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Vegetation response to clearing of exotic invasive plants along the Sabie River, South Africa

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Appendix 1. Category 1 – 3 Declared Weed and Alien Invader Plants in South Africa in terms of the Regulations pertaining to the Conservation of Agricultural Resources Act 43 of 1983 as amended.

Declared Weeds & Invaders:Category 1 Plants
Acacia implexa Benth. Screw - pod wattle. Weed
Acacia longifolia (Andr.) Willd. Long - leaved wattle. Weed
Acacia paradoxa DC. Kangaroo wattle. Weed
Acacia pycnantha Benth. Golden wattle. Weed
Achyranthes aspera L. Burweed.Weed
Ageratina adenophora (Spreng.) Crofton weed. Weed
Ageratina riparia (Regel) R.M.King Mistflower. Weed
Ageratum conyzoides L. Invading ageratum. Weed
Ageratum houstonianum Mill Mexican ageratum. Weed
Albizia lebbeck (L.) Benth. Lebbeck tree. Weed
Albizia procera (Roxb.) Benth. False lebbeck. Weed
Alhagi maurorum Medik. Camel thorn bush. Weed
Anredera cordifolia (Ten.) Steenis Madeira vine, Bridal wreath. Weed
Araujia sericifera Brot. Moth catcher. Weed
Argemone mexicana L. Yellow-flowered Mexican poppy. Weed
Argemone ochroleuca Sweet White-flowered Mexican poppy. Weed
Arundo donax L. Giant reed, Spanish reed Weed
Azolla filiculoides Lam. Azolla, Red water fern.. Weed
Bryophyllum delagoense (Eckl.) Chandelier plant. Weed
Caesalpinia decapetala (Roth) Alston Mauritius thorn. Weed
Campuloclinium macrocephalum (Less) DC. Pom pom weed. Weed
Canna indica L. Indian shot Weed
Cardiospermum grandiflorum Sw. Balloon vine. Weed
Cereus jamacaru DC. Queen of the Night. Weed
Cestrum aurantiacum Lindl. Yellow or Orange cestrum. Weed
Cestrum elegans (Brongn.) Schtdl. Crimson cestrum. Weed

Cestrum laevigatum Schtdl. Inkberry. Weed

Cestrum parqui L'Hér. Chilean cestrum. Weed

Chromolaena odorata (L.) R.M.King Triffid weed, Chromolaena. Weed

Cirsium vulgare (Savi) Ten. Spear thistle, Scotch thistle. Weed

Convolvulus arvensis L. Field bindweed, Wild morning glory. Weed

Cortaderia jubata (Lem.) Stapf Pampas grass. Weed

Cortaderia selloana (Schult.) Asch. Pampas grass. Weed

Cuscuta campestris Yunck. Common dodder. Weed

Cuscuta suaveolens Ser. Lucerne dodder Weed

Cytisus monspessulanus L. Montpellier broom. Weed

Cytisus scoparius (L.) Link Scotch broom. Weed

Datura ferox L. Large thorn apple. Weed

Datura innoxia Mill. Downy thorn apple Weed

Datura stramonium L. Common thorn apple Weed

Echinopsis spachiana (Lem.) Fiedrich Torch cactus. Weed

Echium plantagineum L. Patterson's curse. Weed

Echium vulgare L. Blue echium Weed

Egeria densa Planch. Dense water weed. Weed

Eichhornia crassipes (C.Mart.) Solms Water hyacinth Weed

Elodea canadensis Michx. Canadian water weed Weed

Hakea drupacea (C.F.Gaertn.) Roem. Sweet hakea Weed

Hakea gibbosa (Sm.) Cav. Rock hakea Weed

Hakea sericea Schrad. & J.C.Wendl Silky hakea Weed

Harrisia martinii (Labour.) Britton Moon cactus, Harrisia cactus Weed

Hedychium coccineum Sm. Red ginger lily Weed

Hedychium coronarium J. König White ginger lily Weed

Hedychium flavescens Roscoe Yellow ginger lily Weed

Hedychium gardnerianum Kahili ginger lily Weed

Lantana - all seedbearing forms Lantana, Tickberry, Cherry pie Weed

Lepidium draba L. Pepper - cress, Hoary candaria Weed

Leptospermum laevigatum (Gaertn.) Australian myrtle Weed

Litsea glutinosa (Lour.) C.B.Rob. Indian laurel Weed

Lythrum salicaria L. Purple loosestrife Weed

Macfadyena unguis-cati (L.) Cat's claw creeper Weed

Montanoa hibiscifolia Benth. Tree daisy Weed

Myriophyllum aquaticum (Vell.) Verdc. Parrot's feather Weed

Myriophyllum spicatum L. Spiked water-milfoil Weed

Nassella tenuissima (Trin.) Barkworth White tussock Weed

Nassella trichotoma (Nees) Arech. Nassella tussock Weed

Nerium oleander L. Oleander Weed

Nicotiana glauca Graham Wild tobacco Weed

Opuntia aurantiaca Lindl. Jointed cactus Weed

Opuntia exaltata A.Berger Long spine cactus Weed

Opuntia ficus-indica (L.) Mill. Mission or Sweet prickly pear Weed

Opuntia fulgida Engelm. Rosea cactus Weed

Opuntia humifusa (Raf.) Raf. Large flowered prickly pear Weed

Opuntia imbricata (Haw.) DC. Imbricate cactus or prickly pear Weed

Opuntia lindheimeri Engelm. Small round - leaved prickly pear Weed

Opuntia monacantha Haw. Drooping or Cochineal prickly pear Weed

Opuntia spinulifera Salm-Dyck Saucepan cactus Weed

Opuntia stricta (Haw.) Haw. Pest pear of Australia Weed

Orobanche minor Sm. Lesser broomrape, Clover broomrape Weed

Paraserianthes lophantha (Willi.) Australian Albizia, Stink bean Weed

Parthenium hysterophorus L. Parthenium Weed

Passiflora caerulea L. Blue passion flower Weed

Passiflora mollissima (Kunth) Banana poka, Bananadilla Weed

Passiflora suberosa L. Devil's pumpkin, Indigo berry Weed

Passiflora subpeltata Ortega Granadina Weed

Pennisetum setaceum (Forssk.) Fountain grass Weed

Pennisetum villosum R.Br. ex Fresen. Feathertop Weed

Pereskia aculeata Mill. Barbados gooseberry Weed

Pistia stratiotes L. Water lettuce Weed

Pittosporum undulatum Vent. Australian cheesewood Weed

Psidium x durbanensis Baijnath ined. Durban guava Weed

Pueraria lobata (Willd.) Ohwi Kudzu vine Weed

Rhus succedanea L. Wax tree Weed

Rivina humilis L. Rivina, Bloodberry Weed

Rosa rubiginosa L. Eglantine, Sweetbriar Invader

Rubus cuneifolius Pursh and hybrid *R. x proteus* C.H.Stirt.American bramble Weed

Salvinia molesta D.S.Mitch. Kariba weed Weed

Sesbania punicea (Cav.) Benth. Red sesbania Weed

Solanum elaeagnifolium Cav. Silver-leaf bitter apple Weed

Solanum mauritianum Scop. Bugweed Weed

Solanum seaforthianum Andr. Potato creeper Weed

Solanum sisymbriifolium Lam. Wild tomato Weed

Spartium junceum L. Spanish broom Weed

Tecoma stans (L.) Kunth Yellow bells Weed

Thevetia peruviana (Pers.) K.Schum. Yellow oleander Weed

Tithonia diversifolia (Hemsl.) A.Gray Mexican sunflower Weed

Tithonia rotundifolia (Mill.) S.F.Blake Red sunflower Weed

Triplaris americana L. Triplaris, Ant Tree Weed

Ulex europaeus L. European gorse Weed

Xanthium spinasum L. Spiny cocklebur Weed

Xanthium strumarium L . Large cocklebur Weed

Declared Weeds and Invader Plants: Category 2 Plants

Acacia cyclops A.Cunn. ex G.Don Red eye Invader

Acacia decurrens (Wendi.) Willd. Green wattle Invader

Acacia meamsii De Wild. Black wattle Invader

Acacia melanoxylon R.Br. Australian blackwood Invader

Acacia saligna (Labill.) H.L.Wendl. Port Jackson Invader

Agave sisalana Perrine Sisal Invader

Atriplex nummularia Lindl. Old man saltbush Invader

Casuarina cunninghamiana Miq. Beefwood Invader

Casuarina equisetifolia L. Horsetail tree Invader

Eucalyptus camaldulensis Dehnh. Red river gum Invader

Eucalyptus cladocalyx F.Muell. Sugar gum Invader

Eucalyptus diversicolor F.Muell. Karri Invader

Eucalyptus grandis W.Hill ex Maiden Saligna gum, Rose gum Invader

Eucalyptus paniculata Sm. Grey ironbark Invader

Eucalyptus sideroxylon A.Cunn. Black ironbark, Red ironbark Invader

Gleditsia triacanthos L. Honey locust, Sweet locust Invader

Hypericum perforatum L. St. John's wort, Tipton weed Invader

Pinus canariensis C.Sm. Canary pine Invader

Pinus elliotti Engelm. Slash pine Invader

Pinus halepensis Mill. Aleppo pine Invader

Pinus patula Schltdl. & Cham. Patula pine Invader

Pinus pinaster Aiton Cluster pine Invader

Pinus radiata D.Don Radiata pine, Monterey pine Invader

Pinus roxburghii Sarg. Chir pine, longifolia pine Invader

Pinus taeda L. Loblolly pine Invader

Populus alba L. White poplar Invader

Populus x canescens (Aiton) Sm. Grey poplar, Matchwood poplar Invader

*Prosopis glandulosa*Torr. Var. and hybrids Honey mesquite Invader

Prosopis velutina Wooton and hybrids Velvet mesquite Invader

Psidium guajava L. and hybrids Guava Invader

Ricinus communis L Castor - oil plant Invader

Robinia pseudoacacia L. Black locust Invader

Rorippa nasturtium - aquaticum (L.) Watercress Invader

Rubus fruticosus L. agg. European blackberry Invader

Salix babylonica L. Weeping willow Invader

Salix fragilis L. Crack or brittle willow Invader

Sorghum halepense (L.) Pers. Johnson grass, Aleppo grass Invader

Declared Weeds & Invader Plants: Category 3 Plants

Acacia baileyana F.Muell. Bailey's wattle Invader

Acacia elata A.Cunn. ex Benth. Pepper tree wattle Invader

Acacia podalyriifolia A.Cunn. Pearl acacia Invader

Ailanthus altissima (Mill.) Swingle Tree - of - heaven Invader

Atriplex lindleyi Moq. Subsp. inflata Sponge - fruit saltbush Invader

Bauhinia purpurea L. Butterfly orchid tree Invader

Bauhinia variegata L. Orchid tree Invader

Cotoneaster franchetii Boiss. Cotoneaster Invader

Cotoneaster pannosus Franch. Silver - leaf cotoneaster Invader

Eriobotrya japonica (Thunb.) Lindl. Loquat Invader

Grevillea robusta A.Cunn. ex R.Br. Australian silky oak Invader

Ipomoea purpurea (L.) Roth Morning glory Invader

Jacaranda mimosifolia D.Don Jacaranda Invader

Ligustrum japonicum Thunb. Japanese wax - leaved privet Invader

Ligustrum lucidum Aiton Chinese wax - leaved privet Invader

Ligustrum ovalifolium Hassk. Californian privet Invader

Ligustrum sinense Lour. Chinese privet Invader

Ligustrum vulgare L. Common privet Invader

Lilium formosanum A. Wallace St Joseph's lily, Trumpet lily Invader

Melia azedarach L. Syringa, Persian lilac Invader

Metrosideros excelsa Sol. ex Gaertn. New Zealand christmas tree Invader

Mimosa pigra L . Giant sensitive plant Invader

Morus alba L. White or common mulberry Invader

Myoporum tenuifolium G.Forst. Manatoka Invader

Nephrolepis exaltata (L.) Schott Sword fern Invader

Phytolacca dioica L. Belhambra Invader

Plectranthus comosus Sims 'Abyssinian' coleus Invader

Pontederia cordata L. Pickerel weed Invader

Psidium cattleianum Sabine Strawberry guava Invader

Psidium guineense Sw. Brazilian guava Invader

Pyracantha angustifolia (Franch.) Yellow firethorn Invader

Pyracantha crenulata (D.Don) Himalayan firethorn Invader

Senna bicapsularis (L.) Roxb. Rambling cassia Invader

Senna didymobotrya (Fresen.) lrwin Peanut butter cassia Invader

Senna pendula (Willd.) Irwin Invader

Syzygium cumini (L.) Skeels Jambolan Invader

Syzygium jambos (L.) Alston Rose apple Invader

Tipuana tipu (Benth.) Kuntze Tipu tree Invader

Toona ciliata M.Roem. Toon tree Invader

APPENDIX 2. Study Site Labels and GPS Coordinate Locations using the following settings: Cape Datum; SDI Scale = ±0.25; and units presented in Statuate (hdddºmm.mm').

Example: **H H C 2** - **H**igh/**L**ow altitude; **H**igh/**L**ow invasion intensity;
Cleared/**U**ncleared treatment; Plot number **2**.

High altitude plots	**Low altitude plots**
1 - H H C 2 - S 25º 13.65 E 30º 68.19	21 - L L U 1 - S 25º 05.90 E 30º 91.14
2 - H H C 3 - S 25º 13.62 E 30º 68.38	22 - L H C 1 - S 25º 05.90 E 30º 91.14
3 - H L C 2 - S 25º 13.62 E 30º 68.38	23 - L H C 2 - S 25º 05.90 E 30º 91.14
4 - H H C 4 - S 25º 13.33 E 30º 68.80	24 - L H U 1 - S 25º 05.90 E 30º 91.14
5 - H H C 1 - S 25º 13.30 E 30º 69.03	25 - L L U 2 - S 25º 06.34 E 30º 90.87
6 - H L C 3 - S 25º 12.96 E 30º 69.48	26 - L H C 4 - S 25º 06.22 E 30º 90.85
7 - H L C 4 - S 25º 12.96 E 30º 69.48	27 - L H C 5 - S 25º 06.22 E 30º 90.85
8 - H L C 1 - S 25º 12.55 E 30º 70.43	28 - L H U 4 - S 25º 06.283 E 30º 90.59
9 - H H U 1 - S 25º 12.55 E 30º 70.43	29 - L H U 5 - S 25º 06.28 E 30º 90.59
10 - H H U 2 - S 25º 12.55 E 30º 70.43	30 - L L U 3 - S 25º 06.28 E 30º 90.59
11 - H L U 1 - S 25º 10.77 E 30º 79.86	31 - L H U 2 - S 25º 06.28 E 30º 90.59
12 - H H U 5 - S 24º 95.39 E 30º 88.98	32 - L L C 1 - S 25º 06.15 E 30º 89.78
13 - H H C 5 - S 24º 95.45 E 30º 89.42	33 - L L C 3 - S 25º 06.15 E 30º 89.78
14 - H H U 3 - S 24º 95.45 E 30º 89.42	34 - L L C 4 - S 25º 05.98 E 30º 88.72
15 - H H U 4 - S 24º 95.45 E 30º 89.42	35 - L L C 5 - S 25º 05.98 E 30º 88.72

High altitude plots	Low altitude plots
Appendix 2. Continued…….	
16 - H L U 2 - S 24º 95.45	36 - L L C 2 - S 25º 05.98
E 30º 89.42	E 30º 88.72
17 - H L C 5 - S 24º 95.54	37 - L H C 3 - S 25º 05.84
E 30º 90.90	E 30º 88.27
18 - H L U 3 - S 24º 95.41	38 - L L U 4 - S 25º 05.78
E 30º 91.56	E 30º 87.70
19 - H L U 4 - S 24º 95.39	39 - L L U 5 - S 25º 05.78
E 30º 91.72	E 30º 87.70
20 - H L U 5 - S 24º 95.39	40 - L L U 3 - S 25º 04.96
E 30º 91.72	E 30º 87.70

Appendix 3. Probability values for percentage ground cover estimates of soil, litter, grass, herbaceous vegetation, rock and depth of litter for the three-way ANOVA's on invasion (INV), altitude (ALT) and management (MAN). *d.f.* = 1,32 for all main effects and interaction terms. $P < 0.05$ indicated in **BOLD**.

Variable	ALT	MAN	MAN*ALT	INV	ALT*INV	MAN*INV	MAN*ALT*INV
Soil (%)	0.079	0.424	0.603	0.424	0.242	0.095	0.569
Litter (%)	0.236	**0.004**	**0.037**	**0.042**	0.397	0.149	0.478
Herbaceous (%)	0.755	**0.005**	**0.038**	**0.013**	0.7985	0.477	**0.028**
Rock (%)	0.518	0.871	0.131	0.936	0.152	0.746	0.468
Grass (%)	0.652	0.813	**0.001**	0.488	0.841	0.555	0.087
Depth of litter (cm)	0.084	0.015	0.238	0.377	0.714	0.352	0.234

Appendix 4. Differences in soil physical characteristics tested by three-way ANOVA's with repeated measures (depth) for altitude (ALT), invasion intensity (INV) and clearing (MAN). *d.f.* = 1,32 for all main effects and interaction terms. Bold text indicates $P < 0.05$.

Soil Characteristic	ALT	INV	MAN	ALT *INV	ALT *MAN	INV *MAN	ALT *INV *MAN	Depth	Depth *ALT	Depth *INV	Depth *MAN	Depth *ALT *INV	Depth *ALT *MAN	Depth *INV *MAN	Depth* ALT* INV* MAN
Soil organic matter (%)	**0.0001**	0.605	0.235	0.099	**0.044**	0.956	0.462	**0.0001**	0.103	0.841	0.423	0.923	0.291	0.582	0.856
pH	0.693	0.067	0.260	0.370	0.591	0.972	0.490	**0.016**	0.143	0.776	0.847	0.272	0.847	0.574	0.337
Clay (< 2 μm)	**0.047**	0.140	**0.005**	**0.0001**	0.121	0.433	**0.025**	0.442	0.143	0.520	0.637	0.216	0.809	0.550	0.712
Silt (< 20 μm)	**0.001**	0.145	**0.027**	0.410	0.490	0.876	0.796	0.137	0.406	0.767	**0.022**	0.768	**0.037**	0.565	0.746
Silt (> 20 μm)	0.138	**0.025**	0.393	0.068	0.891	0.319	0.301	0.378	0.113	0.841	0.715	0.113	0.127	0.698	0.112
Sand (> 50 μm)	**0.001**	**0.017**	**0.003**	0.067	0.288	0.774	0.091	0.112	0.328	0.575	**0.019**	0.908	0.934	0.824	0.490
Gravel (> 2000 μm	**0.0002**	**0.025**	0.309	0.110	0.873	0.333	0.378	**0.0004**	**0.025**	0.851	0.174	0.812	0.280	0.613	0.842

Appendix 5. Soil elements as oxides, (mean ± S.E.) found under different altitudes, invasion intensities and management treatments for both A (0 -10 cm) and B (10 - 20 cm) horizons. Means with the same superscript letter within row are not significantly different ($P < 0.05$, Ryan's Q).

Treatment	Soil horizon	High Altitude				Low Altitude			
		High invasion		Low invasion		High invasion		Low invasion	
Oxides		Cleared	Uncleared	Cleared	Uncleared	Cleared	Uncleared	Cleared	Uncleared
Al_2O_3 (%)	A	23.0 ± 1.9^{a}	19.0 ± 1.9^{ab}	18.4 ± 1.0^{ab}	15.4 ± 1.3^{bc}	15.1 ± 2.8^{bc}	11.1 ± 1.5^{c}	16.6 ± 0.5^{abc}	15.0 ± 0.7^{bc}
	B	24.6 ± 2.2^{a}	17.6 ± 1.8^{ab}	19.3 ± 1.4^{ab}	16.2 ± 1.4^{bc}	13.6 ± 2.5^{bc}	10.2 ± 2.0^{c}	18.1 ± 0.8^{ab}	15.5 ± 0.8^{bc}
CaO (%)	A	0.3 ± 0.1^{a}	0.3 ± 0.2^{a}	0.5 ± 0.1^{a}	0.2 ± 0.0^{a}	0.3 ± 0.1^{a}	0.2 ± 0.1^{a}	0.3 ± 0.1^{a}	0.0 ± 0.0^{a}
	B	0.3 ± 0.1^{ab}	0.1 ± 0.1^{ab}	0.4 ± 0.1^{a}	0.1 ± 0.0^{b}	0.2 ± 0.1^{ab}	0.1 ± 0.0^{b}	0.2 ± 0.1^{ab}	0.2 ± 0.0^{ab}
Fe_2O_3 (%)	A	13.6 ± 1.7^{a}	9.3 ± 1.5^{abc}	12.4 ± 1.6^{ab}	7.8 ± 1.7^{abc}	7.7 ± 1.6^{abc}	10.6 ± 1.8^{abc}	6.7 ± 1.0^{bc}	4.7 ± 0.3^{c}
	B	13.8 ± 1.8^{a}	8.0 ± 2.0^{abc}	12.2 ± 2.0^{ab}	7.5 ± 2.0^{abc}	9.5 ± 2.0^{abc}	10.4 ± 1.8^{abc}	6.4 ± 0.8^{bc}	4.8 ± 0.4^{c}
K_2O (%)	A	1.7 ± 0.3^{bc}	0.7 ± 0.3^{c}	2.2 ± 0.1^{ab}	1.3 ± 0.4^{bc}	1.9 ± 0.2^{ab}	1.9 ± 0.4^{ab}	2.1 ± 0.1^{ab}	3.0 ± 0.1^{a}
	B	1.8 ± 0.3^{abc}	0.6 ± 0.3^{c}	2.2 ± 0.3^{ab}	1.4 ± 0.5^{bc}	1.7 ± 0.2^{bc}	1.8 ± 0.4^{abc}	2.3 ± 0.1^{ab}	3.0 ± 0.1^{a}
MgO (%)	A	0.5 ± 0.2^{a}	0.4 ± 0.3^{a}	0.9 ± 0.1^{a}	0.4 ± 0.1^{a}	0.3 ± 0.1^{a}	0.4 ± 0.1^{a}	0.3 ± 0.1^{a}	0.3 ± 0.0^{a}
	B	0.5 ± 0.2^{a}	0.4 ± 0.3^{a}	0.8 ± 0.1^{a}	0.3 ± 0.1^{a}	0.3 ± 0.1^{a}	0.4 ± 0.1^{a}	0.3 ± 0.1^{a}	0.4 ± 0.0^{a}
MnO (%)	A	0.2 ± 0.1^{a}	0.2 ± 0.1^{a}	0.3 ± 0.1^{a}	0.1 ± 0.1^{a}	0.1 ± 0.0^{a}	0.2 ± 0.0^{a}	0.2 ± 0.0^{a}	0.1 ± 0.0^{a}
	B	0.2 ± 0.0^{a}	0.1 ± 0.1^{a}	0.2 ± 0.1^{a}	0.1 ± 0.1^{a}	0.1 ± 0.0^{a}	0.2 ± 0.0^{a}	0.2 ± 0.1^{a}	0.1 ± 0.0^{a}
Na_2O (%)	A	0.3 ± 0.0^{ab}	0.2 ± 0.1^{b}	0.4 ± 0.1^{ab}	0.3 ± 0.1^{ab}	0.6 ± 0.2^{ab}	0.3 ± 0.2^{ab}	0.4 ± 0.0^{ab}	0.7 ± 0.1^{a}
	B	0.3 ± 0.0^{b}	0.2 ± 0.1^{b}	0.4 ± 0.1^{ab}	0.3 ± 0.1^{b}	0.4 ± 0.2^{ab}	0.3 ± 0.2^{ab}	0.5 ± 0.0^{ab}	0.8 ± 0.1^{a}
P_2O_5 (%)	A	0.2 ± 0.0^{a}	0.2 ± 0.0^{a}	0.2 ± 0.0^{a}	0.2 ± 0.0^{ab}	0.1 ± 0.0^{c}	0.1 ± 0.0^{bc}	0.1 ± 0.0^{bc}	0.1 ± 0.0^{c}
	B	0.2 ± 0.0^{a}	0.1 ± 0.0^{bcd}	0.2 ± 0.0^{ab}	0.1 ± 0.0^{abc}	0.1 ± 0.0^{d}	0.1 ± 0.0^{cd}	0.1 ± 0.0^{cd}	0.1 ± 0.0^{cd}
SiO_2 (%)	A	48.8 ± 3.6^{d}	58.3 ± 2.4^{cd}	59.4 ± 5.2^{cd}	70.1 ± 4.1^{bc}	80.5 ± 3.4^{ab}	82.1 ± 2.3^{ab}	76.2 ± 2.2^{ab}	84.0 ± 3.1^{a}
	B	47.6 ± 3.6^{c}	70.9 ± 5.2^{ab}	60.3 ± 6.1^{bc}	72.8 ± 5.5^{ab}	81.7 ± 1.7^{a}	86.5 ± 2.5^{a}	75.4 ± 2.8^{ab}	84.1 ± 2.8^{a}
TiO_2 (%)	A	1.4 ± 0.1^{a}	0.9 ± 0.1^{bc}	1.3 ± 0.2^{ab}	1.0 ± 0.1^{abc}	0.5 ± 0.1^{d}	0.6 ± 0.1^{cd}	0.8 ± 0.1^{cd}	0.6 ± 0.1^{cd}
	B	1.5 ± 0.1^{a}	0.9 ± 0.1^{cd}	1.3 ± 0.2^{ab}	1.1 ± 0.2^{abc}	0.5 ± 0.1^{d}	0.6 ± 0.1^{cd}	0.9 ± 0.1^{bcd}	0.7 ± 0.1^{cd}

Appendix 6. Probability values for soil chemical elements (XRF data) from three way ANOVA=s with repeated measures (depth) for altitude (ALT), invasion intensity (INV) and clearing (MAN). *d.f.* = 1,32 for all main effects and interaction terms. Bold text indicates $P < 0.05$.

Soil Characteristic	ALT	INV	MAN	ALT* INV	ALT* MAN	INV* MAN	ALT* INV* MAN	Depth	Depth* ALT	Depth* INV	Depth* MAN	Depth *ALT *INV	Depth *ALT *MAN	Depth *INV *MAN	Depth* INV* ALT* MAN
Al_2O_3 (%)	**0.0001**	0.992	**0.003**	**0.002**	0.546	0.360	0.834	0.594	0.466	0.059	0.265	0.329	0.372	0.681	0.133
CaO (%)	0.148	0.896	**0.016**	0.810	0.059	0.381	0.117	**0.001**	0.591	0.399	0.907	0.811	0.475	0.210	0.374
Fe_2O_3 (%)	**0.005**	**0.015**	**0.022**	0.188	**0.019**	0.404	0.319	0.899	0.490	0.754	0.455	0.571	0.976	0.335	0.814
K_2O (%)	**0.0002**	**0.001**	0.134	0.609	**0.001**	0.198	0.600	0.999	0.840	0.244	0.707	0.654	0.919	0.939	0.502
MgO (%)	**0.043**	0.540	0.237	0.400	0.075	0.207	0.385	0.932	0.471	0.754	0.726	0.232	0.899	0.707	0.550
MnO (%)	0.348	0.851	0.268	0.569	0.274	0.053	0.738	0.072	0.291	0.995	0.413	0.895	0.675	0.642	0.823
Na_2O (%)	**0.004**	**0.027**	0.687	0.700	0.174	0.095	0.093	0.500	0.544	0.250	0.482	0.298	0.337	0.574	0.476
P_2O_5 (%)	**0.0001**	0.706	**0.046**	0.252	0.069	0.836	0.182	**0.0001**	0.111	0.280	0.146	0.753	0.280	0.111	0.646
SiO_2 (%)	**0.0001**	0.302	**0.0003**	**0.025**	0.254	0.802	0.332	**0.021**	0.326	0.105	**0.020**	0.991	0.282	0.101	0.449
TiO_2 (%)	**0.0001**	0.215	**0.003**	0.187	**0.029**	0.745	**0.038**	0.615	0.625	0.745	0.799	0.755	0.552	0.363	0.675

Appendix 7. Probability values for soil trace elements (XRF data) from three-way ANOVA's of altitude (ALT), invasion (INV) and management / clearing treatment (MAN) for soil depths 0 - 10 cm (A) and 10 - 20 (B). *d.f.* = 1,32 for all main effects and interaction terms. Bold text indicates $P > 0.05$.

Soil characteristic	Soil horizon	ALT	INV	MAN	ALT* INV	ALT* MAN	INV* MAN	ALT*INV*MAN
As ($\mu g.g^{-1}$)	A	**0.005**	**0.013**	0.375	**0.015**	0.726	0.245	0.392
	B	**0.036**	**0.002**	0.472	**0.005**	0.889	0.882	0.598
Ba ($\mu g.g^{-1}$)	A	0.569	**0.010**	**0.005**	0.252	**0.001**	0.271	0.649
	B	0.947	**0.014**	**0.006**	0.518	**0.002**	0.712	0.623
Co ($\mu g.g^{-1}$)	A	0.187	0.890	0.012	0.498	**0.016**	0.272	0.570
	B	0.395	0.902	**0.036**	0.339	**0.072**	0.183	0.717
Cr ($\mu g.g^{-1}$)	A	**0.0001**	0.167	0.403	0.913	**0.011**	0.094	0.499
	B	**0.0003**	0.152	0.138	0.963	**0.032**	0.149	0.514
Cu ($\mu g.g^{-1}$)	A	0.998	0.230	0.270	0.059	**0.041**	0.127	0.260
	B	0.863	0.081	0.099	0.061	0.089	0.308	0.586
Mo ($\mu g.g^{-1}$)	A	0.226	0.116	0.399	0.511	0.638	0.399	0.638
	B	**0.017**	**0.004**	0.255	0.440	0.052	0.769	0.769
Ni ($\mu g.g^{-1}$)	A	0.054	0.637	0.172	0.337	**0.030**	0.106	0.352
	B	0.052	0.278	0.084	0.350	**0.047**	0.176	0.499
Pb ($\mu g.g^{-1}$)	A	1.000	0.055	0.965	0.726	0.726	0.570	0.793
	B	0.589	0.045	0.076	0.570	0.750	0.945	0.051
Rb ($\mu g.g^{-1}$)	A	**0.005**	0.066	**0.012**	0.940	**0.001**	0.590	0.777
	B	**0.010**	0.053	**0.003**	0.500	**0.001**	0.478	0.789

Appendix 8. Soil organic matter, pH and soil physical characteristics tested for significant differences using three-way ANOVA's for altitude (ALT), invasion (INV) and management (MAN) for soil horizons, 0 - 10 cm (A) and 10 - 20 (B). *d.f.* = 1,32 for all main effects and interaction terms. Bold text indicates $P < 0.05$.

Soil Characteristic	Soil horizon	ALT	INV	MAN	ALT*INV	ALT*MAN	INV*MAN	ALT*INV*MAN
Soil organic matter (%)	A	**0.0001**	0.624	0.219	0.162	**0.047**	0.826	0.582
	B	**0.0001**	0.627	0.330	0.077	0.073	0.864	0.376
pH	A	0.364	0.123	0.342	0.255	0.736	0.797	0.889
	B	0.675	0.073	0.275	0.739	0.497	0.779	0.206
Clay (< 2 μm)	A	**0.014**	0.102	**0.017**	**0.001**	0.127	0.666	0.058
	B	0.276	0.318	**0.008**	**0.0001**	0.213	0.344	**0.035**
Silt (< 20 μm)	A	**0.003**	0.211	0.425	0.449	0.730	0.909	0.946
	B	**0.001**	0.165	0.001	0.476	0.058	0.625	0.648
Silt (> 20 μm)	A	0.316	0.080	0.696	0.269	0.290	0.340	0.089
	B	0.203	0.092	0.077	0.086	0.334	0.594	0.759
Sand (> 50 μm)	A	**0.003**	**0.033**	0.172	0.161	0.382	0.744	0.102
	B	**0.007**	**0.039**	**0.0001**	0.064	0.319	0.876	0.198
Gravel (>2000 μm)	A	**0.0001**	0.095	0.933	0.214	0.464	0.340	0.471
	B	**0.047**	0.062	0.061	0.211	0.509	0.625	0.525

Appendix 9. Regression relationships of invasive species basal cover and density with aerial cover used to determine pre-clearing invasion intensity in plots cleared of exotic species. "-" indicates no data available, "#" indicates regression relationship used. Transformations used in the table below were Log_{10} transformations.

Final results		Bugweed		Eucalypt		Pine		Total	
Variables	Data	equation	r^2	equation	r^2	equation	r^2	equation	r^2
Density vs. aerial cover	untransformed	5.06+(104.48*X)	# 0.52	13.27+(281.11*X)	# 0.56	1.42+(20.08*X)	0.03	33.93+(-306.99*X)	0.03
	transformed	5.06+(104.49*X)	0.51	13.26+(281.18*X)	0.56	0.002*exp(94.25*X)	# 0.17	33.96+(-307.37*X)	0.03
Basal cover vs. aerial cover	untransformed	-	-	39.66+(-3226.25*X)	0.13	1.43+(9903.85*X)	0.04	16.66+(60007.59*X)	# 0.44
	transformed	-	-	39.87+(-3255.82*X)	0.13	4.33+(-27499.51*X)	0.12	108.52+10.37*LOG(X)	0.44

Appendix 10. Mean and S.E. for pre- and post-clearing aerial cover of total exotic vegetation and two exotic weed species, *Eucalypus grandis* and *Solanum mauritianum*. Values with the same superscript letter are not significantly different using Ryan's Q post-hoc test ($p < 0.05$).

Treatment	High Altitude				Low Altitude			
	High Invasion		Low Invasion		High Invasion		Low Invasion	
	Cleared	Uncleared	Cleared	Uncleared	Cleared	Uncleared	Cleared	Uncleared
% aerial cover								
Total exotic pre-clearing	72 ± 1^{a}	72 ± 8^{a}	52 ± 3^{ab}	11 ± 4^{c}	65 ± 5^{a}	69 ± 11^{a}	23 ± 10^{bc}	23 ± 7^{bc}
Total exotic post clearing	21 ± 12^{b}	72 ± 8^{a}	3 ± 1^{b}	11 ± 4^{b}	29 ± 8^{b}	69 ± 11^{a}	11 ± 4^{b}	23 ± 7^{b}
S. mauritianum pre-clearing	5 ± 2^{a}	15 ± 7^{a}	8 ± 1^{a}	3 ± 1^{a}	24 ± 8^{a}	32 ± 17^{a}	5 ± 2^{a}	18 ± 5^{a}
S. mauritianum post clearing	3 ± 2^{a}	15 ± 7^{a}	3 ± 1^{a}	3 ± 1^{a}	15 ± 5^{a}	32 ± 17^{a}	5 ± 2^{a}	18 ± 5^{a}
E. grandis pre-clearing	63 ± 4^{a}	71 ± 9^{a}	15 ± 7^{b}	7 ± 3^{b}	64 ± 13^{a}	43 ± 8^{ab}	18 ± 8^{b}	4 ± 2^{b}
E. grandis post clearing	18 ± 13^{bc}	71 ± 9^{a}	1 ± 1^{c}	7 ± 3^{c}	14 ± 6^{bc}	43 ± 8^{b}	2 ± 1^{c}	4 ± 2^{c}

Appendix 11. Means and S.E. for percentage aerial cover of total, indigenous, exotic vegetation and various common species from plots under different experimental categories. "–" indicates not present. Values with same superscript letters in the same row indicate no significant differences using Ryan's Q post-hoc test.

Treatment		High Altitude				Low Altitude			
		High Invasion		Low Invasion		High Invasion		Low Invasion	
% Aerial cover		Cleared	Uncleared	Cleared	Uncleared	Cleared	Uncleared	Cleared	Uncleared
Total	Total	36 ± 11^{a}	83 ± 5^{a}	49 ± 17^{a}	62 ± 12^{a}	49 ± 8^{a}	81 ± 10^{a}	72 ± 13^{a}	77 ± 6^{a}
	> 5 m	17 ± 14^{b}	80 ± 7^{a}	29 ± 18^{b}	11 ± 2^{b}	3 ± 1^{b}	37 ± 11^{b}	40 ± 15^{ab}	45 ± 4^{ab}
	2 - 5 m	16 ± 5^{b}	23 ± 7^{b}	19 ± 8^{b}	26 ± 10^{b}	22 ± 1^{b}	60 ± 11^{a}	40 ± 7^{ab}	41 ± 2^{ab}
	< 2 m	10 ± 3^{a}	12 ± 10^{a}	13 ± 7^{a}	34 ± 12^{a}	21 ± 7^{a}	11 ± 3^{a}	12 ± 6^{a}	12 ± 5^{a}
Indigenous vegetation	Total	14 ± 9^{b}	11 ± 4^{b}	45 ± 16^{ab}	51 ± 13^{ab}	20 ± 1^{ab}	12 ± 7^{b}	61 ± 13^{a}	54 ± 8^{ab}
	> 5 m	5 ± 3^{a}	13 ± 5^{a}	28 ± 17^{a}	6 ± 3^{a}	2 ± 1^{a}	9 ± 6^{a}	36 ± 15^{a}	38 ± 6^{a}
	2 - 5 m	9 ± 6^{ab}	5 ± 2^{b}	18 ± 9^{ab}	22 ± 11^{ab}	7 ± 3^{ab}	15 ± 5^{ab}	37 ± 8^{a}	28 ± 6^{ab}
	< 2 m	7 ± 4^{a}	10 ± 10^{a}	12 ± 7^{a}	32 ± 13^{a}	7 ± 2^{a}	7 ± 3^{a}	8 ± 6^{a}	11 ± 5^{a}
Exotic vegetation	Total	21 ± 12^{b}	72 ± 8^{a}	3 ± 1^{b}	11 ± 4^{b}	29 ± 8^{b}	69 ± 11^{a}	11 ± 4^{b}	23 ± 7^{b}
	> 5 m	13 ± 12^{b}	67 ± 9^{a}	1 ± 1^{b}	5 ± 3^{b}	1 ± 1^{b}	28 ± 12^{b}	4 ± 4^{b}	7 ± 3^{b}
	2 - 5 m	6 ± 3^{b}	18 ± 6^{b}	1 ± 1^{b}	4 ± 2^{b}	15 ± 4^{b}	46 ± 13^{a}	4 ± 2^{b}	13 ± 4^{b}
	< 2 m	3 ± 2^{b}	2 ± 1^{b}	1 ± 0^{b}	2 ± 0^{b}	14 ± 5^{a}	4 ± 2^{b}	4 ± 2^{b}	2 ± 1^{b}
Solanum mauritianum	Total	3 ± 2^{a}	15 ± 7^{a}	3 ± 1^{a}	3 ± 1^{a}	15 ± 5^{a}	32 ± 17^{a}	5 ± 2^{a}	18 ± 5^{a}
	> 5 m	1 ± 1	-	1 ± 1	-	-	-	-	3 ± 1
	2 - 5 m	0 ± 0^{a}	13 ± 6^{a}	1 ± 1^{a}	2 ± 1^{a}	8 ± 2^{a}	30 ± 17^{a}	3 ± 2^{a}	12 ± 4^{a}
	< 2 m	3 ± 2^{a}	2 ± 1^{a}	1 ± 1^{a}	1 ± 0^{a}	7 ± 3^{a}	2 ± 1^{a}	2 ± 2^{a}	3 ± 1^{a}
Eucalyptus grandis	Total	18 ± 13^{bc}	71 ± 9^{a}	1 ± 1^{c}	7 ± 1^{c}	14 ± 6^{c}	43 ± 8^{b}	2 ± 1^{c}	4 ± 2^{c}
	> 5 m	12 ± 12	66 ± 9	-	5 ± 3	1 ± 1	32 ± 10	-	4 ± 2
	2 - 5 m	6 ± 3	5 ± 2	1 ± 1	2 ± 1	6 ± 5	9 ± 5	0 ± 0	-
	< 2 m	0 ± 0	-	0 ± 0	-	7 ± 3	2 ± 1	1 ± 1	-

Treatment		High Altitude				Low Altitude			
		High Invasion		Low Invasion		High Invasion		Low Invasion	
% Aerial cover		Cleared	Uncleared	Cleared	Uncleared	Cleared	Uncleared	Cleared	Uncleared
App 11. Cont.									
Pinus patula	Total	1 ± 1	1 ± 1	-	1 ± 1	0 ± 0	3 ± 2	4 ± 4	1 ± 1
	> 5 m	1 ± 1	1 ± 1	-	-	0 ± 0	3 ± 2	4 ± 4	1 ± 1
	2 - 5 m	-	-	-	0 ± 0	-	-	-	0 ± 0
	< 2 m	-	-	-	1 ± 1	-	-	-	-
Buddleja	Total	-	-	1 ± 1	14 ± 11	-	-	-	-
	> 5 m	-	-	1 ± 1	1 ± 1	-	-	-	-
	2 - 5 m	-	-	0 ± 0	13 ± 9	-	-	-	-
	< 2 m	-	-	-	-	-	-	-	-
Acacia ataxacantha	Total	-	1 ± 1	24 ± 17	-	5 ± 3	3 ± 2	3 ± 2	18 ± 11
	> 5 m	-	1 ± 1	21 ± 14	-	1 ± 1	-	3 ± 3	12 ± 7
	2 - 5 m	-	0 ± 0	3 ± 2	-	4 ± 2	3 ± 2	-	5 ± 3
	< 2 m	-	-	1 ± 1	-	1 ± 1	-	-	0 ± 0
Unidentified Species 22c	Total	7 ± 7	-	-	-	1 ± 1	-	-	1 ± 1
	> 5 m	-	-	-	-	-	-	-	-
	2 - 5 m	3 ± 3	-	-	-	-	-	-	-
	< 2 m	4 ± 4	-	-	-	1 ± 1	-	-	1 ± 1
Unidentified Species 22d	Total	2 ± 2	-	1 ± 1	14 ± 6	0 ± 0	-	-	-
	> 5 m	-	-	-	-	-	-	-	-
	2 - 5 m	2 ± 2	-	-	2 ± 1	0 ± 0	-	-	-
	< 2 m	-	-	1 ± 1	12 ± 6	-	-	-	-

Appendix 12. Letter from the Directorate: Plant and Quality Control, National Department of Agriculture on seed identification.

AGR 02/002

Republiek van Suid-Afrika
Nasionale Departement van Landbou

IRiphabliki yoMzantsi-Afrika
ISebe lezoLimo likaZwelonke

I-Riphabliki yaseNingizimu Africa
UMnyango kaZwelonke wezoLimo

Repabliki ya Afrika-Borwa
Kgoro-kgolo ya Temo

Republic of South Africa
National Department of Agriculture

Direktoraat: Plant- en Gehaltebeheer
Directorate: Plant and Quality Control

Privaatsak/Private Bag X258, PRETORIA 0001

02/09/1997

R Garner
WITS UNIVERSITY
DEPT. BOTANY

Dear Richard

SEED IDENTIFICATION

The seeds I received from you were identified as follows:

A01	*Smilax* sp. (*kraussiana* ?)	LILIACEAE / SMILACACEAE
A02	Unknown species	
A03	*Pavonia* cf. *columella* Cav.	MALVACEAE
A04	*Passiflora* sp.	PASSIFLORACEAE
A05	*Senna* cf. *septemtrionalis* (Viv.) Irwin & Barneby syn. *Cassia* cf. *floribunda*	FABACEAE
A06	cf. *Entada* sp. (*spicata* ?)	FABACEAE
A07	cf. *Robinia* sp.	FABACEAE
A08	cf. *Turraea* sp.	MELIACEAE
A09	*Helinus* cf. *integrifolius* (Lam.) Kuntze	RHAMNACEAE
A10	*Eriosema* sp.	FABACEAE
A11	Unknown Fabaceae	

Herewith the seed back.

Regards

DIRECTOR:
DIRECTORATE OF PLANT & QUALITY CONTROL

Enquiries: Ms A GILDENHUYS ☎ (012) 3196711
Reference No. 16/3/2 🖷 (012) 3196701 (Int. Fax: +2712)

Appendix 13. Species list, presence/absence and richness per experimental category for all seeds and capsules greater than 0.1 cm in diameter found in the litter and soil, down to 4 cm depth of burial.

Treatment	High Altitude				Low Altitude			
Species	High Invasion		Low Invasion		High Invasion		Low Invasion	
	Cleared	Uncleared	Cleared	Uncleared	Cleared	Uncleared	Cleared	Uncleared
Woody species								
Eucalyptus grandis (capsules)	1	1	1	1	1	1	1	1
Solanum mauritianum	1	1	1	1	1	1	1	1
Clutia monticola	1	1	1	1	1	1	1	1
Acacia ataxacantha	0	1	1	1	1	1	1	1
Species number	3	4	4	4	4	4	4	4
Herbaceous species								
Ipomoea spp.	1	1	1	1	1	1	1	1
Unknown Poaceae	1	1	1	1	1	1	1	1
Big Brown seed sp.	0	0	1	0	1	1	1	1
Senna septemtrionalis	0	0	1	0	0	1	1	0
Passiflora edulis	1	1	1	1	1	1	1	1
Big round sp.	0	1	0	1	1	0	1	1
Helinus sp.	1	1	1	1	0	1	1	1
cf. *Turraea* sp.	0	1	1	0	1	0	1	1
Robinia sp.	1	1	1	1	1	1	0	1
Eriosema sp.	1	0	1	1	0	1	1	1
Pavonia cf. *columella*	1	1	1	1	1	0	1	1
Bidens pilosa	0	0	0	0	0	0	0	1
Unknown Fabaceae	1	0	0	0	0	0	1	0
Smilax anceps	0	1	0	0	0	0	0	1
Round Black	0	1	0	0	0	0	0	1
cf. *Entada* sp.	0	0	0	0	0	0	0	1
Species number	8	10	10	8	8	8	11	14
Total Species number	11	14	14	12	12	12	15	18

Appendix 14. Mean and S.E. for all species of seed and capsules found in the soil seed bank for litter, 0 - 2 cm and 2 - 4 cm depth of burial for each treatment category in the experimental design. Values with the same superscript letter are not significantly different using a one-way ANOVA and Ryan's Q post hoc test ($P < 0.05$).

Treatment		High Altitude				Low Altitude			
		High Invasion		Low Invasion		High Invasion		Low Invasion	
		Cleared	Uncleared	Cleared	Uncleared	Cleared	Uncleared	Cleared	Uncleared
Species	Depth								
Eucalyptus grandis (capsules)	Litter	244 ± 138^{ab}	1001 ± 304^{a}	250 ± 179^{ab}	63 ± 19^{ab}	514 ± 162^{ab}	87 ± 42^{ab}	450 ± 219^{ab}	83 ± 56^{b}
	0 - 2 cm	77 ± 67^{a}	226 ± 79^{a}	92 ± 50^{a}	38 ± 24^{a}	283 ± 81^{a}	22 ± 11^{a}	132 ± 55^{a}	79 ± 72^{a}
	2 - 4 cm	146 ± 113^{a}	102 ± 19^{a}	30 ± 14^{a}	12 ± 7^{a}	116 ± 39^{a}	4 ± 2^{a}	141 ± 62^{a}	39 ± 17^{a}
Solanum mauritianum	Litter	24 ± 7^{abc}	16 ± 6^{abc}	7 ± 2^{abc}	7 ± 5^{bc}	181 ± 106^{bc}	64 ± 21^{ab}	10 ± 6^{a}	31 ± 12^{abc}
	0 - 2 cm	51 ± 32^{a}	39 ± 15^{a}	26 ± 13^{a}	17 ± 4^{a}	173 ± 90^{a}	157 ± 28^{a}	42 ± 10^{a}	67 ± 30^{a}
	2 - 4 cm	16 ± 5^{bc}	18 ± 10^{bc}	14 ± 9^{c}	43 ± 32^{bc}	200 ± 47^{a}	154 ± 70^{ab}	28 ± 9^{abc}	54 ± 19^{abc}
Clutia monticola	Litter	1 ± 1^{a}	4 ± 4^{a}	3 ± 2^{a}	3 ± 2^{a}	1 ± 1^{a}	0 ± 0^{a}	0 ± 0^{a}	1 ± 1
	0 - 2 cm	8 ± 8^{b}	6 ± 2^{ab}	8 ± 3^{ab}	41 ± 19^{b}	3 ± 2^{ab}	2 ± 1^{a}	2 ± 1^{b}	7 ± 3^{ab}
	2 - 4 cm	2 ± 2^{b}	4 ± 1^{ab}	12 ± 10^{b}	27 ± 9^{b}	1 ± 1^{ab}	0 ± 0^{a}	0 ± 0^{b}	12 ± 7^{ab}
Unknown *Ipomoea* sp.	Litter	1 ± 1^{a}	1 ± 1^{a}	1 ± 1^{a}	0 ± 0^{a}	3 ± 3^{a}	1 ± 1^{a}	2 ± 1^{a}	0 ± 0^{a}
	0 - 2 cm	3 ± 3^{a}	1 ± 1^{a}	1 ± 1^{a}	4 ± 1^{a}	12 ± 11^{a}	3 ± 3^{a}	2 ± 1^{a}	1 ± 1^{a}
	2 - 4 cm	12 ± 6^{ab}	1 ± 1^{b}	1 ± 1^{b}	0 ± 0^{b}	1 ± 1^{b}	1 ± 1^{b}	16 ± 4^{a}	9 ± 5^{ab}
Helinus integrifolius	Litter	2 ± 1	0 ± 0	3 ± 2	0 ± 0	0 ± 0	0 ± 0	1 ± 1	2 ± 1
	0 - 2 cm	0 ± 0	1 ± 1	1 ± 1	2 ± 1	0 ± 0	2 ± 2	3 ± 3	3 ± 2
	2 - 4 cm	0 ± 0	1 ± 1	0 ± 0	0 ± 0	0 ± 0	0 ± 0	1 ± 1	9 ± 8

Appendix 14. Continued.

Senna cf. *Septemtrionalis*	Litter	0 ± 0	0 ± 0	0 ± 0	0 ± 0	0 ± 0	0 ± 0	0 ± 0	0 ± 0
	0 - 2 cm	0 ± 0	0 ± 0	9 ± 6	0 ± 0	0 ± 0	0 ± 0	1 ± 1	0 ± 0
	2 - 4 cm	0 ± 0	0 ± 0	1 ± 1	0 ± 0	0 ± 0	2 ± 2	0 ± 0	0 ± 0
Acacia ataxacantha	Litter	0 ± 0	3 ± 3	0 ± 0	0 ± 0	0 ± 0	0 ± 0	0 ± 0	0 ± 0
	0 - 2 cm	0 ± 0	26 ± 26	0 ± 0	1 ± 1	0 ± 0	1 ± 1	18 ± 15	6 ± 6
	2 - 4 cm	0 ± 0	10 ± 10	0 ± 0	1 ± 1	1 ± 1	0 ± 0	2 ± 2	1 ± 1
Passiflora edulis	Litter	0 ± 0	2 ± 1	4 ± 2	0 ± 0	0 ± 0	1 ± 1	2 ± 1	0 ± 0
	0 - 2 cm	0 ± 0	2 ± 2	8 ± 5	6 ± 4	2 ± 1	3 ± 3	1 ± 1	3 ± 2
	2 - 4 cm	2 ± 2	0 ± 0	8 ± 8	0 ± 0	0 ± 0	10 ± 10	0 ± 0	0 ± 0
Bidens pilosa	Litter	0 ± 0	0 ± 0	0 ± 0	0 ± 0	0 ± 0	0 ± 0	0 ± 0	4 ± 4
	0 - 2 cm	0 ± 0	0 ± 0	0 ± 0	0 ± 0	0 ± 0	0 ± 0	0 ± 0	0 ± 0
	2 - 4 cm	0 ± 0	0 ± 0	7 ± 4	0 ± 0	0 ± 0	0 ± 0	0 ± 0	0 ± 0
Pavonia cf. *Columella*	Litter	0 ± 0	8 ± 8	0 ± 0	2 ± 2	1 ± 1	0 ± 0	0 ± 0	0 ± 0
	0 - 2 cm	6 ± 6	1 ± 1	19 ± 13	322 ± 275	16 ± 16	0 ± 0	14 ± 13	4 ± 3
	2 - 4 cm	13 ± 5	8 ± 4	2 ± 1	37 ± 20	2 ± 2	0 ± 0	28 ± 16	2 ± 1
Entada sp.	Litter	0 ± 0	0 ± 0	0 ± 0	0 ± 0	0 ± 0	0 ± 0	0 ± 0	0 ± 0
	0 - 2 cm	0 ± 0	0 ± 0	0 ± 0	0 ± 0	0 ± 0	0 ± 0	0 ± 0	0 ± 0
	2 - 4 cm	0 ± 0	0 ± 0	0 ± 0	0 ± 0	0 ± 0	0 ± 0	0 ± 0	1 ± 1
Smilax sp.	Litter	0 ± 0	8 ± 8	0 ± 0	0 ± 0	0 ± 0	0 ± 0	0 ± 0	0 ± 0
	0 - 2 cm	0 ± 0	2 ± 2	0 ± 0	0 ± 0	0 ± 0	0 ± 0	0 ± 0	2 ± 2
	2 - 4 cm	0 ± 0	0 ± 0	0 ± 0	0 ± 0	0 ± 0	0 ± 0	0 ± 0	0 ± 0

Appendix 14. Continued.

Turraea sp.	Litter	2 ± 1	1 ± 1	0 ± 0	0 ± 0	1 ± 1	0 ± 0	1 ± 1	3 ± 2
	0 - 2 cm	0 ± 0	0 ± 0	2 ± 1	0 ± 0	1 ± 1	0 ± 0	6 ± 4	6 ± 4
	2 - 4 cm	0 ± 0	0 ± 0	0 ± 0	0 ± 0	1 ± 1	0 ± 0	8 ± 5	1 ± 1
Robinia sp.	Litter	0 ± 0	0 ± 0	1 ± 1	0 ± 0	0 ± 0	0 ± 0	0 ± 0	0 ± 0
	0 - 2 cm	13 ± 9	0 ± 0	4 ± 3	0 ± 0	1 ± 1	0 ± 0	0 ± 0	0 ± 0
	2 - 4 cm	2 ± 2	2 ± 2	4 ± 4	5 ± 3	0 ± 0	1 ± 1	0 ± 0	12 ± 12
Eriosema sp.	Litter	0 ± 0	0 ± 0	6 ± 4	4 ± 3	0 ± 0	1 ± 1	0 ± 0	0 ± 0
	0 - 2 cm	4 ± 4	0 ± 0	6 ± 4	11 ± 5	0 ± 0	0 ± 0	2 ± 1	2 ± 1
	2 - 4 cm	11 ± 5	0 ± 0	2 ± 2	2 ± 2	0 ± 0	0 ± 0	3 ± 2	2 ± 1
Unknown Fabaceae	Litter	0 ± 0	0 ± 0	0 ± 0	0 ± 0	0 ± 0	0 ± 0	0 ± 0	0 ± 0
	0 - 2 cm	0 ± 0	0 ± 0	0 ± 0	0 ± 0	0 ± 0	0 ± 0	0 ± 0	0 ± 0
	2 - 4 cm	1 ± 1	0 ± 0	0 ± 0	0 ± 0	0 ± 0	0 ± 0	16 ± 15	0 ± 0
Unknown Poeaceae	Litter	0 ± 0	0 ± 0	0 ± 0	0 ± 0	0 ± 0	0 ± 0	1 ± 1	0 ± 0
	0 - 2 cm	8 ± 8	1 ± 1	8 ± 8	1 ± 1	9 ± 8	9 ± 8	16 ± 13	4 ± 2
	2 - 4 cm	0 ± 0	1 ± 1	1 ± 1	0 ± 0	1 ± 1	6 ± 4	2 ± 2	0 ± 0
Big round sp.	Litter	0 ± 0	0 ± 0	0 ± 0	1 ± 1	0 ± 0	0 ± 0	7 ± 4	6 ± 3
	0 - 2 cm	0 ± 0	2 ± 2	0 ± 0	0 ± 0	2 ± 1	0 ± 0	2 ± 1	4 ± 3
	2 - 4 cm	0 ± 0	1 ± 1	2 ± 1	0 ± 0	0 ± 0	0 ± 0	2 ± 1	11 ± 11
Big brown sp.	Litter	0 ± 0	0 ± 0	1 ± 1	0 ± 0	0 ± 0	3 ± 2	2 ± 2	8 ± 7
	0 - 2 cm	0 ± 0	0 ± 0	2 ± 1	0 ± 0	2 ± 1	7 ± 3	0 ± 0	0 ± 0
	2 - 4 cm	0 ± 0	0 ± 0	1 ± 1	0 ± 0	1 ± 1	2 ± 2	1 ± 1	1 ± 1

Appendix 15. Regression equations of seed half life for seeds of *Acacia mearnsii* and *Solanum mauritianum* under greenhouse and field trials for varying light, water and depths of burial. * after r^2 values indicates $P < 0.05$. *X* in the equations is the time of seed in the seedbank in months and *Y* equals the total percentage of seeds remaining in the seedbank.

***S. mauritianum* seed half life**				
Depth	**0 cm**	**2 cm**	**4 cm**	**Average**
Treatment	**Field low light (shaded) conditions**			
Regression relationship	Linear	Linear	Linear	Linear
Equation	92.2 + (-5.0 * *X*)	94.6 + (-4.1 * *X*)	100.0 + (-4.0 * *X*)	95.6 + (-4.4 * *X*)
r^2	0.64*	0.63*	0.70*	0.76*
Projected ½ life	9 ½ months	11 ½ months	13 months	11 months
Treatment	**Field high light (unshaded) conditions**			
Regression relationship	Linear	Linear	Linear	Linear
Equation	97.0 + (-5.8 * *X*)	99.8 + (-5.4 * *X*)	97.5 + (-5.3 * *X*)	98.1 + (-5.5 * *X*)
r^2	0.8*	0.72*	0.85*	0.86*
Projected ½ life	8 ½ months	9 ½ months	9 ½ months	9 months
Treatment	**Greenhouse low light (shaded), low water (5.14 ml/day) conditions**			
Regression relationship	Linear	Linear	linear	
Equation	105.4 + (-5.2 * *X*)	104.6 + (-5.7 * *X*)	105.0 + (-5.5 * *X*)	
r^2	0.67*	0.91*	0.83*	
Projected ½ life	10 ½ months	9 ½ months	10 months	
Treatment	**Greenhouse low light (shaded), high water (50.69 ml/day) conditions**			
Regression relationship	Linear	Linear	Linear	
Equation	103.0 + (-5.7 * *X*)	102.4 + (-5.5 * *X*)	102.7 + (-5.6 * *X*)	
r^2	0.71*	0.80*	0.78*	
Projected ½ life	9 ½ months	9 ½ months	9 ½ months	
Treatment	**Greenhouse high light (unshaded), low water (5.14 ml/day) conditions**			
Regression relationship	Linear	Linear	Linear	
Equation	101.5 + (-5.1 * *X*)	99.9 + (-4.4 * *X*)	100.7 + (-4.7 * *X*)	

Appendix 15. Cont….

r^2	0.76*	0.86*	0.83*
Projected ½ life	10 months	11 ½ months	11 months
Treatment	**Greenhouse high light (unshaded), high water (50.69 ml/day) conditions**		
Regression relationship	Linear	Logarithmic	Linear
Equation	103.0 + (-6.0 * *X*)	69.6 + (-35.3 * Log *X*)	96.4 + (-5.9 * *X*)
r^2	0.90*	0.74*	0.94*
Projected ½ life	9 months	50 months	8 ½ months

***A. mearnsii* seed half life**

Depth	**0 cm**	**2 cm**	**4 cm**	**Average**
Treatment	**Field low light (shaded) conditions**			
Regression relationship	Logarithmic	Linear	exponential	Linear
Equation	81.0 - 28.8 * Log(*X*)	97.9 + (-3.9 * *X*)	98.0 * Exp(-0.4 * *X*)	95.6 + (-3.4 * *X*)
r^2	0.74*	0.66*	0.90*	0.82*
Projected ½ life	25 years	1 year 1 month	6 years 4 months	1 year 3 months
Treatment	**Field high light (unshaded) conditions**			
Regression relationship	Logarithmic	Linear	Logarithmic	Logarithmic
Equation	56.6 - 27.6 * Log(*X*)	96.2 + (-3.5 * *X*)	80.1 - 29.8 * Log(*X*)	73.4 - 31.9 * Log(*X*)
r^2	0.92*	0.77*	0.74*	0.89*
Projected ½ life	5 years	1 year 2 months	25 years	8 years 4 months
Treatment	**Greenhouse low light (shaded), low water (5.14 ml/day) conditions**			
Regression relationship	Linear	Linear	Linear	
Equation	101.2 + (-4.1 8 * *X*)	99.2 + (-3.4 * *X*)	100.2 + (-3.7 * *X*)	
r^2	0.85*	0.83*	0.86*	
Projected ½ life	1 year ½ month	1 year 3 months	1 year 1 ½ months	
Treatment	**Greenhouse low light (shaded), high water (50.69 ml/day) conditions**			
Regression relationship	Exponential	Linear	Linear	
Equation	97.4 * Exp(-4.3 * *X*)	102.1 + (-4.2 * *X*)	99.3 + (-3.8 * *X*)	

Appendix 15. Cont.

r^2	0.80*	0.85*	0.86*
Projected ½ life	1 year 4 months	1 year	1 year 1 month
Treatment	**Greenhouse high light (unshaded), low water (5.14 ml/day) conditions**		
Regression relationship	Linear	Linear	Linear
Equation	99.5 + (-3.7 * *X*)	98.3 + (-3.3 * *X*)	98.9 + (-3.5 * *X*)
r^2	0.76*	0.70*	0.76*
Projected ½ life	1 year 1 ½ months	1 year 3 months	1 year 11 months
Treatment	**Greenhouse high light (unshaded), high water (50.69 ml/day) conditions**		
Regression relationship	Linear	Linear	Linear
Equation	99.7 + (-4.5 * *X*)	99.9 + (-3.9 * *X*)	99.8 + (-4.2 * *X*)
r^2	0.92*	0.85*	0.92*
Projected ½ life	11 ½ months	1 year 1 month	1 year

Appendix 16. Key species codes used in Constrained Canonical Analyses (CCA) Plots Figure 6.6. Species indicated in bold are declared Category 1(*), 2 (**) and 3 (***) weed species and ◙ are undeclared weed species..

Species Name	Species Code in Plot
Bothriochloa radicans	BOTHRADI
Brachiaria deflexa	BRACDEFL
Cymbopogon validus	CYMBVALI
Cyperus esculentus	CYPEESCU
Hemarthria altissima	HEMAALTI
Hyparrhenia dichroa	HYPADICH
Ischaemum fasciculatum	ISCHAFASC
Kyllinga erecta	KYLLEREC
Panicum aequinerve	PANIAEQU
Panicum maximum	PANIMAXI
Paspalum urvillei	PASPURVI
Pennisetum macrourum	PENNMACR
Phragmites australis	PHRAAUST
Setaria incrassata	SETAINCR
Setaria megaphylla	SETAMEGA
Sorghum bicolor	SORGBICO
Sporobolus consimilis	SPORCONS
Themeda triandra	THEMTRIA
Acalypha caperonioides	ACALCAPE
Acalypha villicaulis	ACALVILL
Achyranthes aspera*	**ACHYASPE***
Adenocline acuta	ADENACUT
Adiantum poiretii	ADIAPOIR
Anomatheca laxa	ANOMLAXA
Anthospermum welwitschii	ANTHWELW
Asclepias physocarpa	ASCLPHYS
Asparagus cooperi	ASPACOOP
Bidens pilosa◙	BIDEPILO
Cheilanthes viridis	CHEIVIRI
Chenopodium schraderianum	CHENSCHR
Convolvulus arvensis*	**CONVARVE***
Conyza aegyptiaca◙	CONYAEGY
Conyza albida◙	CONYALBI
Corchorus asperifolius	CORCASPE

Species Name	Species Code in Plot
Cucumis zeyheri	CUCUZEYH
Cynoglossum lanceolatum	CYNOLANC
Desmodium repandum	DESMREPA
Dietes iridioides	DIETIRID
Eriosema pauciflorum	ERIOPAUC
Eriosema psoraleoides	ERIOPSOR
Foeniculum vulgare◙	FOENVULG
Gladiolus dalenii	GLADDALE
Helichrysum ruderale	HELIRUDE
Helichrysum acutatum	HELIACUT
Helichrysum revolutum	HELIREVO
Helichrysum sp.	HELICHRY
Helichrysum rugulosum	HELIRUGU
Hydrocotyle americana	HYDROAMER
Hypoestes forskaolii	HYPOFORS
Hypoxis rigidula	HYPORIGI
Hypoxis sp.	HYPOXISS
Indigofera swaziensis	INDISWAZ
Ipomoea pes-caprae	IPOMPESC
Ipomoea purpurea* **	**IPOMPURP*****
Lagenaria siceraria	LAGESICE
Mariscus congestus	MARICONG
Medicago hispida◙	MEDIHISP
Mentha longifolia	MENTLONG
Myrsiphyllum volubile	MYRSVOLU
Nepeta cataria	NEPECATA
Oxalis corniculata	OXALCORN
Oxalis latifolia	OXALLATI
Passiflora edulis◙	PASSEDUL
Passiflora sp.*	**PASSIFLO***
Pentodon pentandrus	PENTPENT
Physalis angulata◙	PHYSANGU
Protasparagus exuvialis	PROTEXUV
Pseudarthria hookeri	PSEUHOOK
Pseudognaphalium luteo-album	PSEULUTE
Pteridium aquilinum	PTERAQUI
Rhynchosia galpinii	RHYNGALP

Species Name	Species Code in Plot
Rhynchosia hirta	RHYNHIRT
Rumohra adiantiformis	RUMOADIA
Scadoxus multiflorus	SCADMULT
Selago transvaalensis	SELATRAN
Senecio affinis	SENEAFFI
Senecio conrathii	SENECONR
Senecio coronatus	SENECORO
Senecio graminifolius	SENEGRAM
Senecio poseideonis	SENEPOSE
Senecio quinquelobus	SENEQUIN
Senecio serratuloides	SENESERR
Senna septemtrionalis	SENNSEPT
Smilax anceps	SMILANCE
Solanum nigrum	SOLANIGR
Solanum sisymbrifolium*	**SOLASISY***
Stephania abyssinica	STEPABYS
Thelypteris pozoi	THELPOZO
Toddalia asiatica	TODDASIA
Thunbergia natalensis	THUNNATA
Wahlenbergia undulata	WAHLUNDU
Antidesma venosum	ANTIVENO
Artemisia afra	ARTEAFRA
Brachylaena discolor	BRACDISC
Caesalpinia decapetala*	**CAESDECA***
Cassinopsis ilicifolia	CASSILIC
Clausena anisata	CLAUANIS
Cliffortia linearifolia	CLIFLINE
Clutia affinis	CLUTAFFI
Clutia monticola	CLUTMONT
Dalbergia armata	DALBARMA
Diospyros galpinii	DIOSGALP
Diospyros lycioides	DIOSLYCI
Diospyros whyteana	DIOSWHYT
Endostemon obtusifolius	ENDOOBTU
Englerophytum magalismontanum	ENGLMAGA
Euclea crispa	EUCLCRIS
Euclea natalensis	EUCLNATA

Species Name	Species Code in Plot
Flemingia grahamiana	FLEMGRAH
Gymnosporia mossambicensis	GYMNMOSS
Hymenodictyon parvifolium	HYMEPARV
Indigofera daleoides	INDIDALE
Keetia gueinzii	KEETGUEI
Lantana camara*	**LANTCAMA***
Leucosidea sericea	LEUCSERI
Leonotis sp.	LEONOTIS
Lippia javanica	LIPPJAVA
Maesa lanceolata	MAESLANC
Gymnosporia polyacantha	MAYTPOLY
Passerina filiformis	PASSFILI
Pavetta gracilifolia	PAVEGRAC
Pavonia burchellii	PAVOBURC
Plectranthus laxiflorus	PLECLAXI
Plectranthus sp.	PLECOERT
Rhamnus prinoides	RHAMPRIN
Rhoicissus torminalis	RHOITORM
Rhoicissus tridentata subsp. cuneifolia	RHOITRID
Rhus dentata	RHUSDENT
Rhus discolor	RHUSDISC
Rubus cuneifolius*	**RUBUCUNE***
Solanum mauritianum*	**SOLAMAUR***
Toddalia asiatica	TODDASIA
Trimeria grandifolia	TRIMGRAN
Verbena bonariensis◙	VERBBONA
Acacia ataxacantha	ACACATAX
Acacia mearnsii	**ACACMEAR****
Acacia melanoxylon*	**ACACPYCN***
Apodytes dimidiata subsp. *dimidiata*	APODDIMI
Breonadia salicina	BREOSALI
Buddleja auriculata	BUDDLORI
Buddleja salviifolia	BUDDSALV
Cephalanthus natalensis	CEPHNATA
Combretum celastroides	COMBCELA
Combretum fragrans	COMBFRAG

Species Name	**Species Code in Plot**
Combretum kraussii	COMBKRAU
Cussonia paniculata	CUSSPANI
Cyathea dregei	CYATDREG
Dombeya rotundifolia	DOMBROTU
Eucalyptus grandis**	**EUCAGRAN****
Ficus sur	FICUSSUR
Grevillea robusta***	**GREVROBU*****
Grewia occidentalis	GREWOCCI
Halleria lucida	HALLLUCI
Ilex mitis	ILEXMITI
Musa lanceolata	MUSALANC
Pinus patula**	**PINUSPATU****
Prunus persica◙	PRUNPERS
Rawsonia lucida	RAWSLUCI
Sequoia sp.◙	SEQUSEMP
Syzygium cordatum	SYZYCORD
Tricalysia capensis	TRICCAPE
Zanthoxylum davyi	ZANTDAVY
Ziziphus mucronata	ZIZIMUCR

Appendix 17. Mean and standard error for woody plant species alpha diversity. Values with the same superscript letter within rows are not significantly different using Ryan's Q multiple comparison test ($P < 0.05$).

Treatment	High Altitude				Low Altitude			
Variable	High Invasion		Low Invasion		High Invasion		Low Invasion	
	Cleared	Uncleared	Cleared	Uncleared	Cleared	Uncleared	Cleared	Uncleared
1 m^2	0.12 ± 0.06^{a}	0.28 ± 0.06^{a}	0.24 ± 0.07^{a}	0.36 ± 0.12^{a}	0.36 ± 0.08^{b}	0.44 ± 0.13^{b}	0.62 ± 0.15^{b}	0.46 ± 0.14^{b}
10 m^2	0.80 ± 0.46^{a}	1.2 ± 0.12^{a}	0.80 ± 0.34^{a}	1.20 ± 0.64^{a}	1.30 ± 0.20^{b}	1.60 ± 0.33^{b}	2.00 ± 0.35^{b}	2.30 ± 0.64^{b}
100 m^2	0.60 ± 0.25^{ac}	2.6 ± 0.68^{ac}	2.40 ± 0.81^{ad}	2.20 ± 0.80^{ad}	2.40 ± 0.51^{bc}	2.60 ± 0.25^{bc}	5.00 ± 0.84^{bd}	4.20 ± 0.73^{bd}
1000 m^2	1.00 ± 0.55^{ac}	3.2 ± 0.20^{ac}	3.20 ± 0.80^{ad}	2.80 ± 0.58^{ad}	2.40 ± 0.81^{bc}	3.4 ± 0.51^{bc}	5.20 ± 0.66^{bd}	6.20 ± 1.02^{bd}