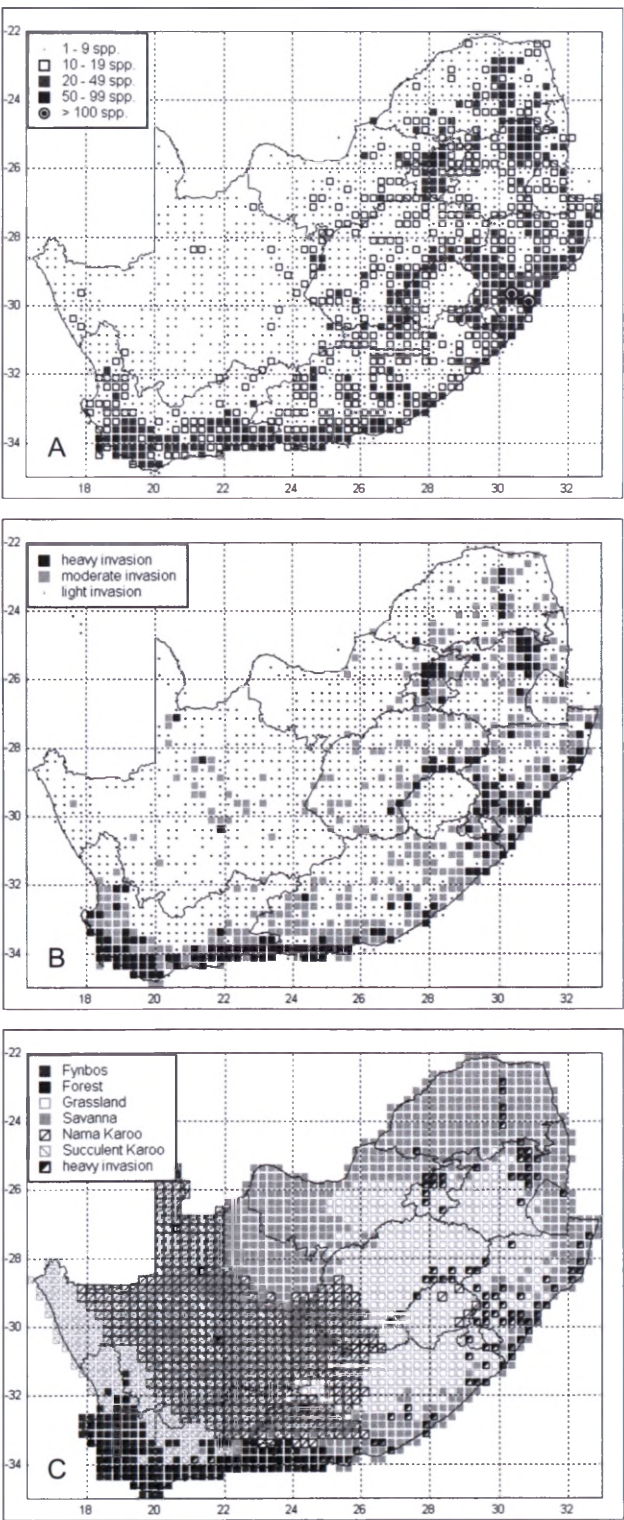


FIGURE 1.—A, species numbers per quarter-degree square in study area; B, severity of invasion per quarter-degree square. Light invasion: < 1 individual or group per km. Moderate invasion: up to 5 individuals or groups per km; some species forming stands. Heavy invasion: up to 50 individuals or groups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

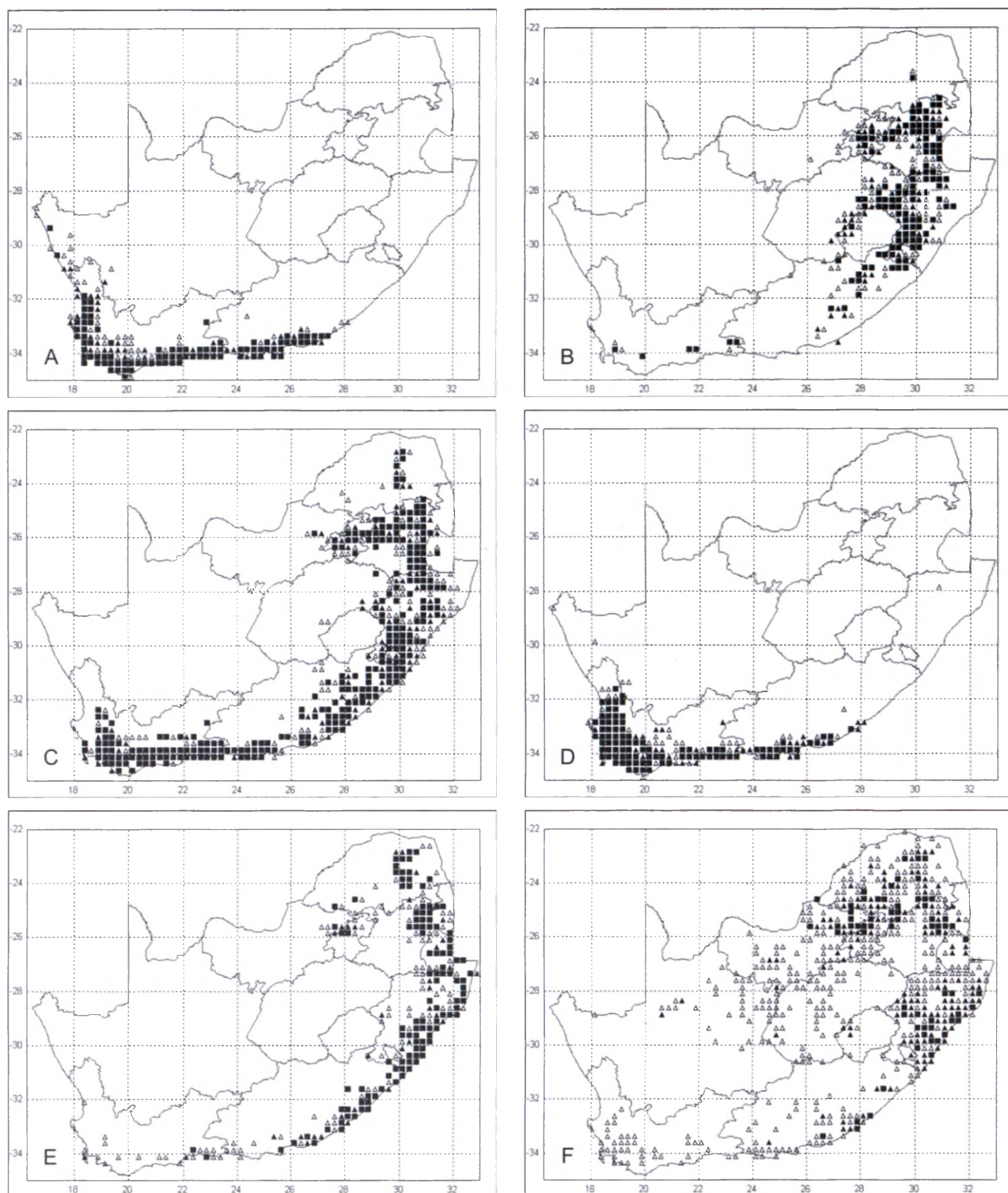


FIGURE 2.—Distribution and severity of invasion in study area: A, *Acacia cyclops*; B, *Acacia dealbata*; C, *Acacia mearnsii*; D, *Acacia saligna*; E, *Lantana camara*; F, *Melia azedarach*. Light invasion, $\triangle$; moderate invasion, $\blacktriangle$; heavy invasion, $\blacksquare$.

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

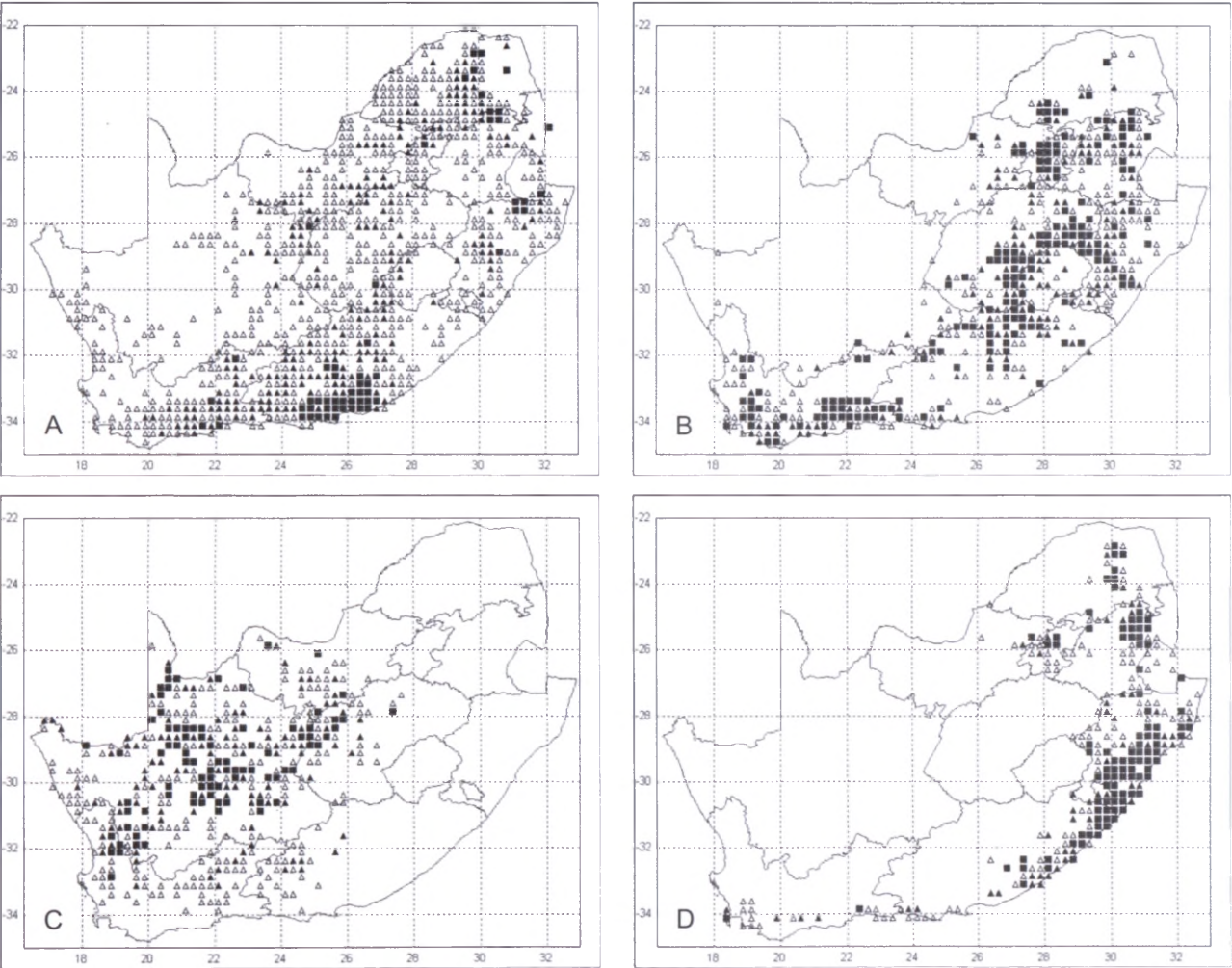


FIGURE 3.—Distribution and severity of invasion in study area: A, *Opuntia ficus-indica*; B, *Populus alba*×*canescens*; C, *Prosopis* spp.; D, *Solanum mauritanium*. Light invasion, △; moderate invasion, ▲; heavy invasion, ■.

the most prominent species with a prominence value of 23.9, followed by *Solanum mauritanium* 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 mauritanium*, *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 $\times$ 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*/ *$\times$ 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 $\pm$ 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.)
Region of origin							
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%)
Taxonomy							
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)
Growth form (spp.)							
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%)
Perennation (spp.)							
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%)
Reproduction (spp.) by:							
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%)
Dispersal (spp.) by:							
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%)
Cultivated uses (spp.)							
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 mauritanium*, *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. mauritanium* 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 mauritanium*, *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 affects 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 (Henderson 2006a).

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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	8.92	3
<i>cyclops</i>	166	91	1 097	203 636	8.66	4	<i>Leptospermum laevigatum</i>	38	15	102	15 916	0.71	
<i>dealbata</i>	256	115	1 079	133 146	6.45	9	<i>Litsea glutinosa</i>	8	3	10	2 713	0.11	
<i>decurrens</i>	101	31	232	23 456	1.23		<i>Macfadyena unguis-cati</i>	22	9	52	9 531	0.41	
<i>longifolia</i>	94	34	363	53 080	2.43		<i>Melia azedarach</i>	551	65	2 119	65 735	6.64	8
<i>mearnsii</i>	428	251	2 620	410 950	18.37	1	<i>Morus alba</i>	129	8	304	5 983	0.85	
<i>melanoxylon</i>	134	29	482	43 926	2.40		<i>Nephrolepis exaltata</i>	13	1	19	459	0.06	
<i>pycnantha</i>	35	15	135	13 864	1.77		<i>Nicotiana glauca</i>	383	14	957	22 132	2.76	
<i>saligna</i>	158	93	1 030	219 223	9.00	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	7.55	5
<i>Agave</i>							<i> robusta</i>	225	2	337	3 244	0.83	
<i> americana</i>	431	8	761	9 136	1.94		<i> stricta</i>	106	14	193	5 412	0.59	
<i> sisalana</i>	170	12	293	8 924	0.91		<i>Paraserianthes lophantha</i>	54	9	286	20 042	1.24	
<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	2.36	
<i> ochroleuca</i>	154	20	206	12 115	0.82		<i> radiata</i>	70	15	206	9 243	0.73	
<i> sp.</i>	14	2	15	1 338	0.07		<i>Populus</i>						
<i>Arundo donax</i>	371	82	855	50 158	3.41		<i> alba</i>	15	2	22	915	0.08	7
<i>Atriplex</i>							<i> alba/canescens</i>	185	47	460	33 871	2.04	7
<i> inflata</i>	164	77	213	58 878	2.28		<i> ×canescens</i>	371	130	939	87 397	4.74	7
<i> nummularia</i>	172	18	333	10 248	1.04		<i>Prosopis</i>						
<i>Azolla filiculoides</i>	194	92	354	47 220	2.23		<i> glandulosa</i>	40	10	50	4 988	0.26	10
<i>Caesalpinia decapetala</i>	127	41	413	33 868	1.94		<i> glandulosa/velutina</i>	390	78	1 107	92 751	5.27	10
<i>Cardiospermum</i>							<i> velutina</i>	48	6	53	3 108	0.21	10
<i> grandiflorum</i>	43	12	57	4 905	0.28		<i>Prunus persica</i>	319	1	728	7 401	1.81	
<i> grandiflorum/halicacabum</i>	16	5	20	2 427	0.12		<i>Psidium guajava</i>	160	50	732	55 791	3.31	
<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/crenulata</i>	40	3	51	1 183	0.15	
<i>Chromolaena odorata</i>	93	64	558	137 654	5.46		<i>Ricinus communis</i>	456	56	1 701	48 855	5.21	
<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	1.18		<i>Rosa rubiginosa</i>	119	12	276	11 494	0.95	
<i>Datura</i>							<i>Rubus</i>						
<i> ferox</i>	175	14	201	8 685	0.71		<i> cuneifolius</i>	75	35	236	49 313	2.03	
<i> innoxia</i>	29	3	36	1 897	0.14		<i> fruticosus</i>	89	32	244	22 810	1.23	
<i> sp.</i>	84	1	110	1 710	0.29		<i> pascuus</i>	3	2	3	450	0.02	
<i> stramonium</i>	286	24	373	12 932	1.21		<i> sp.</i>	86	30	179	29 694	1.30	
<i>Eichhornia crassipes</i>	87	72	431	79 893	3.40		<i> ×proteus</i>	4	3	4	650	0.03	
<i>Eucalyptus</i>							<i>Salix</i>						
<i> camaldulensis</i>	121	22	182	13 259	0.80		<i> babylonica</i>	475	89	1 381	85 116	5.63	
<i> diversicolor</i>	49	8	153	5 562	0.50		<i> fragilis</i>	75	24	176	15 710	0.87	
<i> grandis</i>	100	16	190	14 475	0.86		<i>Salsola kali/tragus</i>	155	31	187	14 080	0.84	
<i> sp.</i>	505	30	1 103	23 523	3.12		<i>Schinus molle</i>	231	2	407	5 355	1.05	
<i>Hakea sericea</i>	77	17	230	15 959	0.99		<i>Senna didymobotrya</i>	139	29	339	16 342	1.24	
<i>Ipomoea</i>							<i>Sesbania punicea</i>	323	68	830	52 078	3.41	
<i> indica</i>	23	3	27	740	0.08		<i>Solanum</i>						
<i> indica/purpurea</i>	74	7	120	2 284	0.33		<i> elaeagnifolium</i>	51	11	60	14 136	0.57	
<i> purpurea</i>	37	3	46	1 801	0.16		<i> mauritianum</i>	265	99	1 364	135 219	7.14	6
<i> sp.</i>	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	1.87		<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	3.40	102	63	810	174 964	27.20	5	0	9	214	0.73
<i>dealbata</i>	39	13	132	12 207	1.74	7	3	23	4 887	0.76	12	3	12	3 361	2.36
<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	7.09	13	3	13	1 642	1.65
<i>mearnsii</i>	134	59	710	75 210	10.20	88	70	871	210 388	31.50	36	22	91	22 825	16.70
<i>melanoxylon</i>	33	2	73	1 274	0.49	50	23	298	38 206	7.35	25	12	85	18 186	14.20

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	2.92					
<i>saligna</i>	27	11	96	12 170	1.55	105	74	860	200 582	30.40	4	2	8	1 313	1.15
<i>Achyranthes aspera</i>	40	3	44	1 078	0.32	5	0	5		0.06	10	2	12	468	1.05
<i>Agave</i>															
<i>americana</i>	146	3	267	3 986	1.75	39	0	84	427	1.02	2	0	2	51	0.16
<i>sisalana</i>	132	12	251	8 801	2.08	10	0	10	46	0.12	3	0	4	22	0.29
<i>Ageratum</i>															
<i>conyzoides</i>	32	8	44	4 979	0.66						1	0	1	1	0.07
<i>conyzoides/houstonianum</i>	27	6	45	2 583	0.46	1	0	1	1	0.01	12	3	13	726	1.24
<i>houstonianum</i>	22	2	26	1 625	0.28						8	2	8	1 261	1.13
<i>Argemone</i>															
<i>mexicana</i>	23	4	32	1 082	0.26	1	1	1	1 000	0.11	1	0	1	50	0.09
<i>ochroleuca</i>	86	13	119	7 190	1.24	2	1	2	201	0.04	1	0	1	50	0.09
sp.	6	2	7	1 272	0.15										
<i>Arundo donax</i>	132	34	372	20 126	3.69	71	25	172	16 721	3.70	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	3.06						17	7	25	6 053	4.48
<i>Cardiospermum</i>															
<i>grandiflorum</i>	40	11	54	4 703	0.69						5	3	7	1 511	1.17
<i>grandiflorum/halicacabum</i>	14	5	18	2 416	0.30						4	2	4	1 251	0.84
<i>Cereus jamacaru</i>	100	11	169	12 857	1.99	6	0	6	6	0.07	1	0	1	10	0.07
<i>Cestrum laevigatum</i>	48	12	138	7 551	1.38	6	0	9	58	0.11	22	9	30	6 457	5.01
<i>Chromolaena odorata</i>	79	57	529	133 524	14.20						33	25	77	41 029	23.90
<i>Cinnamomum camphora</i>	7	1	13	346	0.10	2	0	3	3	0.04	7	1	14	347	1.14
<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	0.69	3	0	3	3	0.04	2	0	2	11	0.15
<i>innoxia</i>	23	1	30	1 435	0.28	1	0	1	50	0.02	1	0	1	50	0.09
sp.	34	0	41	581	0.27	1	1	1	200	0.03					
<i>stramonium</i>	104	9	131	4 082	1.04	15	1	19	1 357	0.36	6	1	6	1 170	0.95
<i>Eichhornia crassipes</i>	46	44	279	60 302	6.64	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	1.13
<i>diversicolor</i>	1	0	1	1	0.01	44	7	148	5 349	2.27	12	4	28	1 897	2.82
<i>grandis</i>	54	8	111	9 827	1.43	1	0	1	10	0.01	15	2	19	974	1.77
sp.	122	8	299	7 242	2.20	72	10	147	4 838	2.21	8	2	17	687	1.51
<i>Hakea sericea</i>	7	2	14	537	0.12	61	14	204	14 344	3.84	3	0	3	61	0.24
<i>Ipomoea</i>															
<i>indica</i>	18	3	22	735	0.18	3	0	3	3	0.04	3	0	3	3	0.21
<i>indica/purpurea</i>	49	3	86	1 101	0.55	10	1	18	409	0.25	11	2	16	1 308	1.71
<i>purpurea</i>	18	1	23	410	0.16	7	2	10	1 271	0.25	7	1	9	1 102	1.13
sp.	2	0	2	51	0.01										
<i>Jacaranda mimosifolia</i>	139	16	497	16 767	4.06						17	2	21	1 589	2.19
<i>Lantana camara</i>	162	90	1 843	126 418	20.60	25	2	60	3 462	1.05	40	28	63	17 136	12.10
<i>Leptospermum laevigatum</i>	3	3	6	701	0.09	35	12	96	15 215	2.66	2	0	3	21	0.22
<i>Litsea glutinosa</i>	8	3	10	2 713	0.29						4	2	6	2 451	1.52
<i>Macfadyena unguis-cati</i>	17	6	47	8 880	1.01						6	5	13	4 912	3.12
<i>Melia azedarach</i>	291	53	1 394	54 100	12.00	44	0	82	181	0.98	17	5	29	4 856	4.22
<i>Morus alba</i>	72	6	192	3 986	1.35	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	1.07
<i>Nicotiana glauca</i>	126	7	274	7 812	2.11	51	2	168	3 657	2.33	1	0	1	50	0.09
<i>Opuntia</i>															
<i>ficus-indica</i>	330	39	1 159	47 136	10.10	73	5	267	7 242	3.85	8	5	8	4 261	2.48
<i>robusta</i>	50	0	61	191	0.34	12	1	13	1 048	0.26					
<i>stricta</i>	82	13	168	5 112	1.32	1	0	1	50	0.02					
<i>Paraserianthes lophantha</i>	5	0	10	104	0.06	47	9	274	19 936	5.22	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	1.37
<i>Pennisetum clandestinum</i>	10	3	12	2 414	0.27	26	4	28	2 106	0.54	3	3	3	3 000	1.56
<i>Pereskia aculeata</i>	34	7	91	5 569	0.96	4	0	4	13	0.05	14	4	39	2 963	4.08
<i>Pinus</i>															
<i>patula</i>	30	7	90	6 154	1.00						14	5	18	1 194	1.80
<i>pinaster</i>	13	5	34	6 549	0.74	66	36	355	39 368	8.14	9	4	29	4 586	4.10
<i>radiata</i>	3	0	4	53	0.03	53	15	186	8 902	3.08	4	3	20	1 235	1.96
<i>Populus</i>															
<i>alba</i>	6	0	11	350	0.09	1	0	1	50	0.02					
<i>alba/canescens</i>	51	22	171	15 598	2.24	1	0	1	50	0.02	8	2	8	611	0.84
<i>×canescens</i>	36	8	76	5 390	0.86	82	34	279	24 456	5.74	3	0	4	22	0.29
<i>Prosopis</i>															
<i>glandulosa</i>	7	5	13	1 421	0.19	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	1.30	22	2	63	1 657	0.90					
<i>velutina</i>	6	1	7	257	0.06	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	8.07	6	0	9	45	0.11	14	8	25	5 174	4.09
<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	10.00	87	7	250	4 189	3.35	25	5	30	1 618	2.84
<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	1.16						5	3	6	2 451	1.52
<i>fruticosus</i>	15	4	24	2 146	0.31	55	21	188	16 874	3.91	7	3	14	1 701	1.75
<i>pascuus</i>	2	1	2	250	0.03										
sp.	31	7	88	8 076	1.16	5	2	5	430	0.10	10	1	12	443	1.04
<i>xproteus</i>	2	2	2	400	0.05										
<i>Salix</i>															
<i>babylonica</i>	67	5	140	3 609	1.05	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	2.60	3	0	3	3	0.04	12	1	15	406	1.24
<i>Sesbania punicea</i>	139	26	405	21 438	3.97	60	19	175	17 026	3.77	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>mauritanium</i>	123	52	748	77 619	10.60	28	2	86	2 035	1.21	66	32	97	27 090	19.00
<i>seaforthianum</i>	28	3	75	2 636	0.62	1	0	1	10	0.01	9	0	31	263	2.30
<i>Tithonia diversifolia</i>	46	5	120	4 033	0.98						8	0	10	313	0.84
<i>Xanthium strumarium</i>	74	16	126	8 577	1.40	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	26.30
<i>dealbata</i>	206	99	922	116 050	20.90	2	0	2	2	0.06					
<i>decurrens</i>	82	24	194	21 677	4.06										
<i>longifolia</i>	19	3	31	4 362	0.76						1	0	2	2	0.16
<i>mearnsii</i>	197	116	1 003	114 979	21.30						9	6	36	10 373	18.20
<i>melanoxylon</i>	49	4	109	4 435	1.33						2	0	2	11	0.18
<i>saligna</i>	2	0	2	11	0.02						24	8	72	6 471	15.30
<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	5.90	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	1.97	51	8	77	2 927	3.80	28	7	46	5 316	11.50
<i>Atriplex</i>															
<i>inflata</i>	3	1	4	460	0.09	83	42	107	37 882	21.00	46	15	61	5 687	13.30
<i>nummularia</i>	4	0	6	153	0.06	88	11	181	4 732	7.90	45	3	83	2 176	9.81
<i>Azolla filiculoides</i>	88	41	172	21 806	3.92	47	25	70	12 944	8.30					
<i>Caesalpinia decapetala</i>	47	19	174	12 902	2.83										
<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	3.14	11	2	16	1 463	1.19					
<i>Datura</i>															
<i>ferox</i>	82	9	85	3 429	1.03	21	2	26	2 566	2.03					
<i>innoxia</i>	3	2	3	401	0.68	2	0	2	11	0.07					
sp.	46	0	65	877	0.57	2	0	2	2	0.06	1	0	1	50	0.15
<i>stramonium</i>	126	12	174	6 224	2.01	40	2	48	1 259	2.10	1	0	1	10	0.09
<i>Eichhornia crassipes</i>	21	21	106	14 000	2.48										
<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	1.13										
sp.	276	12	614	11 153	5.76	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	2.79						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	5.58	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	8.30	66	2	237	5 417	26.80
<i>Opuntia</i>															
<i>ficus-indica</i>	257	10	570	11 437	5.48	161	3	368	5 688	14.00	40	0	81	974	7.87
<i>robusta</i>	72	1	120	927	0.97	80	0	130	1 029	4.60	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	1.73										
<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	0.13										
<i>alba/canescens</i>	128	25	283	18 169	4.26	5	0	5	54	0.18					
× <i>canescens</i>	198	75	486	51 371	9.80	40	8	67	4 537	4.20	15	5	31	1 643	4.89
<i>Prosopis</i>															
<i>glandulosa</i>	3	0	3	61	0.03	25	4	29	2 395	2.00	3	1	3	1 060	1.81
<i>glandulosa/velutina</i>	29	6	54	4 738	0.97	214	55	666	73 664	56.00	61	10	156	7 823	24.00
<i>velutina</i>	1	0	1	1	0.01	37	5	41	2 788	2.60	1	0	1	10	0.09
<i>Prunus persica</i>	211	1	530	6 232	4.56	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	6.07	9	0	10	19	0.32					
<i>angustifolia/crenulata</i>	33	3	44	1 176	0.46										
<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	2.09	11	0	14	157	0.51					
<i>Rosa rubiginosa</i>	104	12	255	11 201	3.20	3	0	3	3	0.10					
<i>Rubus</i>															
<i>cuneifolius</i>	57	31	191	38 602	6.12										
<i>fruticosus</i>	15	5	24	3 219	0.57						4	2	8	571	1.48
<i>pascuus</i>	1	1	1	200	0.03										
sp.	50	21	86	21 188	3.23										
× <i>proteus</i>	2	1	2	250	0.05										
<i>Salix</i>															
<i>babylonica</i>	310	79	1 069	78 092	17.30	54	2	90	1 555	3.55	6	0	8	26	0.67
<i>fragilis</i>	71	23	169	15 388	3.10	1	0	1	1	0.03					
<i>Salsola kali/tragus</i>	20	1	23	610	0.24	95	26	117	12 309	9.50	6	1	7	233	0.90
<i>Schinus molle</i>	54	0	73	360	0.57	75	2	156	3 952	6.80	26	0	47	222	4.06
<i>Senna didymobotrya</i>	33	4	75	2 100	0.79										
<i>Sesbania punicea</i>	117	22	238	13 269	3.34	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	5.30	2	0	2	2	0.16
<i>mauritianum</i>	114	45	530	55 565	10.60										
<i>seaforthianum</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	39	1	75		1	10
<i>cultriformis</i> #	1		1				1			
<i>cyclops</i>	166	91	1 097	181	810	9		1	105	206
<i>dealbata</i>	256	115	1 079	132	23	12	922	2	4	542
<i>decurrens</i>	101	31	232	38		4	194			30
<i>elata</i>	35	1	60	4	51	4	3		2	4
<i>fimbriata</i>	1	1	1	1						
<i>implexa</i>	2		2		2					2
<i>longifolia</i>	94	34	363	66	264	13	31		2	132
<i>mearnsii</i>	428	251	2 620	710	871	91	1 003		36	953
<i>melanoxylon</i>	134	29	482	73	298	85	109		2	130
<i>paradoxa</i>	1		2		2					
<i>podalyriifolia</i>	57	2	101	49	27	1	25			6
<i>pycnantha</i>	35	15	135	4	131					6
<i>saligna</i>	158	93	1 030	96	860	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	44	5	12	34	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	267	84	2	219	160	31	118
var. <i>expansa</i>	1		1		1					
<i>decipiens</i> #	1		1				1			
<i>sisalana</i>	170	12	293	251	10	4	25	3	4	13
sp.	31	1	60	53	4		3			12
<i>Ageratina</i>										
<i>adenophora</i>	11	4	26	11	10	3	5			10
<i>riparia</i> ?#	1		1	1						
<i>Ageratum</i>										
<i>conyzoides</i>	37	8	50	44		1	6			32
<i>conyzoides/houstonianum</i>	31	8	49	45	1	13	3			24
<i>houstonianum</i>	26	2	31	26		8	5			7
<i>Agrimonia</i> cf. <i>parviflora</i> #	1		1				1			1
<i>Agrostemma githago</i> *	1		1				1			
<i>Ailanthus altissima</i>	32	2	40	11	6		19	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	8	1			1	1	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	17	3	7	5			4
<i>Antigonon leptopus</i>	3		5	5						1
<i>Apium graveolens</i> *	1		1	1						

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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	15	2	4	35	1		12
<i>Ardisia crenata</i>	2	1	3	3		2				3
<i>Argemone</i>										
<i>mexicana</i>	27	5	36	32	1	1	3			20
<i>ochroleuca</i> subsp. <i>ochroleuca</i>	154	20	206	119	2	1	56	27	2	50
sp.	14	2	15	7			1	1	6	9
<i>Aristolochia elegans</i>	6	1	8	7		2	1			4
<i>Arundo donax</i>	371	82	855	372	172	3	188	77	46	548
<i>Astartea fascicularis</i> #	1		1		1					
<i>Atriplex</i>										
<i>inflata</i>	164	77	213	16	25		4	107	61	16
<i>muelleri</i> *	1		1					1		
<i>nummularia</i> subsp. <i>nummularia</i>	172	18	333	18	45		6	181	83	107
<i>semibaccata</i> *	4		5				3	2		1
sp.	10		10					8	2	2
<i>Azolla</i>										
<i>filiculoides</i>	194	92	354	75	37	2	172	70		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	42	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	11						1
<i>Begonia cucullata</i> #	1		2	1		1				
<i>Bidens</i>										
<i>bipinnata</i> *	23		23				23			7
<i>bitermata</i> *	1		1	1						
<i>pilosa</i> *	39	3	65	17		1	47			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>dianthus</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	239		25	174			153
<i>gilliesii</i>	18		19	6			3	8	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>viminialis</i>	1		1		1					1
<i>Calotropis procera</i> #	1		1	1						
<i>Campuloclinium macrocephalum</i>	14	5	25	16		1	9			3
<i>Canna</i>										
<i>glaucia</i> #	1		1	1		1				
<i>indica</i>	26	1	34	19	7	6	8			11
sp.	13		17	10	4	1	3			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	54		7	3			29

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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	18		4	2			5
<i>halicacabum</i>	27		35	34		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	8	2		2			8
<i>cunninghamiana/equisetifolia</i>	42	2	63	46	6	1	11			23
<i>equisetifolia</i>	24	1	57	55		6	2			7
<i>Catharanthus roseus</i>	38	1	53	49	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	169	6	1	12	6		6
<i>Cestrum</i>										
<i>aurantiacum</i>	8	1	10	7	1	6	2			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	138	9	30	20			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	529		77	29			220
<i>Cichorium intybus</i>	12	1	16				14	2		2
<i>Cinnamomum camphora</i>	10	1	19	13	3	14	3			3
<i>Cirsium</i>										
<i>arvense</i> *	2		2				2			
<i>vulgare</i>	188	20	345	68	8		253	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	14	5	1				19
<i>Commelina benghalensis</i> *	9		15	7	3	5	3	2		1
<i>Convolvulus arvensis</i>	23	1	23	4	4		11	4		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	11			4			
<i>Cortaderia</i>										
<i>jubata</i>	7		7		2		5			1
<i>jubata/selloana</i>	23	2	28	11		1	16		1	4
<i>selloana</i>	54	1	104	15	77	5	10	1	1	21
<i>Corymbia ficifolia</i> ?#	3		3	1	2					
<i>Cosmos bipinnatus</i> *	48	10	122	3			119			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	23	1		3
<i>pannosus</i>	25		30	2	1		25	2		3

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*, 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.
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<i>Cotoneaster</i> (cont.)										
sp.	21		23	1	1		21			4
<i>Crataegus</i>										
sp. #	2		2				2			
× <i>lavallei</i>	4		4			1	4			
<i>Crotalaria agatiflora</i> subsp.	18		29	24			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		62	5		1
<i>lusitanica</i>	2		2	1			1			1
sp.	18		24	3	1	1	19	1		2
<i>Cuscuta</i>										
<i>campestris</i>	82	1	103	22	3	2	73	5		23
<i>campestris/suaveolens</i>	34		40	22	6	7	6	6		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			14			1
<i>Dahlia imperialis</i> ?#	1		2	2						
<i>Datura</i>										
<i>ferox</i>	175	14	201	87	3	2	85	26		55
<i>innoxia</i>	29	3	36	30	1	1	3	2		18
sp.	84	1	110	41	1		65	2	1	7
<i>stramonium</i>	286	24	373	131	19	6	174	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	33		8	2			8
<i>Dysphania ambrosioides</i> *	2		2	1			1			1
<i>Echinopsis spachiana</i>	57	2	83	29	2		14	37	1	
<i>Echium</i>										
<i>plantagineum</i>	51	6	64	11	31		19	3		4
<i>plantagineum/vulgare</i>			19	2	17					1
<i>vulgare</i>	29	2	31	1	9		21			2
<i>Egeria densa</i>	2		2	2						1
<i>Eichhornia crassipes</i>	87	72	431	279	46		106			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	36	81	3	17	14	34	137
<i>cinerea</i>	11		13	2			11			
<i>cladocalyx</i>	37	4	83	2	71				10	26
<i>cloeziana</i>	1		1	1						
<i>conferruminata</i>	41	10	117	10	106				1	12
<i>diversicolor</i>	49	8	153	1	148	28	2		2	32
<i>?exserta</i>	1	1	1		1					1
<i>fastigata</i>	1		1	1						
<i>globulus</i>	12		16		16	5				1
<i>gomphocephala</i>	6		11		11					
<i>grandis</i>	100	16	190	111	1	19	78			67
<i>leucoxylon</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>sideroxylon</i> ?#	1		1				1			
sp.	505	30	1 103	299	147	17	614	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

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<i>Fallopia convolvulus</i> *	1		1				1			
<i>Ficus</i>										
<i>carica</i>	18		26	1	19		2	1	3	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	11		1	1			6
<i>Foeniculum vulgare</i> *	9		10	3	5		1	1		1
<i>Fraxinus</i>										
<i>americana</i>	13		15				11	4		3
<i>angustifolia</i>	3		3	1	1				1	
sp.	13		14				11	3		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			26			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		136	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	68	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	53				1	
<i>gibbosa</i>	18	3	34	2	31				1	
<i>salicifolia</i>	5	1	5		2		3			1
<i>sericea</i>	77	17	230	14	204	3	1		11	5
<i>victoriae</i> #	1		1		1					
<i>Harrisia martinii</i>	21	10	33	32				1		3
<i>Hedychium</i>										
<i>coccineum</i>	3	1	6	6		2				2
<i>coronarium</i>	14	1	19	18		2	1			2
<i>flavescens</i>	5	2	5	3	2	1				2
<i>gardnerianum</i>	12		18	11		4	7			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		16		3			3
<i>Hypochaeris radicata</i> *	1		1				1			
<i>Ipomoea</i>										
<i>alba</i>	22	1	32	28		5	4			19
<i>carnea</i> subsp. <i>fistulosa</i>	21	1	36	35			1			7
<i>indica</i>	23	3	27	22	3	3	2			8
<i>indica/purpurea</i>	74	7	120	86	18	16	16			34
<i>nil</i>	1		1		1					1
<i>purpurea</i>	37	3	46	23	10	9	13			12
sp.	3		3	2			1			1
<i>Jacaranda mimosifolia</i>	195	16	613	497		21	115	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	10						1
sp.	2		2	1			1			

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<i>Juniperus</i>										
<i>pinchotii</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	1 843	60	63	207		1	289
<i>Lemna</i>										
<i>gibba</i>	3	2	3	2	1					3
sp.	3	1	3	1			1	1		3
<i>Lepidium</i>										
<i>didymum</i> *	1		1	1						
<i>draba</i>	4		4				1	3		
<i>Leptospermum laevigatum</i>	38	15	102	6	96	3				10
<i>Leucaena leucocephala</i>	36	3	123	115		11	8			43
<i>Ligustrum</i>										
<i>japonicum</i>	7		8	2		2	6			4
<i>lucidum</i>	12	1	16	5		2	11			6
<i>ovalifolium</i>	3	1	3	2		1	1			1
<i>sinense</i>	8		11	1			10			5
sp.	12	2	13	6		1	7			7
<i>vulgare</i>	3	1	5	3			2			5
<i>Lilium formosanum</i>	15	3	30	18			12			
<i>Limonium sinuatum</i>	10	1	10		5			4	1	2
<i>Linaria</i>										
<i>genistifolia</i> *	1		1				1			
<i>maroccana</i> *	1		3				3			
<i>Litsea glutinosa</i>	8	3	10	10		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	47		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</i>										
<i>dendromorpha</i>	16	1	24	1	19			1	3	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	30		1				16
<i>Manihot</i>										
<i>esculenta</i>	8		10	9			1			1
<i>grahamii</i> #	6		7	7		1				1
<i>Medicago sativa</i> *	2		2	1			1			
<i>Melaleuca</i>										
<i>hypericifolia</i>	1		2		2					
<i>wilsonii</i> #	1		1		1					
<i>Melia azedarach</i>	551	65	2 119	1 394	82	29	588	49	6	674
<i>Melilotus alba</i> *	15		26	2			24			2
<i>Metasequoia glyptostroboides</i> #	1		1				1			1
<i>Metrosideros excelsa</i>	2	1	5		5					3
<i>Mimosa</i>										
<i>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	41		6	5			13
<i>Moringa oleifera</i> #	2		2	2						
<i>Morus alba</i>	129	8	304	192	2	10	109	1		164
<i>Musa</i> sp. #	8		15	15						10
<i>Myoporum tenuifolium</i> subsp. <i>montanum</i>	30		49	2	44	1			3	4

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<i>Myriophyllum aquaticum</i>	48	10	81	39	17		25			81
<i>spicatum</i>	20		23	11	2		9	1		23
<i>Nassella tenuissima</i>	1		2				2			1
<i>trichotoma</i>	12	3	16	12	1		10	1	1	
<i>Nasturtium officinale</i>	50	1	64	19	4	1	38	3		64
<i>Nephrolepis exaltata</i>	13	1	19	12	6	13	1			2
<i>Nerium oleander</i>	23	2	46	16	21		1	4	4	36
<i>Nicandra physalodes</i> *	1		1	1						
<i>Nicotiana glauca</i>	383	14	957	274	168	1	72	206	237	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	5			13	1		10
<i>glazioviana</i> *	1	1	1				1			
<i>indecora</i> *	1		1				1			
<i>jamesii</i> *	15	2	17	7	1		9			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	50			28	4	2	4
<i>engelmannii</i> (= <i>O. lindheimeri</i>)	10	3	15	6			2	7		1
<i>exaltata</i>	6		6	2			3			
<i>ficus-indica</i>	861	57	2 445	1 159	267	8	570	368	81	129
<i>fulgida</i>	11	2	12	7			2	3		
<i>humifusa</i>	25	3	32	18	2		10	2		2
? <i>humifusa</i> / <i>engelmannii</i>	48	4	49	23			17	9		1
<i>imbricata</i>	131	15	151	49	8	3	48	43	3	6
<i>microdasys</i>	9		10	4	3			3		
<i>monacantha</i>	48	1	114	90	22	5	2			17
<i>robusta</i>	225	2	337	61	13		120	130	13	4
sp.	37		39	21	5		10	3		2
<i>spinulifera</i> ?#	1		1	1						
<i>stricta</i>	106	14	193	168	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	274	7			2	82
<i>Parkinsonia aculeata</i>	15		18	12				6		4
<i>Parthenium hysterophorus</i>	15	3	29	29						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	10	9	2	1			12
<i>edulis</i>	32		55	40	6	19	9			12
sp.	19	1	22	13	6	11	3			7
<i>suberosa</i>	6		7	6		2	1			
<i>subpeltata</i>	21	1	26	22		3	4			3
<i>tripartita</i> var. <i>mollissima</i>	4		4		3	1	1			1
<i>Pennisetum clandestinum</i>	48	12	56	12	28	3	14	2		6
<i>purpureum</i>	40	6	87	82			5			30
<i>setaceum</i>	66	17	84	39	20		8	17		2
<i>setaceum/villosum</i>	15	1	15	4	4		6		1	1
sp.	11	4	15				11			
<i>villosum</i>	22	5	26	2	3		14	7		1

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<i>Pereskia aculeata</i>	44	8	102	91	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	17	20	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	35		3	23	1		7
<i>elliottii/taeda</i>	30	1	59	41		2	18			9
<i>halepensis</i>	85	3	136	45	53		33	4	1	9
<i>patula</i>	85	13	238	90		18	148			59
<i>pinaster</i>	85	44	401	34	355	29	4		8	36
<i>pinea</i>	18		35	1	30		4			1
<i>radiata</i>	70	15	206	4	186	20	10		6	16
<i>roxburghii</i>	2		2				2			
sp.	126	14	169	47	47	3	70	3	2	18
<i>taeda</i>	7		11	6			5			3
<i>Pistia stratiotes</i>	24	6	63	60	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	8	11	1	3			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	11	1		10			17
<i>alba/×canescens</i>	185	47	460	171	1	8	283	5		336
<i>deltoides</i>	100	6	169	37	3	1	114	15		117
<i>nigra</i> var. <i>italica</i>	90		120	2	7		94	17		100
<i>×canescens</i>	371	130	939	76	279	4	486	67	31	823
<i>Portulaca oleracea</i> *	2		2	1			1			
<i>Prosopis</i>										
<i>glandulosa</i> var. <i>torreyana</i>	40	10	50	13	2		3	29	3	13
<i>glandulosa/velutina</i>	390	78	1 108	168	63		54	666	156	443
<i>velutina</i>	48	6	53	7	3		1	41	1	18
<i>Prunus</i>										
<i>armeniaca</i>	32		44	1	6		34	2	1	9
<i>persica</i>	319	1	728	115	65	1	530	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	662	9	25	60		1	179
<i>guineense</i>	2		2	2		1				
sp.	36	7	47	44		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	4		3	3		2
<i>Pyracantha</i>										
<i>angustifolia</i>	142	3	285	13	6	2	256	10		78
<i>angustifolia/crenulata</i>	40	3	51	5	2	1	44			5

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<i>Pyracantha</i> (cont.)										
<i>coccinea</i>	6		7				7			2
<i>crenulata</i>	22		31	2		1	29			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	57	5	26		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	1 230	250	30	166	24	31	582
<i>Rivina humilis</i>	7	1	10	10		4				1
<i>Robinia pseudoacacia</i>	110	14	178	13	6	1	145	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	255	3		59
sp. #	3		3	2			1			
<i>Rubus</i>										
<i>cuneifolius</i>	75	35	236	45		6	191			71
<i>flagellaris</i>	3		4		4					1
<i>fruticosus</i>	89	32	244	24	188	14	24		8	71
? <i>pascuus</i>	3	2	3	2			1			
<i>phoenicolasius</i>	4		4			1	4			
<i>rosifolius</i>	14	1	14	9	2	3	3			3
sp.	86	30	179	88	5	12	86			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	140	74	6	1 069	90	8	1 323
<i>caprea</i>	9		12				12			10
<i>fragilis</i>	75	24	176	5	1		169	1		175
<i>Salsola kali/tragus</i>	155	31	187	27	13		23	117	7	2
<i>Salvinia molesta</i>	29	7	44	25	14		5			44
<i>Sambucus</i>										
<i>canadensis</i>	3	1	3	1			2			3
sp.	10		11	2			9			6
<i>Schefflera actinophylla</i> #	1		1	1						
<i>Schinus</i>										
<i>molle</i>	231	2	407	82	49	1	73	156	47	136
<i>terebinthifolius</i>	30	2	90	85	2	9	3			54
<i>Schizolobium parahyba</i> var.	1		1	1						
<i>parahyba</i> #										
<i>Schkuhria pinnata</i> *	4		4	1			3			1
<i>Senna</i>										
<i>bicapsularis</i>	16	1	45	45						31
<i>corymbosa</i>	4		4	2			2			1
<i>didymobotrya</i>	139	29	339	261	3	15	75			115
<i>hirsuta</i>	9		10	10						1
<i>multiglandulosa</i>	11	1	12	6	4	1	2			3
<i>obtusifolia</i>	4		5	5						3
<i>occidentalis</i>	56	4	75	74		1	1			27
<i>pendula</i> var. <i>glabrata</i>	19	2	21	19		2	2			6
<i>septemtrionalis</i>	63		102	84	1	8	17			31
sp.	16		23	12	6	2	5			12
<i>Sesbania</i>										
<i>bispinosa</i> *	1		1				1			1
<i>punicea</i>	323	68	830	405	175	8	238	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	21						12
<i>elaeagnifolium</i>	51	11	60	18	3		21	16	2	4
<i>mauritianum</i>	265	99	1 364	748	86	97	530			419
<i>pseudocapsicum</i> *	6		10	1	8	7	1			5
<i>seaforthianum</i>	30	3	77	75	1	31	1			50
<i>sisymbriifolium</i>	40	3	51	18	3	1	30			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>davidii</i> #	1		1				1			1
<i>Sorghum halepense</i>	41	2	46	26	3	2	11	6		17
<i>Spartium junceum</i>	20	3	43	4	35		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>Symphytotrichum squamatum</i> *	1		1				1			
<i>Syncarpia glomulifera</i>	2		2	2						
<i>Syzygium</i>										
<i>cumini</i>	9	1	14	13		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	66	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	16		8	58	18	85
<i>Taraxacum officinale</i> *	1		1				1			
<i>Tecoma stans</i>	57	4	99	95		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	23						6
<i>Tipuana tipu</i>	24	1	42	33			9			3
<i>Tithonia</i>										
<i>diversifolia</i>	49	5	123	120		10	3			33
<i>diversifolia/rotundifolia</i>	3	1	3	3						
<i>rotundifolia</i>	19	5	28	22		2	6			7
<i>Toona ciliata</i>	23	1	54	51		7	3			10
<i>Torilis arvensis</i> *	1		1	1						
<i>Toxicodendron succedaneum</i>	12	1	14	12		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	2			11	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			93			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.

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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	14				7		5
<i>Vinca major</i> *	1		1		1					
<i>Vitis</i> sp. #	6		12		11		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	30	3		62	8		27
<i>strumarium</i>	149	21	212	126	3	4	72	11		95
<i>Yucca aloifolia</i>	20		22	8	2		9	2		5
<i>Zinnia peruviana</i> *	4		6	5		1	1			

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

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
 filiculoides 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
 bitemata (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, rigput 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
 glaucia 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.) Schltdl. (= *C. purpureum* (Lindl.) Standl.), Solan-
 aceae, crimson cestrum
 laevigatum Schltdl., 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
selloana (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* Hérincq (= *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 Yunc., Convolvulaceae, common dodder
suaveolens Ser., Convolvulaceae, lucerne dodder
- Cyathea cooperi* (Hook. ex F.Muell.) Domin (= *Sphaopteris 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
leucocylon 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 ?#
sideroxylon 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 Lottsy, 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.Burtt (= *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
gardenianum 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
- Hylocereus undatus** (Haw.) Britton & Rose, Cactaceae, night-blooming cereus
- Hypericum**
patulum Thunb. (= *H. patulum* var. *forrestii* Chitt.), Clusiaceae
perforatum L., Clusiaceae, St. John's wort
- Hypochaeris 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
- Koeleruteria 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 honey-suckle
- 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. *paradisiaca* 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. utilisissima* 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
pubida L. var. *hispida* Brenan, 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 Arehav. (= *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 #
Orobancha 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 Flügge, 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 Schumacher, 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
Polygona 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* Baijnath 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, Peeltion 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 tiliifolia* 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 (= *Brassaia 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 Schldl. (= *S. hispidum* auct. non Pers.), Solanaceae, giant devil's fig
elaeagnifolium Cav., Solanaceae, silver-leaf bitter apple
mauritanum 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
viarum 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 (= *Thelechiton 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 ?#
Symphytotrichum 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. neriifolia* 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., Arecaceae, 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 #	spinosum 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
Acacia											
cyclops	Fabaceae	ST (Aus.)	t/s	woo	per	ev	seed		bir, mam	#c/b, bar	sa, fy, sk
dealbata	Fabaceae	ST (Aus.)	t	woo	per	ev	seed	cop	wat, ?ant, ?bir	silc, #bar, orn	sa, fo, gr
decurrens	Fabaceae	ST (Aus.)	t	woo	per	ev	seed	cop	wat, ?ant, ?bir	silc, #bar, orn	gr
longifolia	Fabaceae	ST (Aus.)	t/s	woo	per	ev	seed		wat, bir, ant	#c/b, bar, orn	fy, fo
mearnsii	Fabaceae	ST (Aus.)	t	woo	per	ev	seed	cop	wat, ?ant, ?bir	#silc, bar, orn	sa, fy, fo, gr, sk
melanoxydon	Fabaceae	ST (Aus.)	t	woo	per	ev	seed	suc	bir, wat	#silc, bar, orn	fy, fo
pycnantha	Fabaceae	ST (Aus.)	t	woo	per	ev	seed		wat, mam, ?bir	#silc, c/b, bar, orn	fy
saligna	Fabaceae	ST (Aus.)	t/s	woo	per	ev	seed	cop	wat, mam, ant	silc, agrc, #c/b, bar, orn	sa, fy, fo, sk
Achyranthes aspera	Amaranthaceae	T (?Afr.)	h	her	per	ev/d	seed		mam	none	fo
Agave											
americana var. americana	Agavaceae	T (Am.)	s	suc	per	ev	seed	suc	win, hum	orn, #bar, agrc	sa, nk
sisalana	Agavaceae	T (Am.)	s	suc	per	ev		suc, bul	wat, hum	bar, #agrc, orn	sa
Ageratum											
conyzoides	Asteraceae	T (Am.)	h	her	ann	germ	seed		win	#orn	sa, fo
houstonianum	Asteraceae	T (Am.)	h	her	ann	germ	seed		win	#orn	sa, fo
Argemone											
mexicana	Papaveraceae	T (Am.)	h	her	ann	germ	seed		wat, ?hum (soil), ?ant	none	sa
ochroleuca subsp. ochroleuca	Papaveraceae	T (Am.)	h	her	ann	germ	seed		wat, ?hum (soil), ?ant	none	sa
Arundo donax	Poaceae	NT (Med. & Asia)	g/r	sem	per	ev		rhz, div	wat, hum	#agrc, orn, bar	sa, fy, gr, nk, sk
Atriplex											
inflata	Chenopodiaceae	ST (Aus.)	h	sem	per	ev/d	seed		win	#?agrc	nk, sk
nummularia subsp. nummularia	Chenopodiaceae	ST (Aus.)	s	woo/sem	per	ev/d	seed		win	#agrc, bar	nk, sk
Azolla filiculoides	Azollaceae	T (Am.)	h	her	var	var	spore	div	wat, bir	#orn	gr, nk
Caesalpinia decapetala	Fabaceae	TI (Asia)	s/c	woo	per	ev	seed		wat, ?hum, mam (cattle)	#bar, orn	sa, fo, gr
Cardiospermum											
grandiflorum	Sapindaceae	T (Am.)	c	sem	per	ev/d	seed		wat, win	#orn	sa, fo
halicacabum	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	rhiz	bir, wat	#orn	fo
<i>coronarum</i>	Zingiberaceae	NT (Asia)	h	her	per	ev	seed	rhiz	bir, wat	#orn	fo
<i>gardnerianum</i>	Zingiberaceae	NT (Asia)	h	her	per	ev	seed	rhiz	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>fuscus-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	rhiz, 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

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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; rhiz, 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 d	seed	rhz	?bir	none	nk
<i>mauritanum</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**; **rhiz**, **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.