

# SABONET *news*

*Newsletter of the Southern African Botanical Diversity Network* Volume 7 No. 3 ISSN 1027-4286 December 2002

## POACEAE SPECIAL • EDITION

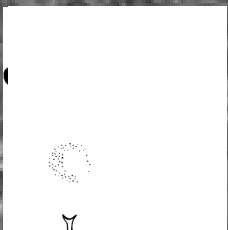
**Environmental education in grasslands**

**Living Plant Collections:**

**Free State National Botanical Garden and**

**Vumba Botanical Garden**

**Southern African Herbaria: Botswana**





ON OUR COVER: Learning about plants and animals in the Pretoria National Botanical Garden grassland.  
(Photo: National Botanical Institute)

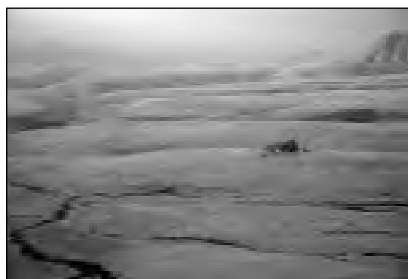
# c o n t e n t s

## Cover Stories

- 176 Poaceae Special Edition
- 198 Environmental education in grasslands
- 226 Living plant collections: Free State National Botanical Garden
- 228 Living plant collections: Vumba Botanical Garden
- 231 Southern African herbaria: Botswana

## Poaceae Special

- 178 Invasive Aliens in the Poaceae
- 181 Alien invasive grass in Botswana
- 183 Preparing herbarium specimens: Poaceae
- 185 A checklist of Zimbabwean grasses published
- 186 A single map—much information and many uses
- 189 Work on the genus *Loudetia*
- 193 Traditional uses of indigenous grasses of Zimbabwe



208 Ekangala

- 197 Does the grassland biome of South Africa have endemic grass species and genera?
- 200 Environmental education in grasslands
- 205 A natural grassland in the heart of a city
- 208 The Ekangala Grassland Project
- 211 The grasses of the Licuati Forest and Maputo Elephant Reserves
- 219 Useful Poaceae literature
- 220 Literature on southern African Poaceae
- 221 Lesotho Poaceae Checklist report

## Features

- 170 Profile: Gladys Msekandiana
- 170 Profile: Marinda Koekemoer
- 171 13<sup>th</sup> SABONET Steering Committee Meeting
- 172 Obituary: Amadeus Mogale
- 175 Obituary: Stephen Mavi
- 222 Threatened Plants Programme: Dioscorea
- 223 Angolan workshop on plants threatened with extinction
- 226 Living plant collections: Free State National Botanical Garden
- 228 Living plant collections: Vumba Botanical Garden
- 231 Southern African herbaria: Botswana



245 News from South Africa

## Book Reviews

- 239 World atlas of biodiversity
- 240 Cultivated plants
- 241 Tree Spotting Lowveld
- 243 Rebirth of science in Africa
- 244 The forests of Taraba and Adamawa States

## Regulars

- 167 Editorial
- 168 Letters to the Editors
- 224 From the Web
- 233 The Paper Chase
- 245 Regional News Update
- 254 E-mail Addresses



239 Book Reviews



205 Grassland in the City

# letter from the editors

**EDITORS:** STEFAN SIEBERT & MARTHINA MÖSSMER

Welcome to the 20<sup>th</sup> edition of *SABONET News*, which marks the end of the seventh year of the newsletter's existence. A total of 1 320 pages have been published and we hope to add a few more before the end of 2003. The newsletter will, however, be scaled down next year, and we plan to launch it as an email newsletter in 2004. This will also free SABONET staff to prioritise activities and to focus on our major goal, namely publishing nearly twenty numbers in the SABONET Report Series! Most of these are national plant checklists, with the Zimbabwe Vascular Plant Checklist leading the way; it will go to print in January/February 2003. Thus, we have now moved from induction to production ...

SABONET's main focus for the coming year will be to mobilise and support trained staff in participating herbaria and botanical gardens to develop tools to aid biodiversity research and to document the indigenous plant diversity of southern Africa, and in so doing, contribute to the objectives of the Convention on Biological Diversity. With these products we hope to enable the end-users of botanical information to undertake research in plant diversity and to apply the SABONET products in ways that assist the conservation and sustainable utilisation of indigenous plant resources. Yet to achieve these conservation goals, capacity needs to be sustained by maintaining successful networks. SABONET, on the other hand, only has funds to continue until 31 December 2003, and hence, the coming year will see project management drafting a proposal for a new project to build on the institutional capacity that has been developed so far.

The Poaceae is a priority group for project outputs, and was the first family to have been completely computerised by the majority of the participating herbaria. As an example of what we wish to achieve in the coming year this edition of the newsletter contains an abundance of SABONET articles on the grasses of southern Africa: to mention only a few, there are articles about traditional uses of grass in Zimbabwe, environmental education, endemism in grasslands, useful Poaceae literature, using distribution maps, the grasses in southern Mozambique, as well as invaluable practical information on collecting and pressing grass specimens.

In addition, this issue includes all our regular items—*Profile*, *Living Collections*, *Southern African Herbaria*, *The Paper Chase* and *Regional News*. We want to thank Lesley Henderson for another instalment in her interesting series on invasive alien plants, this time dealing, appropriately, with invasive grasses (page 178). We also publish an article on the invasive grass species *Cenchrus biflorus* in Botswana. We have five book reviews in this issue, starting on page 239.

Looking back at 2002, SABONET was once again involved in a wide range of activities to enhance the scientific and technical capacity of participating institutions. The Regional Office would like to thank everyone involved for their tremendous dedication and enthusiasm during another successful year. We wish the readers of the newsletter a peaceful and safe holiday season and a productive new year. 🍀

—Stefan Siebert & Marthina Mössmer



**SABONET News**  
Newsletter of the Southern African Botanical Diversity Network

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## Design and Layout

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(27) 82 909-0109

## Reproduction and Printing

Business Print Centre  
(27) 12 349-2295

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*SABONET News* is the official newsletter of the Southern African Botanical Diversity Network (SABONET).



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*SABONET News* is published in March, July and November and is distributed free of charge.

Current number of subscribers: 2 228, in 79 countries

Printed on recycled paper.

This newsletter was made possible through support provided by the GEF/UNDP (SABONET is a GEF Project implemented by the UNDP) and the Regional Centre for Southern Africa, Gaborone, Botswana, US Agency for International Development (Plot no. 14818 Lebatlane Road, Gaborone West, Extension 6 Gaborone), under the terms of the Grant No. 690-0283-A-00-5950. The opinions expressed in the newsletter are those of the authors and do not necessarily reflect the views of the US Agency for International Development, the GEF/UNDP, the SABONET Steering Committee or the National Working Groups.

**IUCN**  
The World Conservation Union



GEF



NATIONAL  
BOTANICAL  
INSTITUTE

## PLANT RED DATA LISTS

I was greatly surprised and delighted to receive, by post, a copy of the *South African Plant Red Data Lists* publication. If this is a gift, as I must interpret it, since I could find no accompanying statement in explanation of the book's arrival, I thank you and others responsible for its production and dissemination, most sincerely. It will be full of interest as I consult it, and valuable as a guide in following through my particular botanical interests among the plants of the southern African subcontinent.

As detailed knowledge grows, I believe there is much to be interpreted from plant distribution. There is particular interest for me in attempting to understand variability within widely distributed complexes, the outliers of which are often poorly represented and often surviving in what can be hostile habitats. Members of some of these will surely be listed.

It will take time to absorb the criteria that have been followed and all the detail, both verbal and pictorial, contained. This will afford me interest and enjoyment as I use the book. Again my gratitude.

—Kath Gordon-Gray  
Pietermaritzburg

## FROM OUR ARCHIVES

Thank you for sending me *SABONET News* 1(1). On page 7 you mentioned a giant baobab tree—*Adansonia digitata* I have made a list of exotic plant species in the Flora of Saurashtra (Gujarat State, India) that includes 31 species of flowering plants of African origin. *A. digitata* is one of them, perhaps introduced more than 100 years ago. The baobab (called “Rukhado” locally) is found in private gardens and some public gardens and premises.

I enclose a photograph of an approximately 100-year-old tree with a CBH of 27 feet (8 m) and height of 39 feet (12 m), located at Village Mithivirdi near Alang Ship Yard on the sea coast of Bhavnagar, District of the Gujarat State. The local people worship the tree. I hope this information will be of some interest to you.

—S. M. Pandya  
India



## instructions to authors

- 1) Manuscripts should preferably be in English.
- 2) If possible, text should be sent in electronic format via e-mail or on a stiffy disk and should be in Microsoft Word, WordPerfect, or Rich Text Format. Otherwise, hard copy can be sent or faxed to the SABONET head office.
- 3) Tables and charts should be in one of the following formats: Microsoft Excel, Quattro Pro, Lotus 1-2-3, or Harvard Graphics. Data must be supplied with charts.
- 4) If possible, include colour slides, black-and-white photographs, or line drawings to illustrate articles. If you want to submit scanned images with your article, scan them at 300 dpi and save as TIF or JPEG files.
- 5) Caption all tables, figures, and photographs clearly on a separate sheet. Include photographer credits.
- 6) Each author should provide name, affiliation, postal address, telephone and fax numbers, and an e-mail address (if applicable).
- 7) Look at the most recent issue of *SABONET News* for stylistic conventions.
- 8) *SABONET News* holds the right to edit any received copy.
- 9) Manuscripts should be sent to Marthina Mössmer. Via e-mail: editors@sabonet.org  
Hard copy: SABONET, National Botanical Institute, Private Bag X101, Pretoria 0001, SOUTH AFRICA. Fax: (27) 12 804-5979/3211.
- 10) **Submissions for the next issue should reach the editors before 28 February 2003. Late submissions will not be included.**

## WANTED: ACACIA FLOWERS

I was wondering if some of the SABONET Newsreaders might be of assistance. I am looking for flowers of interesting *Acacia* species. Flowers should be preserved in FAA or anything else with an alcohol base—gin, vodka, cane, even methylated spirits will do.

I am looking for any non-South African species—the following are only the *most* wanted ones:

- *Acacia bussei* (Ethiopia, Somalia, Kenya, Tanzania)
- *Acacia dolichocephala* (Ethiopia, Kenya, Sudan, Uganda)
- *Acacia horrida* (India, Sudan, United Arab Emirates, Ethiopia, Somalia, Kenya)
- *Acacia lahai* (Ethiopia, Kenya, Tanzania, Uganda)

Please note that any *Acacia* flowers are welcome as long as they are from natural populations. Anybody interested in helping me should please contact me at the address below.

ROSS, J.H. 1979. Conspectus of the African *Acacia* Species. *Memoirs of the Botanical Survey of South Africa* No. 44. Botanical Research Institute, Pretoria.

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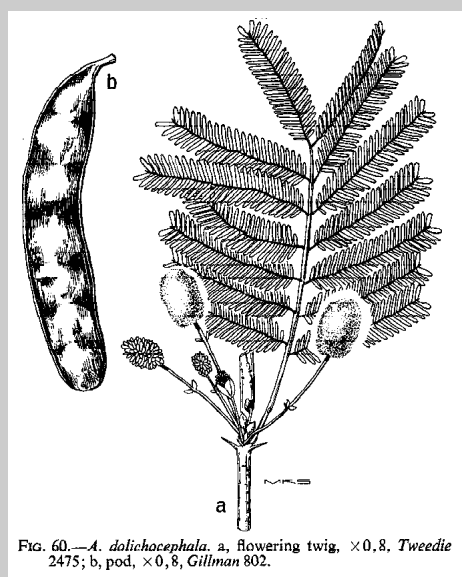


FIG. 60.—*A. dolichocephala*. a, flowering twig,  $\times 0.8$ , Tweedie 2475; b, pod,  $\times 0.8$ , Gillman 802.

Drawing of *Acacia dolichocephala*. (Reproduced from Ross (1979: 88) , with kind permission of the NBI.)

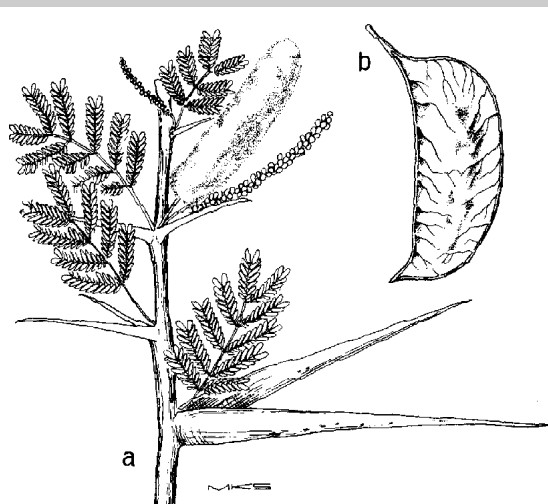


FIG. 57.—*A. horrida* subsp. *benadirensis*. a, flowering twig,  $\times 0.7$ , Hemming 1383; b, pod,  $\times 0.7$ , Dale K732.

Drawing of *Acacia horrida*. (Reproduced from Ross (1979: 86) , with kind permission of the National Botanical Institute.)

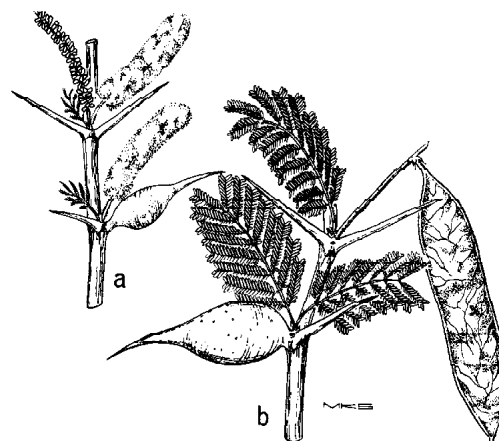


FIG. 58.—*A. bussei*. a, flowering twig,  $\times 0.7$ , Wood 1; b, fruiting twig,  $\times 0.7$ , Hemming 2234.

Drawing of *Acacia bussei*. (Reproduced from Ross (1979: 87) , with kind permission of the National Botanical Institute.)

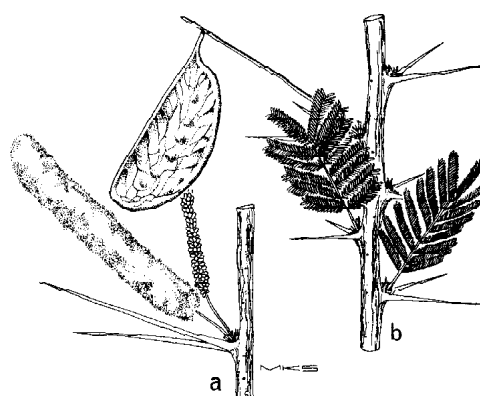


FIG. 59.—*A. lahai*. a, flowering twig,  $\times 0.7$ , Greenway 9054; b, fruiting twig,  $\times 0.7$ , Greenway & Kanuri 12582.

Drawing of *Acacia lahai*. (Reproduced from Ross (1979: 87) , with kind permission of the National Botanical Institute.)

# Profile



**Gladys Msekandiana**

Gladys was born on 6 August 1970 at Mwadzama village in Traditional Authority Kaphuka in Dedza District in the central region of Malawi. She started her formal primary school education at Dzenza School and completed her primary school education at Nthumbo Primary School in Ntcheu District. It was from this school that Gladys was selected in 1987 for further studies at St. Michael's Girls' Secondary School in Mangochi District, in the southern region of Malawi. Because of her outstanding performance in class, she was selected to do a BSc Degree Pro-

gramme in 1991 at the University of Malawi, Chancellor College, in Zomba.

During her studies, she did a biology research project entitled "Assessment of conservation status and utility of Chirunga Natural Woodland". During vacations, Gladys worked as a herbarium attendant at the National Herbarium and Botanic Gardens of Malawi. She was involved in listing the herbarium specimens, checking damaged specimens, mounting specimens, and filing them in the cabinets. She completed her university studies in 1995, majoring in biology and demography. It was during this time that Gladys developed a keen interest in biology.

After graduating, Gladys was employed as a Biology, Physical Science, and Mathematics teacher at Berlin Private Secondary School in Thyolo District. She later joined the Ministry of Education, Science and Technology as a Biology and Mathematics teacher. In September 2000 Gladys started working at the National Herbarium and Botanic Gardens of Malawi as an Assistant Scientific Officer, responsible for vegetation surveys, identification of plants, ethnobotany, curation of plants, fumigation of the herbarium, and systematic research.

In November 2002, she was appointed as SABONET Research Officer, a position that she still holds at the institu-

tion. She is responsible for supervising computerisation of herbarium specimens, writing quarterly progress reports, organising field trips, plant collecting and identification, procuring project equipment, and coordinating production of plant checklists.

Gladys attended a number of training courses under SABONET. In December 2000, she participated in the Database Course for Beginners at NBI in Pretoria, South Africa. In 2001, she attended Herbarium Management and Plant Identification courses at NBI in South Africa, and at the National Institute for Agronomic Research in Mozambique. She also attended a SABONET Red Data List Workshop that was held in Malawi. In June 2002, she attended a vegetation survey training course at Liwonde, Malawi, also organised by SABONET. With financial support from the SABONET Project, Gladys contributed to the production of the Red Data List for Malawi, as well as the compilation of the Zomba checklist and the National Checklist of vascular plants.

Gladys is hard-working and committed, and her goal is to continue with plant studies, which will enable her to do meaningful research work in botany.

Gladys is married to Albert Msekandiana and is the mother of two boys, Anderson and Goodluck. 🏡

# Profile



**Marinda Koekemoer**

Marinda was born in Johannesburg on 17 September 1961. She attended primary schools in Johannesburg, Cape Town, and Krugersdorp, and high school in Phalaborwa. Whilst

moving around the country it was always one of the family's objectives to explore new areas extensively and enjoy what nature had to offer. A career in botany was an obvious choice.

She studied at the Rand Afrikaans University and obtained a BSc (1983), Teaching Diploma (1984), MSc (1991), and finally a PhD (2002). The topics for both her MSc and PhD were in the Asteraceae, in the tribe Gnaphalieae. Her research efforts are still focused on this large and very interesting family.

Marinda started working at the National Botanical Institute in 1987, after teaching for a year at schools in Groblersdal and Middelburg. At the NBI she started off as technician working on the Poaceae with Dr Beth Gibbs Russell, Lyn Fish, and other grass experts. This involvement culminated in the publication of "Grasses of southern Africa" in 1990. Thereafter she waved the grasses goodbye and started working on the Asteraceae,

also becoming involved in management as Assistant Curator and later Curator (1992).

Today, most of her time is consumed by management duties, but she enjoys the occasional field trip with the staff to explore new and undercollected areas and to build up the Asteraceae collections. Her collections number 2 525 and cover areas all over South Africa. She also had the privilege to join the SABONET Nyika Expedition to Malawi in 2000. Her involvement in plant collecting expeditions combines many of her interests—camping and outdoor life, hiking, travelling, and photography—and she hopes to continue collecting for many more years.

Her hope for SABONET is that the network it created will long outlive the life of the SABONET Project. 🏡

See *News from South Africa* for an interesting account of Marinda's latest field trip with Priscilla Burgoyne and Hester Steyn.

# SABONET Meetings and Activities



From left to right: Stefan Siebert, Gideon Smith, Augustine Chikuni, Gillian Maggs-Kölling, Brian Huntley, Nozipo Nobanda, Moretloa Polaki, Nonofe Mosesane, Patrick Phiri, Titus Dlamini, Esperanca da Costa, Mario da Silva, Chris Willis.  
(Photo: Hans Heilgendorff)

The 13<sup>th</sup> SABONET Steering Committee (SSC) Meeting, Fourth Tripartite Review (TPR) Meeting, and a SABONET Publications Workshop were held at Pretoria National Herbarium, South Africa, during the period 29 August–2 September 2002.

## Steering Committee Meeting

The 13<sup>th</sup> SSC Meeting was hosted by Prof. Gideon Smith, National Coordinator of SABONET-South Africa, and chaired by Prof. Brian Huntley, Chairperson of the SABONET Steering Committee. All ten countries were represented at the meeting and nine of the ten National Coordinators were present. Mr Moretloa Polaki attended his fourth consecutive meeting as alternate coordinator for Lesotho. Ms Lorna Davis, SABONET Financial Officer, attended her first meeting since she took over the finances from Ms Carina Haasbroek. In addition to the Steering Committee, the following people also attended the meeting:

- Dr Alan Rodgers, UNDP-GEF, Arusha, Tanzania
- Mr Trevor Arnold, SABONET IT, Pretoria, South Africa
- Mr Christopher Willis, National Botanical Institute, South Africa
- Dr Stefan Siebert, SABONET Regional Office
- Ms Nyasha Rukazhanga-Noko, SABONET Regional Office

Apologies were received from Ms Federica Battista, UNDP-South Africa, and Dr Gert Willemse, DEAT-South Africa, as they were both heavily involved at the World Summit on Sustainable Development.

Major issues discussed at the meeting related to staff dedicated to project activities, publications, progress with National Checklists, End-user Work-

shops, computerisation of herbarium specimens, and the Fourth Tripartite Review.

The date of and venue for the next SSC Meeting will be decided at the 2003 Logframe Revision and Budget Allocation Meeting that is scheduled to take place in South Africa on 18 and 19 February 2003. SABONET's Exit and Sustainability Strategy will become a major discussion point at SSC Meetings in 2003.

## Tripartite Review

Dr Alan Rodgers chaired the Fourth Tripartite Review. The Annual Project Report completed by National Coordinators, government officials, and UNDP representatives in each participating country was used as a basis for discussion. The following are five of the 11 recommendations\* made through the Tripartite Review:

Decision 5: The Fourth Tripartite Review requests Project management to source additional editorial support for hard copy and electronic product delivery.

Decision 6: The Fourth Tripartite Review requests Project management to monitor the impact of increased activity in the area of electronic product delivery and to take appropriate steps if required.

Decision 8: The Fourth Tripartite Review encourages the development of a concept document for a follow-on regional project looking at the mainstreaming of biodiversity. This should address the integration of taxonomy and conservation activities. The concept document, together with the results (demonstrating impact) of the current Project, should be presented

and discussed at the 14<sup>th</sup> SABONET Steering Committee meeting, to be held in March 2003.

Decision 9: The Fourth Tripartite Review requests National Coordinators to increase awareness amongst stakeholders, promoting partnerships and interaction with national conservation agencies, UNDP offices, CBD focal points, and relevant government departments.

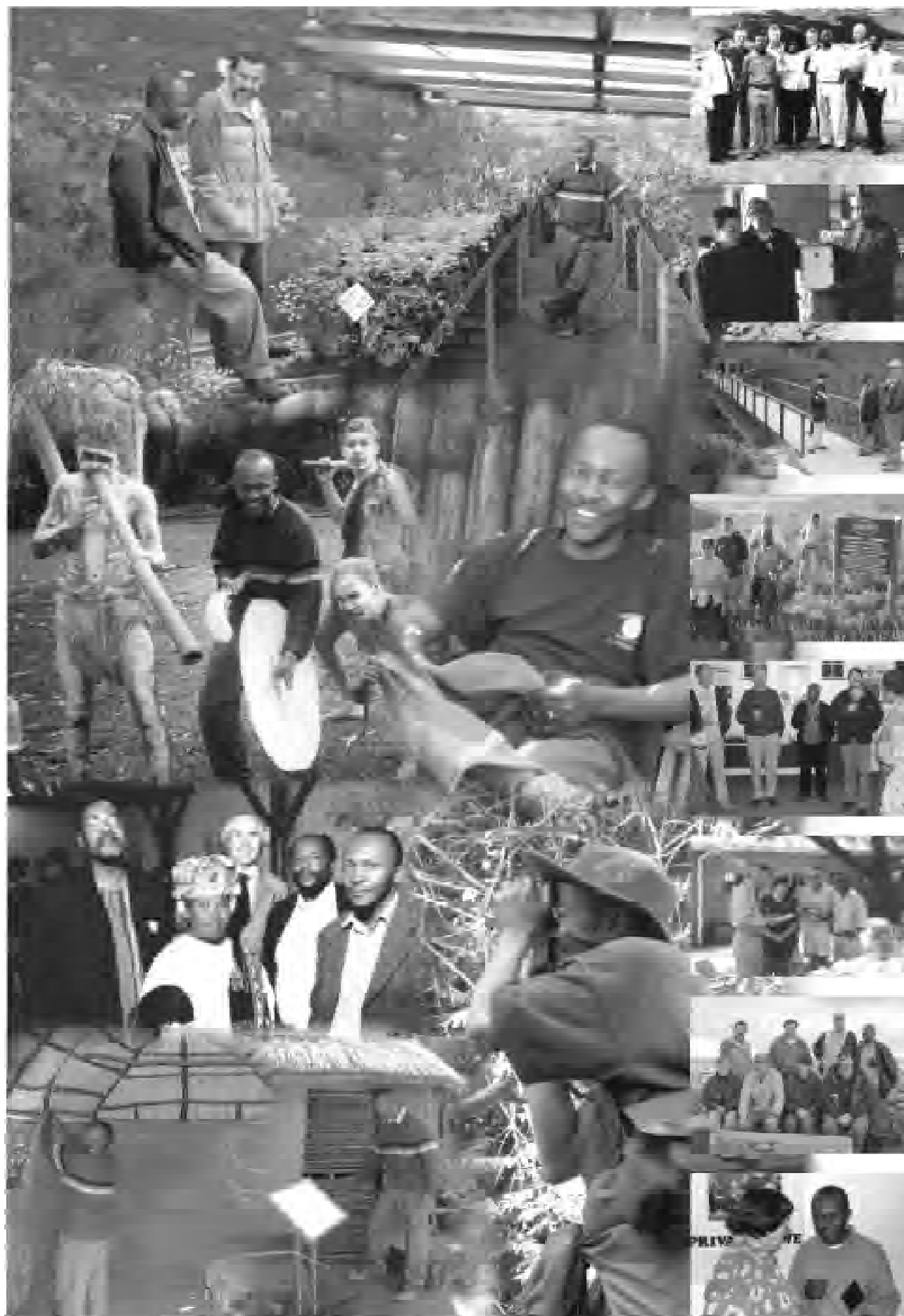
Decision 11: The Fourth Tripartite Review requests National Coordinators to encourage end-user involvement in the Project and its activities.

## World Summit

The SABONET meetings coincided with the World Summit on Sustainable Development and the project was advertised and marketed at a number of parallel events. Posters and publications of the SABONET Project were displayed at the National Botanical Institute's (NBI) *Africa's Plants and People* events at the Witwatersrand and Pretoria National Botanical Gardens and at the World Conservation Union's (IUCN) Exhibition at the Nedcor Building in Sandton. A special thanks to Ms Kinny Mmakola, Mr Alpheus Mothapo, Ms Tebogo Rampho and Mr Solomon Nkoana—all SABONET contract employees—for staffing the stands and informing interested parties of our successful network here in southern Africa.

The SABONET SSC attended the NBI's International Workshop on *Mainstreaming Biodiversity on a Bioregional Scale* at the Witwatersrand National Botanical Garden on 30 August 2002. This was a very informative workshop and we are looking forward to the out-

(continued on page 175)



# Obituary

## *Amadeus Mogale*

*(1970–2002)*

Amadeus Mogale, Curator of the Free State National Botanical Garden, Bloemfontein (South Africa), died tragically in a car accident on 13 August 2002. He was on his way back from a plant-collecting trip. At the age of 31, Amadeus was in the prime of his life. His passing is a great loss, not only to his family, but also to the National Botanical Institute, botany, and the botanical garden community in southern Africa.

Born in Kwa Thema, Springs (south-east of Johannesburg), on 1 November 1970, Amadeus, or “Oupa” as he was affectionately known, matriculated in 1989 from the St Franciscan Matric Project, Boksburg. In 1990 he registered for a National Diploma in Horticulture at the Peninsula Technikon in Bellville, Cape Town, and completed the diploma in 1993. Amadeus was Class Representative during the first two years of the course. Between 1991 and 1996 he was employed as a general supervisor at the Ferndale Nurseries, Constantia, Cape Town.

In September 1996 Amadeus joined the National Botanical Institute (NBI) as a young horticulturist in the Free State National Botanical Garden. Two years later he became Curator of the Garden, where he worked until his untimely death.

Amadeus's greatest professional achievements were his contributions towards the development and completion of a Water-wise Demonstration Garden (officially opened in November 1998) and the Medicinal Demonstration Garden (officially opened in March 2001) showcasing the traditional medicinal plants of the Free State.

Amadeus participated in the Needs Assessment of the botanical gardens of Lesotho in February 1999 and was committed to close collaboration with staff from the Katse Botanical Garden in central Lesotho. During his rela-

tively short career within the NBI, he had the opportunity to proudly represent the NBI and South Africa at the Chelsea Flower Show in the UK in May 1998 and the Gardens 2001 Congress, held in Canberra, Australia, in April 2001. During this trip he made many new acquaintances and friends visiting the Australian National Botanic Gardens (Canberra), Royal Botanic Gardens, Sydney, Royal Botanic Gardens, Melbourne, Booderee Botanic Gardens, Olive Pink Botanic Garden, and Alice Springs Desert Park in central Australia. He gave well-received presentations on the Free State National Botanical Garden in Canberra, Melbourne, and Alice Springs.

Those who knew him as a sincere, generous, positive, and approachable person, full of life, humour, energy, enthusiasm, and optimism, will always remember Amadeus. One of his greatest gifts was his ability to work with people from diverse backgrounds and cultures. He also placed a high premium on the development and social wellness of his staff. He put much effort into training and HIV/AIDS awareness programmes, amongst others. He was a talented leader and respected by his staff and colleagues. We shall miss him.

Amadeus was laid to rest in the Vlaktefontein Cemetery, Springs, on Sunday 18 August 2002, and is survived by his wife Refiloe and their two-year old son, Thagalo. Our sincere sympathies are extended to his family and friends.

—Christopher Willis  
Director

*Garden and Horticultural Services  
National Botanical Institute*

I am very sorry to hear the news about Amadeus. I would appreciate it if you could pass on my condolences to both his family and the staff at the Garden. Given the need to rapidly in-

crease both the involvement and skill of black South Africans in curatorial positions in NBI, you can truly ill afford losing the like of Amadeus's experience and enthusiasm.

—Mark Richardson  
*Alice Springs Desert Park  
Central Australia*

News of the death of Amadeus has reached us, and we were very sad to hear of it. Please accept our condolences. We remember Amadeus very well, and it was a pleasure to work with him on his trip to Australia.

—Jeanette Mill  
*Australian Network for Plant Conservation  
Canberra, Australia*

I met Amadeus last year in Canberra at the Gardens 2001 Congress and developed a friendship with him during the conference. On the field trip that followed to the south coast of New South Wales, I found him to be enthusiastic, interested in the world around him—plants in particular—and full of life, with a delightful sense of humour. I greatly enjoyed the few days I spent in his company. I was shocked and saddened to hear of his tragic death and I extend my sincere sympathy to his family, friends, and colleagues. Amadeus was a fine ambassador for his country and I am sure he will be remembered for his role and achievements as Curator of the Free State National Botanical Garden. In September I will be presenting a paper at the Botanic Gardens of Adelaide Conference—I intend to dedicate this to the memory of Amadeus.

Rest in peace, my friend. It was a pleasure to know you.

—John Zwar  
*WMC Olympic Dam Environment  
Section  
Roxby Downs  
South Australia*

On behalf of my committee, and all the members of the Lowveld branch of the Botanical Society, I wish to extend to all of you our sincere condolences on the death of Amadeus (Oupa) Mogale.

Having recently met him, we know how keenly you will all miss him. What a tragedy it is for the Gardens to lose such a fine young man, with so much talent and enthusiasm, such an engaging personality, and so much going for him. He made such a warm, positive impression on all who met and spoke to him at the Curators' dinner last month.

We feel very keenly too, for his wife and child, and also his parents.

—Jo Onderstall  
Chairman, Lowveld Branch  
Botanical Society of South Africa  
Nelspruit

My sincere condolences on the death of your Curator for the Free State Garden. This is a very big loss to our African Botanic Gardens family. Please extend my heartfelt condolences to the entire family, NBI and SABONET on my behalf and on behalf of the entire Limbe Botanic Garden.

With lots of sorrow,

—Christopher Fominyam  
Limbe Botanic Garden  
Cameroon

We were all devastated to learn of Amadeus's tragic death. He is well remembered here after his attendance at the Gardens 2001 Congress. He had such an engaging personality and made many friends. What a dreadful tragedy. My heart goes out to his widow and baby son.

—Virginia Berger  
Secretariat  
Council of Heads of Australian  
Botanic Gardens (CHABG), Australia

Amadeus stayed with us for only a few days last year. In that short time we felt we had met a friend and, while we could see our contact being restricted to annual Christmas wishes, we believed that sometime our paths would cross again and we looked forward to that meeting. We were shocked to hear of his death and send our deepest sympathy to his wife and family, and to his friends and working colleagues. The world is a poorer place.

—Norm and Jenny Morrison  
Canberra, Australia

To appoint Amadeus as a horticulturist in the Free State National Botanical Garden was one of those obvious choices in life, although small in stature, he stood head and shoulders above the other candidates. To start walking the road of a promising career with him on 3 September 1996 was no less a pleasant experience. Not only was this young man talented and ambitious, but his pleasant, optimistic, and humorous personality made it a pleasure to work with him. He had a cheerful effect on people meeting and working with him, even when circumstances were unsatisfactory. Very soon he became more than just a colleague. Amadeus was a very special friend.

When the position of Curator of the Free State NBG became vacant two years after Amadeus had been appointed, it would normally have been too soon in his career for him to take up that responsibility. However, he did apply and again it was obvious that he was the man to be appointed in the position, and once again, his ambition and positive attitude pulled him through to soon become a respected and beloved leader of the Free State team.

One may well say that the passing away of a young man with such a bright future was untimely, yet Amadeus probably achieved more in his short but meaningful life than many

a person blessed with a long life, merely because of the person he was.

—Rudi Britz  
Curator  
Lowveld National Botanical Garden

Amadeus was such a pleasant, positive person to work with, considerate and with a really lovely sense of humour. Whenever I visited the Free State National Botanical Garden I was always warmly welcomed.

When I recently helped with storyboards in the Garden, he personally dealt with all my queries promptly and efficiently in order to get the job done as soon as possible. He himself accompanied me up the koppies and made notes as to where each and every board had to be placed (despite the fact that he was ill that day).

He treated his staff well, and always spoke to them with respect. We are all going to miss Amadeus very much—he was a wonderful person to work with and such a good example to all. Our heartfelt condolences to his wife, Refiloe, and son, Thagalo.

—Pitta and Leon Joffe

It is a sad time to remember our Curator who passed away more than two months ago. He built a concrete house in our hearts that will never be broken down. His love to the people will never be forgotten, his humanity and patience will always reside in our minds and his success will always inspire us.

He was one of a kind in this world, a role model to us and we will always remember the good short time we had with him under the sun. May God bless him and let him rest in peace. 🕊

—Peter Gavhi  
Acting curator  
FSNBG

# Obituary

## Stephen Mavi (1948–2002)



Steve in his earlier days collecting plant specimens in the Harare (then Salisbury) area.

Stephen (known to most as Steve) Mavi was born on 29 September 1948. He joined the National Herbarium and Botanic Garden of Zimbabwe in 1965 at the age of 17 as a technical assistant in the Herbarium. By the time he retired in April 1998, he had risen to the grade of Senior Research Technician within the Institute. Upon his retirement he continued to do work in ethnobotany.

Steve was one of the best field botanists ever produced by the Institute. He collaborated with numerous organisations and researchers and provided taxonomic expertise on Zimbabwean plants and their uses. In 1986 was awarded the *Natural Resources Gold Medal* in recognition of his contributions to conservation education.

Steve's main passion was ethnobotany, in particular traditional medicinal plants and their uses. His interest in this area led to the production of a number of publications including the following:

- *Rhodesian botanical dictionary of African and English plant names* Wild, H. Revised and enlarged by Biegel, H.M. and Mavi, S. Government Printers, Salisbury, 1972.

- *The traditional medical practitioner in Zimbabwe. His principles of practice and pharmacopoeia* Gelfand, M., Mavi, S., Drummond, R.B. and Ndemera, B. Mambo Press, Gweru, 1985.
- *Food plants of Zimbabwe* Tredgold, M.H. in collaboration with Biegel, H.M. and Mavi, S. Mambo Press, Gweru, 1986.

Steve died on 20 June 2002 and was laid to rest on 22 June 2002 at Grenville Cemetery in Harare. He is survived by his wife and three children. His contribution to Zimbabwean botany will forever be remembered and his expertise will be greatly missed by all those who worked with him. 🕊

—Soul Shava  
National Herbarium and Botanic  
Garden  
Harare



Steve in his later days.

(continued from page 171)

comes. At the workshop, Ms Janice Golding presented the first copies of the *Southern African Plant Red Data Lists*, SABONET Report Series 15, to key stakeholders and donor agencies.

August 31 was spent at the World Summit and the SSC members visited the Ubuntu Village in Johannesburg. What a fantastic display! Everyone agreed that the South African government had really done an excellent job. Once again we are looking forward to see the outcomes of the Summit being implemented in southern Africa.

### Publications Workshop

Monday, 2 September 2002, saw a group of SSC members that have submitted final or draft National Checklists, getting back to serious work during the follow-up workshop to develop *Minimum and Maximum Standards for SABONET Checklists* (The first workshop was held on 7 August 2002 in Pretoria.) Five SABONET National Coordinators, three NBI Publication Section staff members, and three participants from the SABONET Regional Office attended the follow-up workshop. A set of minimum and maximum standards were drawn up and was subsequently distributed to all parties working on checklists as part of the SABONET Project. An electronic template is currently being prepared and will also be distributed to all interested parties. The *Checklist of Zimbabwean Grasses* SABONET Report Series 16, was published according to these standards and should serve as a template for everyone working on SABONET Checklists.

A special thank you to all those who took part in and/or arranged these meetings and workshops! 🕊

—Stefan Siebert & Gideon Smith

\*Combined recommendations of the 13<sup>th</sup> SSC and 4<sup>th</sup> TPR meetings are available from the SABONET Regional Office on request (stefan@nbipre.nbi.ac.za).



## Did You Know?

**T**he Poaceae is the fourth or fifth largest plant family (depending on the classification followed) in the world, with 688 genera and 9 500 species. In the SABONET countries, there are 210 genera and 1 222 species.

**W**orldwide about 30% of the land area is covered by vegetation types such as grassland and savanna, which are dominated by grasses. Grasses are found to a lesser or greater extent in all vegetation types. Even in forests dominated by trees, there are grasses, for example *Oplismenus* species and *Setaria megaphylla*. In some of the coldest, windiest places on earth such as Gough Island where very little else grows, one finds grasses, mainly species of *Poa* and *Festuca*.

**F**ossil evidence is poor, but shows that grasses originated millions of years ago, with fossils dating from the Cretaceous (65 million years ago). Poaceae apparently evolved early enough to be represented on all major landmasses.

**G**rasses vary greatly in size. In Africa the tiny *Oropetium capense* reaches 15 cm while *Phragmites* can become 8 m tall and the bamboo *Oxytenanthera* up to 13 m. Some bamboos outside Africa can reach a height of 21 m.

**G**rasses are the world's most important source of plant food for both humans and animals. Many have been in cultivation for so long that their origins and wild ancestors are obscure.

**T**hink about it: every time you eat meat or chicken, you are indirectly eating grass.

**W**heat, *Triticum aestivum*, also known as Bread Wheat, is one of the most important grain crops. Bread is one of the most widely consumed staple foods. The flour made from cultivars of wheat is also used for cakes, biscuits, and pastry. *Triticum durum* or Durum Wheat provides the flour for pasta. Wheat probably evolved from wild species of *Triticum* and *Aegilops* in southwestern Asia and the eastern Mediterranean regions.

**H**umans eat oats, *Avena sativa*, as breakfast porridge or in biscuits, but it is mainly used for feeding livestock. The husks are used to make furfural, the derivatives of which are used in making nylon, oil refining, synthetic rubber production, and in the manufacture of antiseptics, to mention a few.

**B**arley, *Hordeum*, is used as malt in brewing beer. It has been known in Europe since the Bronze Age and impressions of *Hordeum vulgare* are found on Greek and Roman coins of about 500 B.C.

**W**heat and barley are frequently mentioned in both the Old and the New Testament of the Bible.

**R**ye (rog in Afrikaans), *Secale cereale*, is thought to have originated in Asia Minor and today it is used for the special dark breads of Western Europe. It is used for making whisky (in America), gin (in Holland), and beer (in Russia), while mature plants are used for bedding, thatching, straw hats, and papermaking. In South Africa there is a species of rye, known as *Secale africana* or *Secale strictum* subsp. *africana*, found in a very localised area around Sutherland. It is very rare today, but it is said to have been more common

during earlier times and to have given the area its name of "Roggeveld" (Ryeland).

**M**aize or mealies, *Zea mays*, has its origins in the Americas, but is now a staple food in many parts of the world, such as southern and eastern Africa. Popcorn is a cultivar of maize. In many countries it is also an important fodder for livestock.

**R**ice, *Oryza sativa*, originated in Asia and is known to have already been a staple food in China and probably India in 2800 B.C. It is now cultivated and has become a staple food in many other parts of the world. In West Africa where is an indigenous rice, *Oryza glaberrima*, which is unfortunately not widely used today as preference is given to the Asian species. Although it is not known how, this rice has apparently been introduced to Costa Rica and El Salvador.

**G**uinea Corn, *Sorghum*, originated in Africa but has been cultivated in Asia since ancient times. It has the advantage that it can grow in marginal areas where other cereals fail. Worldwide it is a staple food for more than 500 million people in more than 30 countries. Some forms have very sweet stems, which are chewed like sugar cane. It is popular for making beer and is also used as fodder for animals.

**P**earl Millet, *Pennisetum glaucum*, is indigenous to Africa and has been cultivated for over 4 000 years. It is very widely grown in areas of great heat and low rainfall. Pearl Millet is a staple cereal in northern Namibia, the Okavango, and adjoining parts of Angola where it is eaten as a porridge, mixed with other ingredients, and used in beer-making.





**A**frican Finger Millet, *Eleusine coracana* subsp. *coracana*, has been found in 5 000 year-old archaeological sites in Ethiopia. It is an important food crop in some parts of Africa such as Malawi and Zambia, and is also used in making beer.

**S**ugar Cane, *Saccharum officinarum*, is thought to have originated in New Guinea and is now cultivated throughout the tropics. Juice from cane is used to distil a drink known as *shiwawayaya*, as well as to make rum; golden syrup is used for brewing *shikokiyane*. By-products are used to produce paper, fibreboard, and other industrial products.

**I**n times of famine, wild grasses are still used as food in rural areas of Africa, such as *Echinochloa stagnina*, *E. crus-galli*, *Miscanthus capensis*, and *Sporobolus fimbriatus*.

**T**eff, *Eragrostis tef*, is a very important staple cereal in Ethiopia. Elsewhere it is used as animal feed or in rehabilitation programmes along roadsides. As it is an annual, it is sown in newly disturbed areas or as a first grass crop on lands to stabilise the area, thus allowing perennial grasses to re-establish.

**S**tipagrostis *uniplumis* is used in the Kalahari for thatching of huts and shelters, and as a dune stabiliser. As it is often a dominant grass in its area, it is important for grazing.

**D**aba Grass, *Miscanthus junceus*, is used for thatching in the Okavango, for brooms in Swaziland, and is also used for fencing.

**P**hragmites *australis*, found world wide in wet places, is used for traditional sitting mats in Botswana. Split stems are used for basketry and for making chairs. It is also used for fencing and is important in eco-tourism as it is often used for the building of tourist camps. Musical instruments such as flutes and whistles are also made of this grass.

**E**ragrostis *pallens* is used for thatching, brooms, and basketry in Botswana.

**T**he following grasses are used for brooms: *Aristida junciformis*, *A. transvaalensis*, *Fingerhuthia sesleriiformis*, *Merxmüllera* (alternative genus *Rytidosperma*) species

**F**estuca species are used for mats in Swaziland.

**H**yparrhenia species such as *H. hirta* and *H. anamesa* are used for thatching. In South Africa the species are included in a commercial thatching product. In the eastern Free State of South Africa and probably into Lesotho it is used as building material for various parts of huts and surrounding screens or fences and as baskets for storing grain. Elsewhere, for example in Swaziland, nesting baskets for hens are made.

**S**ome of the finest paper is made from grass, for example, a species of *Stipa* common in North Africa.

**B**amboos are an interesting group of grasses. They are not common in Africa, with only a few indigenous species and a number of introduced ones. Known to grow very fast, it is said that one can

hear and see them grow! In Japan the culm of *Phyllostachys bambusoides* was recorded to grow almost 1.2 m in 24 hours. Another peculiarity of many bamboos is that they flower only at long intervals—20, 30, 60 or 120 years apart and then all at about the same time. All plants of the same species, wherever they are in the world, will flower and then the plants usually die. In the holdings of PRE (National Herbarium, Pretoria), there are two flowering specimens of *Thamnocalamus tessellatus*, a bamboo found in Lesotho, the surrounding South African areas and a part of the Eastern Cape. The dates of collection are 1908 and 1963, giving a 55-year gap. So can we expect flowering in 2018? Beware: if a culm is damaged, it may be stimulated to flower, giving a false indication of the 'natural' flowering time.

**M**elinis *repens* is planted as a garden plant in the USA, but is regarded as a weed in Australia.

**I**mperata *cylindrica* is a problem plant in the USA.

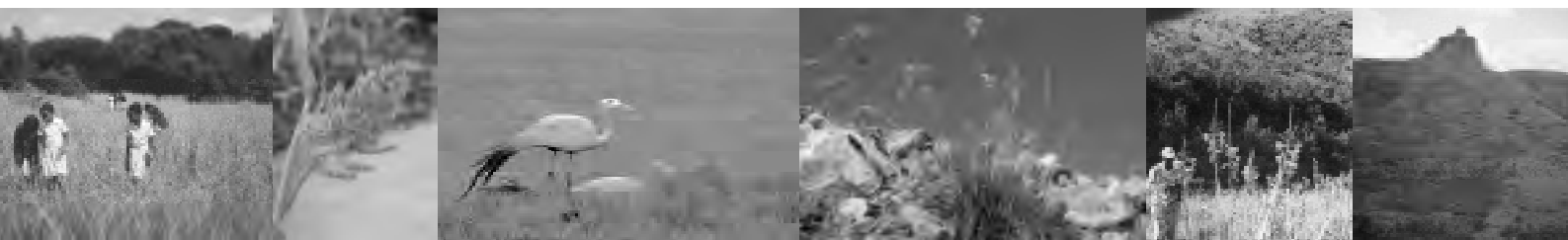
**B**rachypodium sp. is a problem plant in California (USA).

**S**pecies of *Ehrharta* are problem plants in both Australia and the USA.

**T**hese grasses are regarded as weeds in parts of Australia: *Eragrostis superba*, *Pennisetum macrourum*, *Hyparrhenia hirta*, *Sporobolus africanus-pyramidalis* complex. 🌱

—Lyn Fish

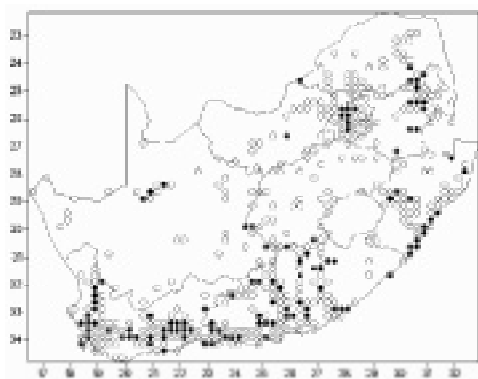
National Herbarium Pretoria  
lyn@nbipre.nbi.ac.za



# invasive alien plants

## Part 5:

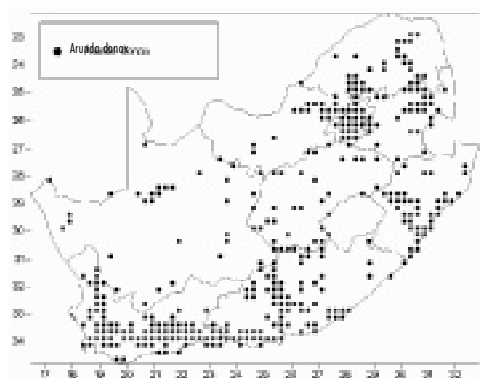
## Poaceae The Grasses



The distribution of declared grasses in South Africa. Bold dots indicate where they are abundant, forming stands.



*Arundo donax*



In southern Africa the Poaceae is one of the largest plant families with 194 genera, 967 species and infraspecific taxa, 847 indigenous species, and 115 naturalised species (Gibbs Russell *et al.* 1990).

Eight of the 198 species listed as declared plants in South Africa belong to the Poaceae; seven species are prohibited (Category 1), while one species is permitted under conditions of controlled cultivation (Category 2). A further six species have been proposed as Category 3 Plants, but more information is needed before they can be listed. Legislation concerning their control, cultivation, and trade are contained in the Conservation of Agricultural Resources Act (CARA), Act 43 of 1983, and amended in 2001. (See appendix for species list.)

### Giant Reed

The Giant Reed, *Arundo donax*, is the most widespread and abundant invasive grass species in southern Africa. It was introduced by early colonists to the Cape, probably in the 1700s or even earlier. One of the earliest botanical explorers in southern Africa, William J. Burchell, refers to it in 1811. He describes the ceiling of a house in Genadendal near Caledon, which was constructed with this reed and says that it was known as the Spanish Reed and was widely cultivated by farmers (Burchell 1822). Although Giant Reed is often reported as a native of the Mediterranean, it was probably introduced to this region many years ago, and originally came from eastern Asia (Fornell 1990).

It is a large and robust reed 2–6 m high, spreading from horizontal rootstocks or rhizomes. It can be distinguished from indigenous reeds

(*Phragmites* species) by the following combination of features:

- Leaf tips are soft or firm but not rigid and penetrating (as in *P. mauritanicus*).
- Leaf sheaths are persistent on stem.
- Inflorescence is compact and spear-shaped.
- Often grows on roadsides or other sites away from water, unlike indigenous reeds.

In South Africa it rarely flowers above an altitude of 1 000 m and then usually next to busy roads. Propagation appears to be entirely vegetative from rhizome and stem fragments. It has been reported that it does not produce viable seed in most areas where it has been introduced (Perdue 1958).

Giant Reed competes with and replaces indigenous species. It forms very dense stands on riverbanks and in riverbeds, which results in the narrowing of water channels, increased siltation, and the exclusion of smaller and less vigorous riverbank species. During floods, stem and rhizome fragments are carried downstream and dumped against bridges, drainage pipes and other flood control structures, causing blockages, damage, and even structural failure. Dense stands obstruct access to watercourses and impede vision for motorists along road verges; they are also a fire hazard.

### Pampas Grasses

Pampas grasses, *Cortaderia selloana* and *C. jubata*, are South American tussock grasses that have been planted for decoration and mine dump stabilisation. They have become invasive not only in South Africa, but also in California, Hawaii, New Zealand, and Australia. They are now listed as Category 1 Plants in South Africa and may no longer be cultivated (with the exception of sterile cultivars of *C. selloana*).

# in southern africa

and must be controlled or eradicated where possible. They are invading grassland, forest edges, riverbanks and other seasonally wet areas, roadsides, and wasteland.

Purple Pampas or Jubata Grass (*C. jubata*) has longer flowering stems and a darker purplish, loosely branching inflorescence. Silver Pampas (*C. selloana*) has a paler, silvery-white to mauve, stiffly branching inflorescence; the flowering stems are only slightly taller than the foliage. Silver Pampas has male and female plants and reproduces sexually. Both species can be propagated vegetatively from rhizomes. Studies in California (DiTomaso *et al.* 2002) have shown that Jubata Grass produces only female flowers and is able to reproduce apomictically—that is, seeds are produced without pollen. Each inflorescence can produce over 100 000 seeds and all seeds are genetically identical to the parent plant.

Once established, mature plants of both species are very competitive and large infestations crowd out indigenous species. The accumulation of dry material creates a fire hazard. Leaves have sharp, cutting edges and the flowers can cause severe asthma.

## Tussock Grasses

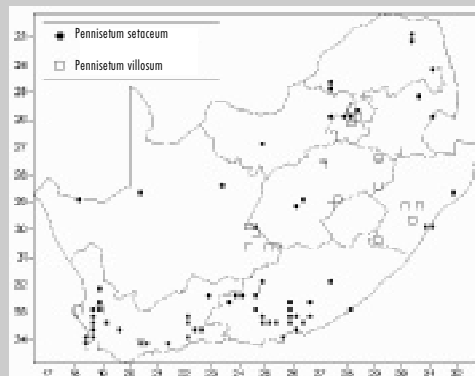
*Nassella trichotoma* Nassella Tussock, and *N. tenuissima* White Tussock, are South American grasses that are suspected of being accidentally introduced into South Africa during the Anglo-Boer War (1899–1902) with hay imported from Argentina (Henderson *et al.* 1987, Wells & De Beer 1987). Both species have invaded natural grasslands in the Eastern Cape, while *Nassella* invasion extends into the Western Cape. Both *Nassella* species are listed as Category 1 Plants.

In the 1980s, *Nassella* was predicted to have the potential to invade two million hectares of grassland in South Africa (Wells no date). Its success as an invader can be attributed to

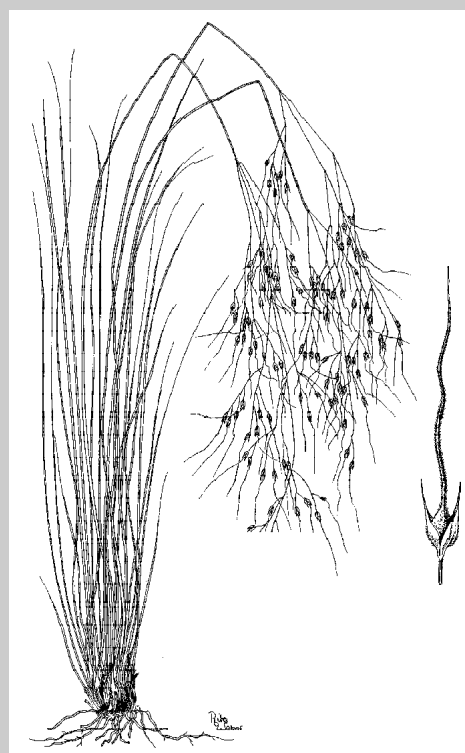
its vigorous growth, high seed production, long seed viability, efficient seed dispersal by wind, water and animals, its unpalatability, and its ability to thrive under a wide range of climatic and soil conditions. It can completely replace the natural veld once this has been disturbed, and because of its inedibility, reduces the carrying capacity of the land. A vigorous campaign using herbicides has greatly helped to control this species.

## *Pennisetum*

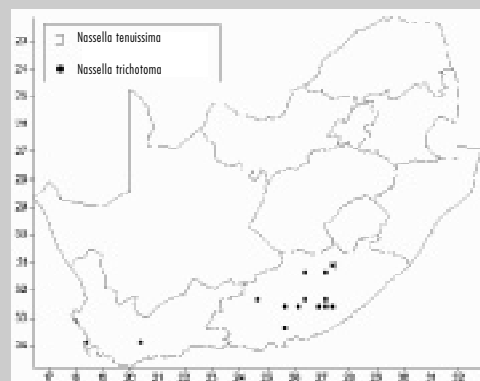
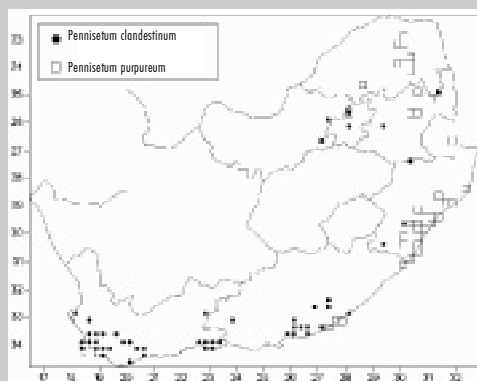
*Pennisetum setaceum*, Fountain Grass, and *P. villosum*, Feathertop, are North African tufted grasses that have been cultivated for ornamentation and mine dump stabilisation. Fountain Grass is tussock-forming and widespread, preferring hot, dry sites, whereas Feathertop has a more open, creeping habit and prefers cooler, wetter sites. Both species can form stands along roadsides and in other disturbed sites, competing with indigenous ruderal species. They

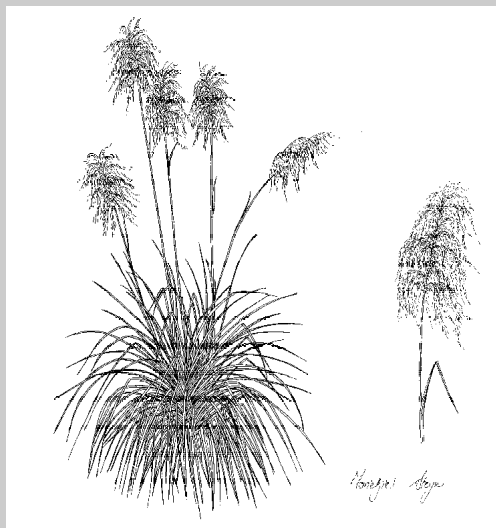


*Pennisetum setaceum*

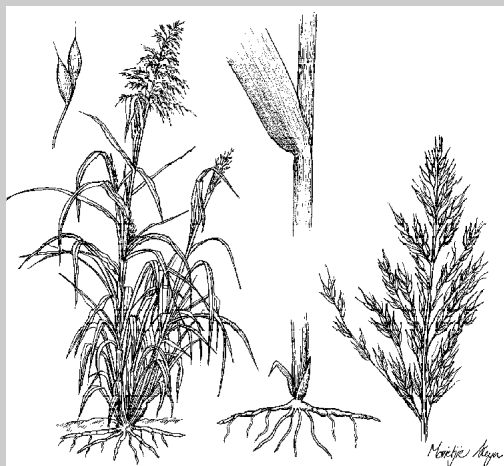
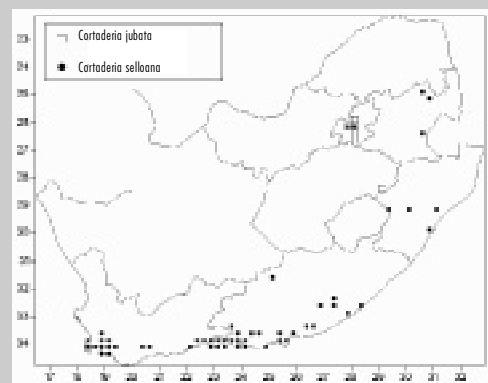


*Nassella trichotoma*

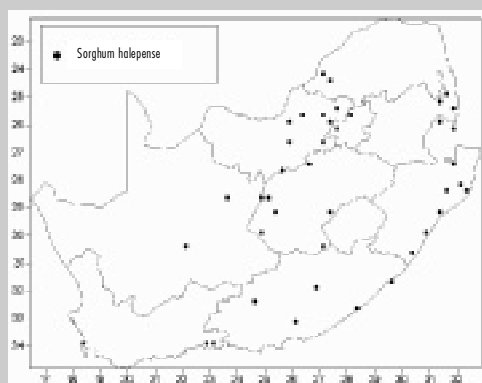




**Cortaderia jubata**



**Sorghum halepense**



have the potential to spread into adjacent natural veld. Fountain Grass has become a formidable weed in dry habitats in several states of the USA, including Hawaii (Benton 2002). It is a fire-adapted colonizer and readily out-competes indigenous species. It flowers and seeds prolifically, and wind, water, animals, and humans disperse the seed. Both Fountain Grass and Feathertop are Category 1 Plants in South Africa.

### Sorghum

*Sorghum halepense*, Johnson or Columbus Grass, is both a troublesome weed and a valuable fodder plant for livestock. Wilted foliage and young sprouts, however, cause prussic acid poisoning in livestock (Kellerman *et al.* 1988). It has been cultivated in many parts of the world and is widely naturalised. Its region of origin is now obscure, although it may be native to the Mediterranean. Johnson Grass can form spreading stands that are difficult to eradicate because of long, deeply-buried rhizomes. It invades agricultural lands, disturbed sites, roadsides, grassland, and particularly riverbanks and riverbeds. It has been listed as a Category 2 Plant, which means that it may still be cultivated under controlled conditions, but must be prevented from spreading.

### Proposed Species

A further six invasive grass species have been proposed as Category 3 Plants, but because they are also useful cultivated plants, conflicts of interest will have to be resolved before they can be listed.

- *Ammophila arenaria* (Marram Grass)
- *Cynodon dactylon* (Couch or Kweek)
- *Lolium multiflorum* (Italian Ryegrass)
- *Lolium perenne* (Perennial Ryegrass)
- *Pennisetum clandestinum* (Kikuyu Grass)
- *Pennisetum purpureum* (Napier Grass)

Marram Grass has been used for stabilising coastal sand dunes, Couch and Kikuyu are both widely used for lawns, fodder, and for erosion control. The ryegrasses are used as fodder crops and erosion control. Napier Grass is cultivated for fodder and as a screen.

### Next Instalment

The next article in this series deals with the Solanaceae (potato family). This family is well known for its many edible species, which are important crop plants. However, all 12 declared spe-

cies belonging to the genera of *Cestrum*, *Datura*, *Nicotiana*, and *Solanum* are poisonous to humans and other mammals. They are also prominent invaders of indigenous inland and coastal forests, forestry plantations, watercourses, and agricultural croplands. 🌱

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—Lesley Henderson  
ARC-Plant Protection Research  
Institute  
Stationed at National Botanical  
Institute, Pretoria

## Declared Plants in the Poaceae in South Africa

N.B. The regulations concerning Categories 1, 2 and 3 are briefly summarised here. To avoid any misunderstanding the reader should consult the full regulations given in the Government Gazette, Vol. 429, No. 22166 of 30 March 2001 or Henderson (2001).

**Category 1:** Prohibited; must be controlled, or eradicated where possible.

- *Arundo donax*, Giant Reed
- *Cortaderia jubata*, Purple Pampas or Jubata Grass
- *Cortaderia selloana*, Pampas or Silver Pampas Grass
- *Nassella tenuissima* (*Stipa tenuissima*), White Tussock
- *Nassella trichotoma* (*Stipa trichotoma*), Nassella Tussock
- *Pennisetum setaceum*, Fountain Grass
- *Pennisetum villosum*, Feathertop

**Category 2:** Allowed only in demarcated areas under controlled conditions; prohibited within 30 m of the 1:50 year flood line of watercourses or wetlands.

- *Sorghum halepense* (*S. alnum*), Johnson or Columbus Grass

**Category 3:** No further planting or trade of propagative material allowed; existing plants may remain but must be prevented from spreading; prohibited within 30 m of the 1:50 year flood line of watercourses or wetlands.

No species belonging to the Poaceae.

**Proposed Category 3 Plants:** More information is required before they can be listed.

- *Ammophila arenaria*, Marram Grass
- *Cynodon dactylon*, Couch or Kweek
- *Lolium multiflorum*, Italian Ryegrass
- *Lolium perenne*, Perennial Ryegrass
- *Pennisetum clandestinum*, Kikuyu Grass
- *Pennisetum purpureum*, Napier Grass

## *Cenchrus biflorus*: An Alien Invasive Grass in the Botswana Flora

Botswana's beef industry relies and thrives on abundant forage resources provided by grasses. These are, however, threatened by some undesirable and invasive alien species. One of these is *Cenchrus biflorus* Roxb., one of the two species of *Cenchrus* recorded for Botswana. The other species, *Cenchrus ciliaris* L., is indigenous and is a valuable palatable pasture grass utilised by livestock (Field 1976).

*C. biflorus* is also palatable when young, but becomes a nuisance once it sets seed. It is thought to originate from the Indian subcontinent, and has now invaded most agricultural regions in Botswana. It was probably introduced to the Lake Ngami area (Ngamiland District) in the late 1940s. It occurs either mixed with indigenous vegetation (Sekhute *et al.* 2000) or as a single species around boreholes in the Kalahari. It is considered troublesome by livestock owners and arable farmers, because it competes for nutrients and prevents farmers from entering their fields because of piercing spikes. It also clings to the bodies of livestock, often resulting in injuries and even causing blindness when it gets stuck next to the animal's eyes. The plant is known by a number of names such as Bur Grass, Makunda Grass, and Kram-kram.

Detailed studies on the life history of *C. biflorus* and its effect on the Kalahari savanna ecosystem have been carried out by a research group at HOORC, Maun, Botswana, through the INVASS Project (1998–2000). Findings from the studies include the following:

- The grass is closely associated with increased grazing pressure, soil disturbance, erosion, and decreased soil fertility.
- Migrating or imported livestock are the main cause of the spread of the grass, in addition to humans and vehicles. This conclusion is supported by the finding that many known populations of *C. biflorus* occur where cattle are congregated



***C. biflorus* (Kram-kram)** is an annual plant accidentally introduced in the Kalahari sand dune savannah of Botswana. It produces seeds that may be easily dispersed and wounds live stock and wildlife. Local farmers regard the plant as a serious pest. (used with permission from Dr. Wim H. van der Putten, Coordinator, INVASS Project, Netherlands Institute of Ecology, Centre for Terrestrial Ecology (NIOO-KNAW-CTE))

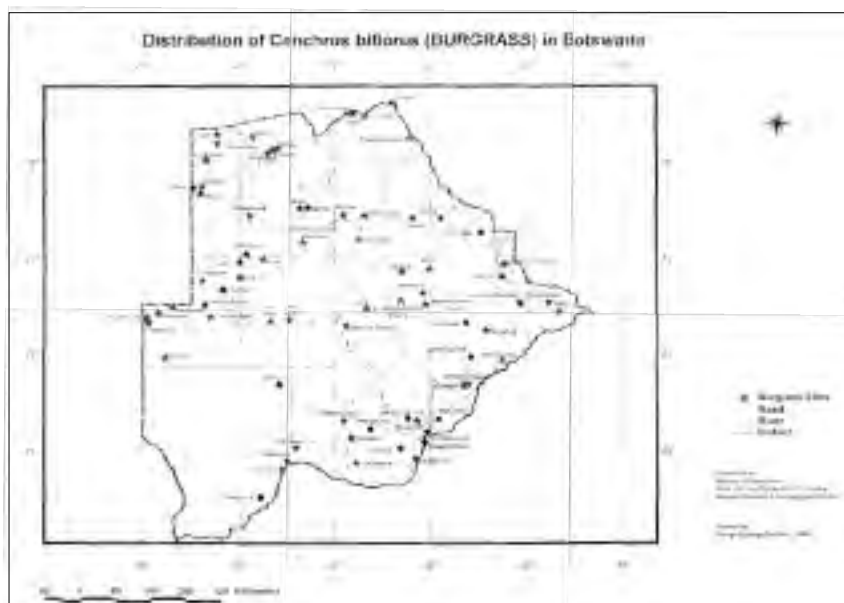
for agricultural extension purposes (insemination camps, agricultural stations, and agricultural show grounds).

The Ministry of Education has, through the Division of Plant Protection, set recommendations for the control of this grass species, based on the information generated by the INVASS Project. Yet only some of these recommendations are being implemented, as some might have long-term impacts on the ecosystems where the grass occurs (G. Ben, pers. comm.). These recommendations fall under four sections:

- Arable lands
- Grazing lands
- Semi-quarantine system
- Public education

### Arable Lands

- The application of herbicides, such as glyphosate, is recommended at a rate of three litres per hectare as minimum requirement. This, however, might not be a solution because the herbicides would also target indigenous vegetation and as such create new colonisation opportunities for *C. biflorus*



- Timely and selective weeding or uprooting of the grass is necessary where the population stand is sporadic but dense. Alternatively, perform spot treatment using chemicals.

### Grazing Lands

- Farmers should follow proper range management procedures like *practising* proper stocking rates to allow desirable species to out-compete *C. biflorus*.
- Introduce desirable and indigenous species that are known to out-compete *C. biflorus*, for example, *Eragrostis lehmanniana* or *Urochloa trichopus* (both prefer sandveld but also grow in hardveld), or *Chloris virgata* (prefers clay and moist areas).
- Spot treatment, using glyphosate, is recommended in pure and dense population stands. Alternatively, hand picking or weeding can be done in sporadic and scanty distributions.

### Semi-Quarantine System

- To ensure that livestock, vehicles, and machinery do not escalate the problem, they should be checked at the point of departure.
- To ensure that feed and seed from affected areas do not carry Bur Grass seed, a phytosanitary certificate should confirm that feed or seed is free of *C. biflorus*.
- Customs and Excise officials at the border posts, and Veterinary Patrol Teams at Cordon Fence Gates

should assist to ensure that farmers conform to these items. Spot sampling could also be done at entry or departure points.

- The Seed Multiplication Unit, under the Department of Agricultural Research, should ascertain that seed collected from farmers are free of *C. biflorus*.

### Public Education

- A general information flyer has been developed to educate the public and frontline extension workers.
- Extension workers are to empower farmers with information about *C. biflorus*.
- Regular workshops and training courses on the identification, ecology, and control of *C. biflorus* should be held for extension workers and farmers. 📄

FIELD, D. 1976. *A handbook of common grasses in Botswana* Ministry of Agriculture. Gaborone, Botswana.

SEKHUTE, B.R., VEENENDAAL, E.M., RUSSEL, S., WEBER, P., HENGVELD, F.J., MUBYANA, T. & KGATHI, D.L. 2000. *Life history of C. biflorus and its effect on the Kalahari savanna ecosystem* Harry Oppenheimer Okavango Research Centre, Maun, Botswana.

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***C. biflorus*: a whole inflorescence showing disentangling fruits ready to dislodge themselves onto any animate target that passes by.**



**A close view of the fruits of *C. biflorus*.**



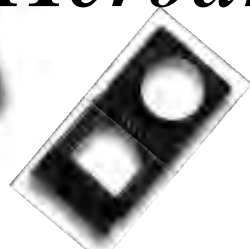
**A close view of a single fruit. Note the vicious spines that the fruit uses to cling to dispersal agents.**



**A close view of the caryopses (seeds) of *C. biflorus*.**



# Preparing Poaceae Herbarium Specimens



I have already published a detailed account on preparing herbarium specimens of plants in general (Fish 1999, *Strelitzia* 7). In this article I wish to concentrate and expand on how to deal specifically with grasses, giving hints from my own experiences and emphasising the importance of following certain procedures. This article must be used in conjunction with *Strelitzia* 7.

## Collecting

There is only one rule for grasses: collect the whole plant. However, if a plant is too big or tall and there is no smaller plant available, then representatives of each plant part should be collected. *Phragmites* is usually far too tall to fit on a standard mounting board. Such a collection will therefore probably consist of an inflorescence with a few leaves, a section showing a node with branches emerging, another one with mature leaves, and finally the basal part with the rhizome.

- Collect a good, sizeable tuft to give a reasonable indication of the habit.
- In the case of tall plants, try and choose a size that, when folded (see under *Pressing*), will fit onto a mounting board.
- A character most often used for distinguishing grass taxa in keys is whether a plant is annual or perennial, but often it's also the most difficult to establish. The basal part of a grass or the habit of the plant can give a clue to this state.
- Ensure that rhizomes are collected. The presence of a rhizome is the main character that distinguishes *Eragrostis inamoena* from *E. atrovirens*, and in those areas where they occur together it may be difficult to assign the correct name to a poor specimen not showing the underground parts.

- Stolons are often not collected because they have spread away from the parent plant and are then not easily observed in dense vegetation. Make an effort to include them when you collect.
- Other useful characters of the base of the plant include whether it is fibrous or not, glabrous or hairy, type of hairs, shape of basal leaf sheaths, and whether the leaves are mainly basal or cauline.
- Ensure that the inflorescence actually still possesses complete spikelets. Often only the glumes are left on an old inflorescence.
- Very young inflorescences also cause difficulties with identification in certain genera, for example, *Aristida* and *Loudetia*.
- Try to collect at least one duplicate. Duplicates can be very useful not only in building up an exchange system with other herbaria, but also if there are problems with identifying a specific taxon. A duplicate can then be sent to an expert on that specific group; people are usually only too happy to help in exchange for a specimen for their herbarium.
- The best equipment for collecting grasses, I have found, is a geological or prospecting hammer. It is reasonably weighty and has a sharp side that makes digging easy, and it can also be used for leverage.

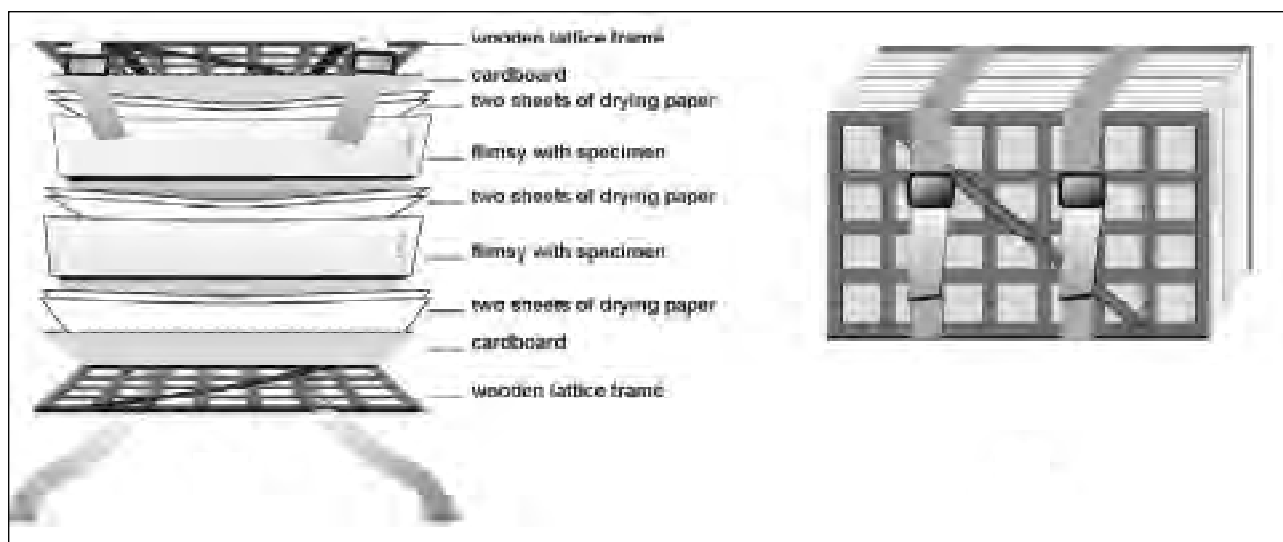
## Labels

Detailed description of label information is given in *Strelitzia* 7. Remember that the information on a label not only tells one about a particular specimen but can also be used to build up information on a particular species.

- All details about the plant that cannot be seen or obtained from the dried, pressed specimen should be given, such as certain characters of the plant and its habitat.
- Supply the usual information such as collector's name and number, date of collecting, and details of the locality (major, minor, and precise), as well as the latitude and longitude (GPS readings if possible).
- Record the height, especially in the case of taller grasses for which representative parts from smaller plants are pressed to fit onto a mounting board.
- Give the colour of the plant, usually referring to the leaves. This can be described as different shades of green or grey or given as glaucous; old leaves are often red. The culms often also have a distinctive colour that may or may not disappear on drying.
- Chewing a grass or crushing the leaves can give additional information.
- Any uses for a grass should also be noted.



Lyn preparing grass specimens while on a field trip to the Nyika Plateau. (Photo: Chris Willis)

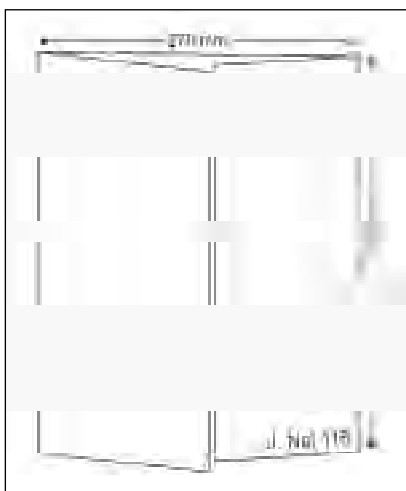


Assembling an effective plant press. (Drawing by Sandra Turck, NBI)

### Pressing

As in the case of plants from other families, grasses have to be pressed as flat as possible and as quickly as possible. The basic equipment is therefore the same. Remember to make all components of the press, except the flimsies, slightly larger than the standard mounting board. You will need:

- Two strong, rigid wooden frames with cross bars to allow for airflow, the frames slightly bigger than a standard mounting board.
- Two straps that are easy to tighten or loosen when the press has to be closed or opened, but otherwise remaining firm.
- Drying paper should be fairly thick and absorbent. Printed or unprinted newspaper can be used. Cut to size if necessary and staple together for thickness.
- Cardboard sheets that are fairly rigid (to improve pressing by separating bulky objects from more deli-



Folding a flimsy.  
(Drawing by Sandra Turck, NBI)

cate material) and corrugated (for ventilation to speed up drying).

- Flimsies can also be made out of newspaper. Fold the paper to have the opening in the middle. This system works very well as it prevents specimens from sliding out while still moist and springy. The folded flimsy should be the size of a standard mounting board. One can then fill the sheet with a large specimen knowing it will fit the mounting board, or be sure that enough material is being pressed to fill an entire mounting board. Remember to leave a space for the label. Flimsies can be used over and over, but it is important to delete all previous collectors' names and numbers and any other old information relating to previous collections. It is a good idea to mount specimens as soon as possible to make the flimsies available for re-use.
- As with other plants, grasses should be pressed as soon as possible after collection. Although the dropping of spikelets/flowers and leaves is usually not such a problem as in some other families, wilting can occur even if it is not always evident at first glance. In grasses, wilting causes the leaves to fold or roll. As this is sometimes a key character, it is important to note the state of the leaves on collecting. If it changes, put this information on the label.
- If possible, press the whole plant. Even fairly tall grasses can be pressed without cutting them into pieces. The specimen (leaves, culm and inflorescence) can be folded a number of times to fit in a flimsy and one can then be sure that it will be the correct size for mounting. You can bruise the hard culm at the point of folding by using your fin-

gernails. If it is impossible to press the plant as a whole, try and cut it up into parts: the inflorescence, middle section, and basal part, keeping the leaves whole. The problem with not pressing an entire plant is that, between the time of collecting and the time of mounting, loose parts can become separated and inadvertently placed in the wrong collection.

- There are some taxa for which it would be impossible to collect and press an entire plant. In such cases, the inflorescence should be placed on one sheet, a piece of the culm possibly showing the branching and leaves or only leaf sheaths on a second sheet, and finally the basal section with roots and/or rhizome on another sheet, all clearly marked as Sheet 1, 2, 3 and so on.
- Separate the duplicates before pressing. Do **not** take a large tuft, bend the culms and inflorescences close together, press and dry it and then try to separate the material into various specimens for mounting and for duplicates. This cannot be done without damage: often the spikelets are lost, inflorescences are broken, and the plant no longer lies flat or fits well onto the mounting sheet.
- Press the specimen as you want it to look on the mounting board. Show the shape of the inflorescence, shape of the leaf blade, the basal parts, and as much of the habit as possible.

### Drying

The basic principle remains the same: dry as soon as possible after collecting. Grasses usually dry quickly and easily, unlike many other plant families.

- Beware of too high a temperature, as it tends to make the plants brittle.
- Initially the drying paper should be changed every day and then less frequently until the material is dry, depending on the weather. The paper can sometimes become covered in fungus, especially if it is hot and humid or cold but very rainy.

### Mounting

- Do not draw the inflorescence(s) close together or towards the plant. This may save time when mounting, but generally makes it impossible to see the shape of the inflorescence and other characters are sometimes also hidden.
- Do not use a lot of glue but do use enough straps, which are generally removable, to keep the various plant parts firmly in place.
- Keep glue away from nodes, the ligule, inflorescence, and spikelets.
- Glue the back of the base, but do not put on so much that it penetrates through the tuft to the front and obscures any characteristics.
- Be aware that in certain genera, like *Melinis* and *Oryza*, the spikelets tend to drop during drying. Such loose material should be placed in an envelope and mounted with the specimen. 📎

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A well-pressed and beautifully mounted grass specimen.  
(Drawing by Gillian Condy)

# A Checklist of *Zimbabwean Grasses* Published

The first SABONET Poaceae Checklist was published in September 2002 as Number 16 in the SABONET Report Series, and was compiled and edited by Christopher Chapano, a staff member of the National Herbarium and Botanic Garden of Zimbabwe. This checklist follows on *A checklist of Namibian plant species* by Craven (ed.), published in November 1999 as SABONET Report No. 7. These are the first two checklists of approximately 16 that are planned for publication before 31 December 2003.

*A checklist of Zimbabwean grasses* begins with an **Introduction** to the grass flora of Zimbabwe, a literature review and a guide for using the checklist. Also included is a **map** of Zimbabwe with the major floristic regions clearly indicated. A **Checklist of Zimbabwean grasses** follows, based on the holdings of the National Herbarium of Zimbabwe (SRGH). The checklist comprises 152 genera, which accounts for 520 indigenous species and 20 naturalised alien species.

The Global Environmental Facility/United Nations Development Programme through the SABONET Project supported the publication financially. Many thanks to the Department of Research and Specialist Services, Zimbabwe, and the dynamic National Herbarium of Zimbabwe, for the support they gave to the project and for accommodating the production of the checklist in their day-to-day activities.

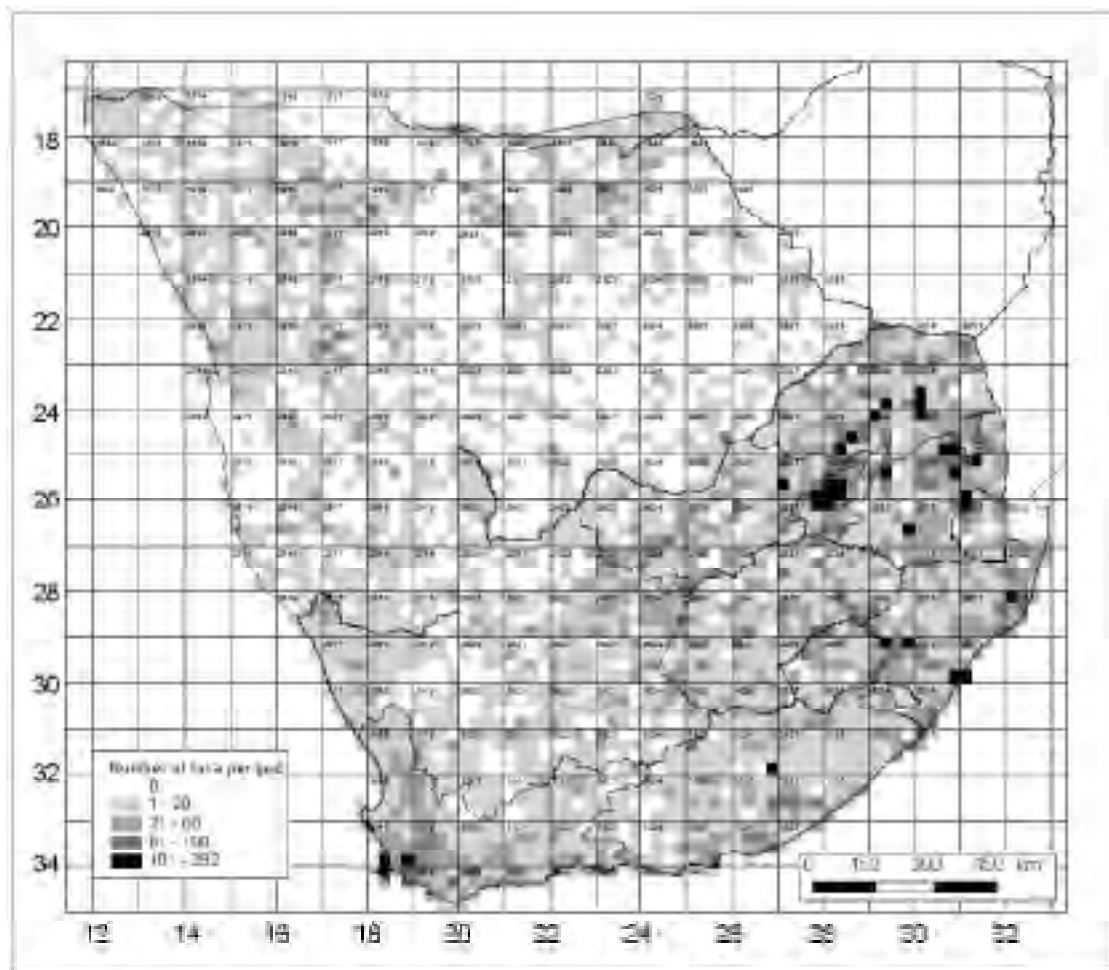
Report details: CHAPANO, C. 2002. *A checklist of Zimbabwean grasses* Southern African Botanical Diversity Network Report No. 16. SABONET, Harare. 30 pages. ISBN 1-919795-66-9.

The report is available free of charge from the SABONET Regional Office. 📎

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# A Single Map— Much Information and Many Uses



This map shows the number of grass taxa per quarter-degree square in the holdings of the National Herbarium in Pretoria. Much can be learned from this map: it indicates which grids should be targeted for further collecting and highlights areas of high rainfall and grassland vegetation; it even points out areas that used to be missionary stations or agricultural research stations!

The map shown here represents the number of grass taxa per quarter-degree square for the FSA region\*, represented in the holdings of the National Herbarium Pretoria (PRE). This single map is the key to much information, for example, the status of the herbarium collection, past history of collectors, collecting intensities, as well as the reasons for the various intensities. Quantitative maps like this also have many uses for herbarium workers:

- The status of the collection of the family Poaceae at PRE can easily be seen.
- It is immediately clear in which grids or areas collecting is needed to ensure that the entire distribution range of all taxa of Poaceae for the FSA region is represented in the herbarium.
- Knowing which grids are under-collected makes field trips easier to plan and much more cost-effective.

## High Collecting Intensities

Grids with high numbers of taxa per quarter-degree square are often an indication of cities or towns where accessibility is easier and the concentration of possible collectors higher. Places with a herbarium or important agricultural centre or research farm usually also fall into this category. Research often reveals historical or other interesting facts about collectors or areas of high collecting intensities.

Examples of well-collected grids surrounding towns or cities:

- Namibia— 2217CA (Windhoek)
- South Africa— 2329CD (Polokwane); 2528C (Pretoria); 2824DB (Kimberley); 2926AA (Bloemfontein) and 2930CB (Pietermaritzburg); 3418AB (Cape Town)

- Swaziland— 2927AD, 2631AC (Mbabane)

Nature reserves are usually well collected compared to the surrounding areas:

- 2929AB (Giant's Castle Game Reserve)
- 2823AA (formerly Hluhluwe Game Reserve)
- 2817AA, AB, CA (Richtersveld National Park)

Ms Henrici of the Division of Plant Industry was sent to Fauresmith in 1929 to work on Karoo vegetation and pasture problems. She did extensive collecting in the area and was instrumental in building up the Fauresmith Veld Reserve, which was maintained for many years afterwards. Other officials stationed there after her continued collecting and sending specimens to

PRE. Hence 2925CB falls into the 61-plus range of grass taxa per grid, but the surrounding grids have 20 or fewer taxa represented in PRE.

In Lesotho, the high number of grass taxa collected in 2828CC is the result of the collecting efforts of Ms Dieterlen, a missionary and teacher who lived in the area around 1895, and who collected on the Leribe plateau.

In Swaziland, the high number of taxa for 2631AA, AB, AC is mainly due to the collecting of Prof. R.H. Compton who retired there in 1953. Later, Ms K. Braun, who was stationed at the Malalotje Nature Reserve, added more specimens to the PRE collection.

In Namibia, the high number of taxa for 1918AC is probably due to the location of an Agriculture Research Station. It would be interesting to know why Rundu in 1719DD is represented by such a high number of Poaceae taxa.

### Vegetation Types and Rainfall

Vegetation types and rainfall are also indicated by patterns on the map, as the following examples show.

The grasslands—for example, those on the Lesotho/South African border, the northwestern corner of Swaziland, the grids 2430, 2530 and around Johannesburg—are indicated by 61-plus taxa of Poaceae per quarter-degree grid.

The Cape Floral Kingdom with its fynbos vegetation is usually characterised by a restioid component that replaces the grass component on nutrient-poor soils in this winter-rainfall region. The map, however, shows a relatively high Poaceae diversity for the grids 3318CD, DD; 3319 AD, CA, CB, CC; 3418AD, BB; 3319AA, BD (Western Cape) in this vegetation type. The reason may be that, apart from the high human population density and therefore possible collectors, there are Poaceae genera occurring in these grids that are endemic or near-endemic to the fynbos. In addition to these endemic taxa—*Pentaschistis* (30 taxa), *Ehrharta* (24 taxa), and *Pentameris* (5 taxa)—there are other widespread grass taxa that also occur in this area.

The more mesic eastern and southern parts of South Africa, as well as Swaziland and Lesotho, are instantly recognisable as areas of high collecting intensities and grass diversity. Being wetter, there are probably more

grass taxa growing in these grids. More people tend to live in the wetter regions of a country; people also prefer retiring to such areas and then often become interested in and have more time to collect plants.

By contrast, the western part of the FSA region is drier, and rainfall is not only less, but also very unpredictable. This makes planning of collecting trips very difficult for herbarium staff, especially in view of the problems of obtaining collecting permits and long-term financial planning. These areas are usually less densely populated and accessibility is difficult, since there are fewer access roads and it is difficult to find the landowners. Typical examples in South Africa are the grids 2919, 2920, 3019, and 3020 with nil or only 1–21 grass taxa per grid represented in PRE. The vegetation in this area is sparse and not generally considered a botanical hotspot—few professional or ama-

teur botanists are interested in collecting here.

### Poaceae Representation

The table shows the percentage of grids on the map for each category of taxa per grid:

- For the FSA region as a whole
- For each country of the FSA region
- For the different provinces of South Africa
- The percentage of grids present in each country of the FSA region and in the provinces of South Africa.

It is clear from these figures that for a family as large as the Poaceae, the representation per grid in PRE is still poor for many areas. In the whole FSA region no Poaceae have been collected in 32% of the grids, and 50% have only 1–20 taxa per grid. Since Poaceae diversity varies across the FSA region, it is often difficult (apart from nil grids)

### Distribution of grass specimens

**Grid squares were divided among four categories based on the number of Poaceae taxa per grid. Values are percentages of the total number of quarter-degree grid squares per country or province.**

Country or province	Category (number of Poaceae taxa per quarter-degree grid square)				Percentage of total number of FSA grids
	0	1-20	21-60	61-292	
<b>FSA countries:</b>					
Botswana	63	35	3	0,1	21,7
Lesotho	11	43	36	11	0,7
Namibia	43	50	7	0,3	31,2
South Africa	10	56	25	8	48,5
Swaziland	14	48	19	19	0,6
<b>SA provinces:</b>					
Limpopo	7	55	41	18	4,6
Mpumalanga	2	22	18	9	2,9
Gauteng	0	19	22	58	1
Kwa-ZuluNatal	1	43	40	15	3,9
Free State	6	64	22	7	4,9
Eastern Cape	5	73	17	4	7,3
Western Cape	7	56	31	6	5,5
Northern Cape	25	60	14	0,2	11,4
North West	13	54	27	6	4,3
<b>FSA as a whole</b>	<b>32</b>	<b>50</b>	<b>25</b>	<b>8</b>	<b>100</b>

\*The FSA (*Flora of southern Africa*) region covers Namibia, Botswana, Lesotho, South Africa, and Swaziland.

## How to Create your own Quantitative Distribution Maps using ArcView

You can create a quantitative distribution map in ArcView by adding an existing table (tab-delimited text file or dbase file) to your project. This table should contain the grid references, for example, 2329AB, and the corresponding number of taxa per grid. The latitude and longitude should be in separate fields in the table and these values must be in decimal degrees.

Grid	Latitude	Longitude	Total number of species
1813CB	-18,625	13,375	0
1813CC	-18,875	13,125	16
1813CD	-18,875	13,375	1
1813DA	-18,625	13,625	13
1813DB	-18,625	13,875	7
1813DC	-18,875	13,625	40
1813DD	-18,875	13,875	9
1814AA	-18,125	14,125	12
1814AB	-18,125	14,375	3
1814AC	-18,375	14,125	5

1. Add the table from the PROJECT window in ArcView. After you have selected the correct path and filename, ArcView opens the file in your project.
2. Now add the table as an EVENT THEME from the VIEW window. Select the correct table from the TABLE dropdown list. If the correct names for the X and Y fields are not chosen automatically, choose them from the X and Y FIELD dropdown lists. ArcView now adds the new theme to your view containing all the points defined in your table.
3. To change the way your theme is displayed, select GRADUATED COLOR from the LEGEND TYPE dropdown list in the LEGEND EDITOR. From the CLASSIFICATION FIELD dropdown list, choose the attribute that you want to use to classify the features, for example, *total number of species* and then change the colour scheme if needed.
4. Click APPLY to redraw the view using your new legend.
5. If you want to print the map with a title, scale bar, legend etc., create a layout of your view.

to decide which grid category should be regarded as under-collected for any given area. It is interesting that the highest percentage of grids falls in the category 1–20 taxa per grid for both the FSA region as a whole, and for each country individually.

Botswana and Namibia, both large countries with around 21% and 31% of the total FSA grids and relatively low population densities and few roads, have the most grids with nil taxa collected (63% and 43%, respectively). The PRE collection can benefit by collecting in these grids. Now that the herbaria in these countries have computerised their Poaceae data, it would be interesting to compare maps to see if similar collecting density patterns emerge.

Grass taxa within South African grids are relatively well represented in PRE, with only 10% empty grids. The Northern Cape, which contains the most grids (11% of total grids for South Africa), is also the most under-collected, with 25% of its grids empty. This area lies in the dry, sparsely populated western region of South Africa. Gauteng,

the smallest province, but in the more mesic area, with the highest population density, largest road network, and most tertiary educational institutions, has 58% of its grids well collected with regard to Poaceae taxa, while no grids have nil grasses collected.

### Conclusion

This map shows that there is still much collecting to be done before we'll have a complete distribution record for all grass taxa in the FSA region. It also indicates the grids that should be targeted for further collecting and highlights areas of possible high rainfall and grassland vegetation. It also alerts one to do research on the reasons for high or low collecting densities, resulting in the discovery of interesting historical facts, such as the existence of missionary stations or agriculture research stations. 🏠

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## Definition of the year

**Suburb:** place where people bulldoze all the plants, eradicate all the wildlife, and then name streets after them.

## Definition of the millennium

**Vandalism:** when humans destroy what humans have created.

**Development:** when humans destroy what nature has created.



# A Preliminary Report on *Loudetia*

An excerpt from an MSc project proposal: *A phenetic and cladistic account of the genus Loudetia Hochst. ex Steud. with a preliminary assessment of the conservation status of the genus in southern Africa*, supervised by Prof. Kevin Balkwill, University of the Witwatersrand, and Lyn Fish, NBI, Pretoria.

The grass genus *Loudetia* Hochst. ex Steud. (Panicoideae, Panicoideae, Arundinelleae) occurs extensively throughout tropical and subtropical Africa, with outliers in Madagascar and tropical South America (Hubbard 1936, 1937; Phipps 1964; Clayton 1970; Gibbs Russell *et al.* 1990; Watson & Dallwitz 1994; Van Oudtshoorn 1999). It has been recorded in various biomes and phytocoria, including Madagascar, Saharo-Sindia, Sudano-Angola, West African Rainforest, Namib-Karoo, Saharo-Sudan, Somalo-Ethiopia, South Tropical Africa and Kalahari.

## Number of Species

Earlier reports estimate that there are between 20 and 40 species—40 (Hubbard 1936), 30 (Phipps 1964), 28 (Clayton 1972) and 20 (Clayton *et al.* 1974). More recent reports put the figures between 23 (Clayton 1989) and 26 species (Gibbs Russell *et al.* 1990; Watson & Dallwitz 1994), ten of which have been recorded in southern Africa (Clayton *et al.* 1974). From these inconsistent estimates, it is impossible to know the exact number of species in the genus.

## Habitat

The plants grow in helophytic, mesophytic, or xerophytic environments, mainly in poor, shallow soils in open savanna woodlands, on stony slopes, and at the edges of vleis (Watson & Dallwitz 1994; Van Oudtshoorn 1999). They may therefore be used as indicators of poor soil.

## Description

*Loudetia* species are caespitose, mostly perennial (at least three North African species are annuals,) with erect culms, from 20 cm to over 450 cm high. Leaf-blades are filiform or flat, relatively short to long and taper to an acute apex. The ligule is a fringe of hairs. Indumentum is variable within and between species in both vegetative and reproductive parts, being glabrous, glabrescent, or hairy. It is not known whether co-occurring populations of *Loudetia simplex* (Nees) C.E. Hubbard

with tubercle-based and non-tubercle-based hairs on glumes and/or lemmas exchange genetic material, and there is a need to investigate this to ascertain their taxonomic status. The inflorescence is an open or contracted panicle (Phipps 1964); a few species have a spike-like panicle.

The basic chromosome numbers are  $x = 6$  and 12 (Metcalf 1960) and polyploidy has been documented, with  $2n = 20, 24, 40$ , and 60 (Watson & Dallwitz 1994).

## Utilisation

Some species can be used for thatching roofs (Hubbard 1937), making hand brooms or occasionally for providing coarse pasture (Van Oudtshoorn 1999). The seeds of *Loudetia esculenta* (a doubtful member of the genus) are eaten in Sudan (Hubbard 1949; Watson & Dallwitz 1994) while *L. simplex* is a garden weed. *Loudetia* is therefore a genus of some economic importance.

## Nomenclature

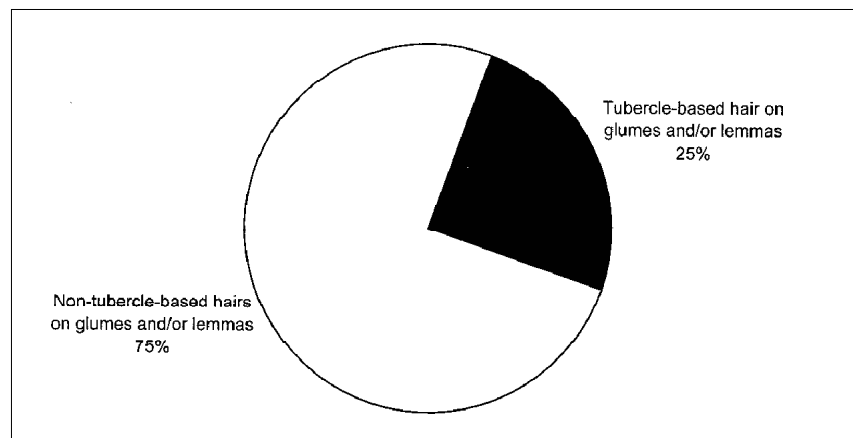
Hochstetter originally proposed the generic name *Loudetia* in 1841 for an Abyssinian grass, *Loudetia elegans* Hochst. (Hubbard 1936; Clayton 1970). Since no description was provided, however, the name was invalidly published. Subsequently Braun provided a brief description of the type species *L. elegans* to validate the basionym. He later noted that the generic names

*Loudetia* and *Tristachya* Nees were applied to indistinct taxa (Hubbard 1949), which differed only in the diad and triad spikelet aggregation. He combined the two genera and opted for the name *Loudetia*, under which *Tristachya* became a section. As this was a later homonym, *Loudetia* became a superfluous name for *Tristachya*; this application of the name was illegitimate. In 1854, Steudel provided the generic description that separated *Tristachya* from *Loudetia*. He used the same type as the illegitimate *Loudetia* A.Br. to avoid making it a later homonym; hence the name was validly published. Because of wide usage, the homonym *Loudetia* was later conserved over *Tristachya* (Clayton 1970, 1972).

## Delimitation

The genus *Loudetia* is currently known from several piecemeal studies in scattered regional accounts (Hubbard 1935, 1936, 1937, 1949; Metcalf 1960; Chapman 1962; Phipps 1964, 1966, 1972b; Astle 1965; Clayton 1967, 1968, 1970, 1972; Clayton *et al.* 1974; Renvoize 1980; Clayton 1989; Gibbs Russell *et al.* 1990; Watson & Dallwitz 1994; Van Oudtshoorn 1999).

Moreover, Hubbard's (1934) treatment and classification scheme (1937), as well as Conert's (1957) and Lubke & Phipps's (1973) revision of Arundinelleae provide wide coverage of the genus, but all of them are outdated and all but Lubke & Phipps (1973) are based



on subjective methods of taxon delimitation.

This lack of consensus among workers on generic characters and taxonomy is due to the differential weighting of characters (Clayton 1967, 1978). This has caused taxonomic inconsistencies and instability of names and groups in the tribe Arundinelleae and some of its constituent genera, including *Loudetia* (Hubbard 1936; Phipps 1966, 1972b; Clayton 1967, 1972; Renvoize 1987). In general, there has been movement of species among the following genera:

*Arundinella*

*Loudetia*

*Loudetiopsis*

*Danthoniopsis*

*Trichopteryx* and

*Tristachya*

The long list of names associated with *Loudetia*, some of which have been reduced to synonymy or have been excluded from *Loudetia* (Phipps 1972a), exemplifies this situation. Most of the species that were previously described under *Trichopteryx* have been transferred to *Loudetia* (Hubbard 1937; Clayton *et al.* 1974). The creation of a new genus, *Loudetiopsis*, from sections of *Tristachya* and *Loudetia* (Conert 1957) made the latter a fairly homogeneous taxon (Phipps 1964; Clayton *et al.* 1974). It is still lacking a comprehensive definition of some complex taxa, including *L. simplex*. This movement of taxa among the genera may have added to the confusion in the delimitation of species.

### Aims and Objectives

The aims of my MSc study are to publish a revision of the genus for southern Africa and to determine the conservation status of the species. These aims will be achieved through the following objectives:

- Determine whether separate groups can be formed among variable *Loudetia* taxa, or those with anomalous circumscription.
- Elucidate the phylogenetic relationships among *Loudetia* species.
- Assess the conservation status of southern African taxa.

### Materials and Methods

I obtained herbarium specimens on loan from PRE, MO, UWO, BR (electronic material), K, BM, and recently from SRGH. These have been sorted into 18 putative groups, on which phenetic analyses will be based. Qualitative and quantitative morphologies have been assessed for all the putative groups; but analyses await complementary sets of anatomical characters.

### SRGH Internship

I also undertook a study visit to SRGH (13–22 June 2002) with the help of the SABONET Internship Programme, to study the herbarium holdings of *Loudetia* and obtain data required to fulfil the aims set out in the main proposal for the MSc course (partly presented above). SRGH was chosen because it houses specimens from the *Flora zambesiaca* region (Malawi, Mozambique, Zambia, and Zimbabwe), as well as a reasonable number of specimens from Angola, the Democratic Republic of Congo, Tanzania, and Kenya. The objectives of my study visit were to

- Confirm the determinations of the *Loudetia* holdings for the *Flora zambesiaca* region (according to my putative groups).
- Separate the *Loudetia simplex* complex into the two putative groups (one with and the other without tubercle-based hairs on the glumes and/or lower lemma).
- Determine the phenology and the distribution of the groups.

- Collect data leading to the preliminary assessment of the conservation status of the genus in the region.

I examined the whole *Loudetia* collection of 563 specimens at SRGH based on currently accepted names and my putative groups. A few misplaced specimens were moved to the correct names. Where detailed studies were required, the specimens were noted for future corrections or included among the loan material for further studies. These include:

- Vesey-FitzGerald 1711, 2511, s.n.
- Du Toit 1099, 1157
- Astle 394 and Webster 135, which might be *Loudetia demeusei*
- Hyde 140 and Davis 3343, which are doubtfully *L. filifolia*
- All the specimens filed under *L. vanderystii*, *L. coarctata*, and *L. densispica*. They appear to have been mixed up.
- *Loudetiasp.* (Vesey-FitzGerald 1796) might well be a new species; this awaits confirmation by phenetic methods.

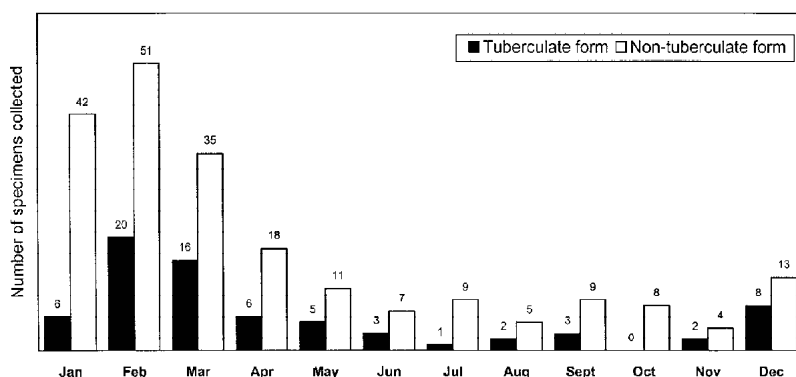
### The *Loudetia simplex* Complex

*Loudetia simplex* is a highly variable group, containing tufted perennial plants with tubercle-based as well as non-tubercle-based hairs on glumes and lower lemma. The presence or absence of these tubercle-based hairs form a striking difference between the members of the *L. simplex* complex and suggest that these may be two separate taxonomic entities.

Plants with truncate lower glume tips and linear leaves that tend to be flat, dominate the non-tubercle-based hair form. Culm nodes are hairy or glabrous and the inflorescence is mostly an open panicle, with very few plants having a contracted panicle type. The lower glume of the tubercle-based hair form is mostly broad and rounded at the tip, with filiform or flat leaves, the latter being involute at the margins and occurring mostly at basal nodes. The outline of the tip of the lower glume is mostly emarginate because of the protrusion of the three veins in the non-tubercle-based hair form, and entire and membranous in the tuberculate form.

Growth characteristics are more variable in the tubercle-based hair form. Culms are slender to relatively stout, relatively long to short (South African ecotypes are predominantly short).

**Flowering times of different *Loudetia* forms**



Also variable is awn morphology, the distribution and the densities of tubercles, with glumes and lower lemma having either dense or sparse hairs. Sometimes the upper glume and/or lower lemma are glabrescent. It will be interesting to see if there are consistent differences in anatomical characters (under investigation).

In addition to these differences, one of the most important morphological characters for the genus, the callus, is similar—Y-shaped, with lengths of both teeth equal and diverging towards the free end. This is probably a character that has led to the two forms being placed together under *L. simplex*. Commonly misidentified are forms with an oblique callus tip (due to different lengths of a pair of teeth), which may be *L. demeusei* (also under investigation).

The tubercle- and non-tubercle-based forms are being studied using phenetics methods with a bias for southern African plants, to determine if separate taxa can be recognized, and at what level of the taxonomic hierarchy (part of objective one).

To determine the geographical distribution of each form with some detail, the collection of PRE (mainly for the *Flora of southern Africa* including Botswana, Lesotho, Swaziland, Namibia, and South Africa) was supplemented by the collection of the *Flora zambesiaca* region housed at SRGH.

It is estimated that of the 319 *L. simplex* plant specimens of the *Flora zambesiaca* region, 80 (25%) have tubercle-based hairs on glumes and/or lemmas whereas 239 (75%) are forms with no tubercle-based hairs.

Two or more species with a sympatric distribution may exchange genetic material if there are no other effective barriers to gene flow. One of the barriers is the difference in flowering seasons. The flow of genetic material and hybridisation can, to some extent, be suspected to occur between tubercle-based and non-tubercle-based hair forms of the *L. simplex* complex, based on the presence of forms with sparse hairs on glumes and/or lower lemma (personal observation), particularly those that exhibit random distribution within a plant (although these may be mutants or rare varieties). Allozyme studies are necessary to test this, but are beyond the scope of the present project. However, by documenting the

flowering seasons of co-occurring forms, I intend to determine whether there is a need for understanding the gene flow between the two forms of *L. simplex*. Phenological data for the *Flora zambesiaca* region have been obtained for each putative group of the complex.

Preliminary results show that both forms flower throughout the year across Africa; this may be due to rainfall patterns (correlation not calculated). In the *Flora zambesiaca* region, the flowering/fruiting period falls mostly between December and April, with a peak season in February for both forms (which may follow summer rainfall). Therefore tuberculate and non-tuberculate forms of *L. simplex* are not reproductively separated in time and the possibility of pollen from one form fertilizing the other cannot be ruled out.

### **Loudetia Distribution**

Ten *Loudetia* species have been recorded from southern Africa:

*L. angolensis*  
*L. densispica*  
*L. filifolia*  
*L. flavida*  
*L. kagerensis*  
*L. lanata*  
*L. pedicellata*  
*L. phragmitopides*  
*L. simplex* complex  
*L. vanderystii*

All of these, except *L. pedicellata*, are known from the *Flora zambesiaca* region, representing a significant proportion (90%) of the number of *Loudetia* species known to occur in the southern African region. A comprehensive coverage of the geographical distribution is therefore one containing a full account of the collections housed at both SRGH and PRE.

While analysing the geographical distribution of the different species, an interesting form of *L. flavida* was encountered: its distribution seems to be limited to the southern end of Lake Tanganyika in Zambia. Further investigation (present study) will determine whether this is simply an ecotype.

In general, a comprehensive study of the biogeography of the genus may help with conclusions about major environmental conditions, and also provide information regarding possible phylogenetic relationships that can be compared with the results of cladistic analyses).

### **Conservation Status**

Unlike other taxa (such as irritating or thorny plants), which can be unattractive to collectors or can present difficulties in handling and processing, *Loudetia* species are fairly uniform in their attributes and they can be assumed to have an equal chance of being collected by different grass workers. The assumption that the number of times a species has been collected over a long period in a given area determines its level of abundance and continued survival, can be used in the assessment of the plants' conservation status. In addition, some collectors have indicated the relative abundance levels for some species by indicating commonness or dominance. Although these are qualitative and non-standardised terms, they may be used with caution in conjunction with distribution maps to give an indication of conservation status, employing the IUCN (2001) threat categories.

### **Conclusion**

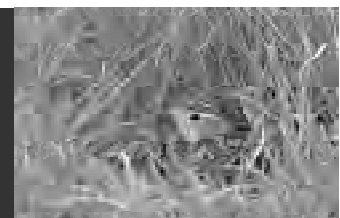
My study visit to SRGH has provided me with data on the phenology, geographical distribution, and conservation status of the species in the *Flora zambesiaca* region, as well as a deeper knowledge of the number of species that have been documented in the region. The data will complement the specimens housed at PRE and make the findings as detailed as possible during the limited study period. This is essential if the aims—to publish the first comprehensive account of the genus using modern phenetics and cladistics methods, and to compile a preliminary conservation status report of *Loudetia* species in southern Africa—are to be achieved. 📌

I am indebted to the SABONET Regional Office and the SABONET Steering Committee, in particular Dr Augustine Chikuni, for accepting my application for funds. Special thanks to Ms Nozipo Nobanda for allowing me to study the *Loudetia* collection at SRGH and providing all the logistical support. Kind assistance was provided by the staff of the National Herbarium and Botanic Garden of Zimbabwe, particularly Mr Ezekiel Kwembeya, Mr Soul Shava, Mr Christopher Chapano and Mrs Beatrice Kaunda. Finally, I would like to thank my supervisors, Prof. Kevin Balkwill and Ms Lyn Fish for their encouragement and support to take on this project as part of my studies at the University of the Witwatersrand.

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—Dickson Kamundi  
National Herbarium and Botanic  
Gardens  
Malawi

## Some Grassland Facts



The Grassland Biome has an ancient origin. Grasslands once covered nearly 50% of Africa's surface. Then, a change in climate around 3 million years ago allowed trees to encroach into these grasslands and create the savannas we know today. This climatic change may also have allowed humans to leave the forests and jungles to settle in the savannas. Even today, the vast majority of the African Savanna Biome's wealth of large herbivorous mammals are grazers, not browsers. Most plant reproduction takes place vegetatively and not through seed production, particularly among bulbous plants and climax grasses. One of the implications is that many grass clumps are genetically identical to grass

clumps that were in the area as long as 2 000 years ago!

### General Characteristics

- The climate is typically warm, with wet summers followed by cold, dry winters with heavy frosts.
- The vegetation is dominated by grass species with a diversity of bulbous plants.
- Shrubs and trees are restricted by fire and frost to protected kloofs and rocky areas.
- The topography is characterised by rolling hills and valleys.
- Grasslands are generally found at either high altitudes or high latitudes.

- Grasslands are often characterised by the presence of wetlands.

### Water Supply

Montane grasslands are "reservoirs" for rainwater. They reduce immediate runoff and therefore erosion, retaining water as ground water or in wetlands, and release it slowly throughout the year (including the dry season) through seepage zones, a sort of sponge effect.

Montane grasslands provide a year-round water supply essential for the cooling of power stations that produce

(continued on page 204)

# Traditional Uses of *Indigenous Grasses of Zimbabwe*

Indigenous communities rely heavily on the natural environment for their sustenance. Local plants play a very important role to maintain the livelihoods of such communities, providing food, raw materials, medicines, and many other products. The relationships between plants and people are often clearer in indigenous societies, demonstrated by the knowledge they have accumulated over numerous generations about the plants around them.

The grass family is of immense value to humans, livestock, and wildlife. Grain cereals such as maize, wheat, and rice provide the staple carbohydrate sources for most human societies around the world. Grasses are the main component of cultivated and natural pastures and are also the food source for most of our herbivorous wildlife.

Zimbabwe has more than 500 indigenous and naturalised grass species (Chapano 2002). Studies on various aspects of the grass family have been

done and are well documented in Zimbabwe and in the southern African region. These include taxonomy (Chipindall and Crook 1976, Bennett 1980, Clayton and Renvoize 1982, Gibbs Russell 1988, Gibbs Russell *et al.* 1991, Van Oudtshoorn 1999), ecology (Rattray 1937, 1960), and pasture use (SARCCUS 1961). In this article, by contrast, we draw attention to traditional uses of indigenous grasses by local Zimbabwean communities, an aspect that is usually underplayed. The scope of the article is limited to the following categories: grasses used traditionally as food (cereals and beverages), grasses used for making domestic utensils, utility items, crafts, and grasses used as construction materials. A few grasses, for example, *Cymbopogon* species, are also used as medicines, but because of the lack of information on medicinal grasses, it will not be discussed here. Most of the information on grass use discussed here is derived from our personal observations and substantiated by documented data wherever possible.

## Grasses Used Traditionally as Foods

The sustenance of many indigenous communities over many generations has relied on a broad food base to supply their nutritional requirements. In the past, local communities used a wide range of indigenous grass species as carbohydrate sources. At present, however, the majority of these grasses have been replaced by the larger-grained exotics, such as maize,

wheat, and rice. Indigenous species have been relegated to use only as substitutes during times of famine. This trend indicates a narrowing of the original plant food resource base, which depended on species more adapted to the local conditions. This dietary shift has had dire consequences on the food security of local communities as exotic crops fail under adverse conditions, are prone to pest and disease attacks, are labour intensive, and require enormous and expensive chemical inputs.

Some indigenous cereals still have considerable food value amongst the locals, exemplified by their continued cultivation, albeit at a subsistence level. It is interesting to note that there was preference for the larger-grained species in the selection of indigenous cereals for cultivation; ease of harvesting and processing most likely influenced this selection. These indigenous grains still fall under the small grain category compared to popular exotic cereals such as maize, showing a continued trend by local communities to select in favour of larger-grained species. Included among these preferred indigenous cereals, which have been cultivated since time immemorial, are the following:

- *Eleusine coracana* Finger Millet (English); rapoko, zviyo, njera, rukweza (Shona); uphoko (Ndebele). Finger Millet is widely cultivated in areas where annual rainfall is above 800 mm. The grain is ground into fine meal and used to make porridge or *sadza*.
- *Pennisetum glaucum* Bulrush Millet (English); mhunga (Shona); inyawuthi (Ndebele). Bulrush Millet grows well under hot, semi-arid conditions found in the Zimbabwean Lowveld. It provides better food security under such conditions, despite not being as popular as maize. The grain is pounded or ground into a fine meal, which is then used to make porridge or *sadza*.
- *Sorghum bicolor*: Sorghum (English); mapfunde, mashava (Shona); amabele (Ndebele). Sorghum grows very well in low-rainfall ar-



Traditional cereal: *Pennisetum glaucum*. (Photo: SRGH, Zimbabwe)



Traditional cereal: *Sorghum bicolor*. (Photo: SRGH, Zimbabwe)

## Grain Cereals

### Commonly used indigenous grass cereals

<i>Eleusine coracana</i>	Finger millet (English); rapoko, zviyo, njera, rukweza (Shona); uphoko (Ndebele)
<i>Pennisetum glaucum</i>	Bulrush millet (English); mhunga (Shona); inyawuthi (Ndebele)
<i>Sorghum bicolor</i>	Sorghum (English); mapfunde, mashava (Shona); amabele (Ndebele)

### Less commonly used indigenous grass cereals

<i>Brachiaria brizantha</i>	Upright brachiaria, common signal grass (English), zinyaruzoka (Shona)	Reynolds 1991
<i>Brachiaria deflexa</i>	False signal grass (English)	Scudder 1962, 1971
<i>Dactyloctenium aegyptium</i>	Crow-foot grass (English)	
<i>Dactyloctenium giganteum</i>	Giant crow foot grass	Scudder 1962, 1971
<i>Echinochloa colona</i>	Jungle rice (English)	Scudder 1962, 1971, Reynolds 1991
<i>Echinochloa crus-galli</i>	Barnyard millet (English)	Scudder 1962
<i>Echinochloa pyramidalis</i>	Antelope grass (English)	Dalziel 1937
<i>Leptochloa uniflora</i>		Scudder 1971, 1972
<i>Oryza longistaminata</i>	Wild rice (English)	Reynolds 1991
<i>Panicum coloratum</i>	Buffalo grass (English)	
<i>Panicum novemnerve</i>		Scudder 1962, 1971, Reynolds 1991
<i>Rottboellia cochinchinensis</i>	Guineafowl grass, shamva grass (English)	Reynolds 1991
<i>Sorghum bicolor subsp. arundinaceum</i>	Common wild sorghum (English)	Scudder 1962, 1971
<i>Sorghum versicolor</i>	Black sudan grass (English)	Reynolds 1991
<i>Sporobolus panicoides</i>	Famine grass (English), Kambumbu (Tonga)	Chipindall & Crook 1976
<i>Urochloa mosambicensis</i>	Gonya grass (English), mbawani (Shona)	Scudder 1962, 1971, Reynolds 1991
<i>Urochloa trichopus</i>		Reynolds 1991

eas. However, like other traditional cereals, it has since been replaced by maize as a staple food. The ground meal from the grain is used to make porridge or *sadza*. A sweet variety of sorghum, sweet cane (ipwa (Shona); imfe (Ndebele)), is grown for its culms that have a high sugar content. The culms are chewed raw for their sweet sap when they are mature.

Several efforts are being made to improve and popularise these indigenous small-grain cereals, in particular in the semi-arid areas where rainfall is unreliable. The Sorghum and Millet Research Team of the Division of Agricultural Research and Extension (AREX) in the Ministry of Lands, Agriculture and Rural Resettlement is working on sorghum and millet improvement at Matopos Research Station and while the International Crop Research Institute for Semi-Arid Trop-

ics (ICRISAT) is working on all small grain crops in Zimbabwe. Despite all these efforts, these small grains are not very popular. This is due to a number of factors, including the difficulties in processing the grain (the traditional processes being labour intensive), the quality of the resulting end product (which is said to be gritty compared to maize meal), the producer prices offered by both local and international markets, and food preferences amongst local communities. It is hoped continued research and awareness will yield positive results in the long run.

Other less-used indigenous grain cereals are listed in the accompanying table. Most of these are used only during times of famine and are collected from the wild.

The most popular traditional cereal beverage is an opaque alcoholic brew called *hwahwa* (Shona) or *utshwala*

(Ndebele). This is mainly consumed at social gatherings, community functions such as participatory communal weeding practices (nhimbe (Shona); ilima (Ndebele)), and in religious/spiritual ceremonies. This beer is made from grain malt, usually Sorghum, Finger Millet or Bullrush Millet.

The malting process is similar for all species, with the grain being steeped in cold water until it starts to germinate. The germinated grain is dried in the sun, ground, boiled into porridge, and allowed to cool. More fermented malt is added and the brew left to stand for one day to several days. The resultant brew is then strained and is ready for serving. Women traditionally undertake the whole brewing process. Today, however, opaque beer is commercially produced by a number of breweries. For this purpose, selected varieties are used and the crop is produced under contract terms between



**Traditional grass products: hand brooms made from *Aristida junciformis*. (Photo: Anthony Mapaura)**



**Traditional grass products: sleeping mats in the background made from *Phragmites mauritiana*; the winnowing basket in the foreground is also made from *Phragmites* sp. and has a rim made from *Oxytenanthera abyssinica*. (Photo: Anthony Mapaura)**



**Modern and traditional grass products: a range of baskets made from *Phragmites* sp. (Photo: Anthony Mapaura)**

## Broom Grasses

### Commonly used broom grasses

<i>Aristida junciformis</i>	Bristle grass (English); mutsvairo (Shona); inkonkoni (Ndebele)
<i>Miscanthus junceus</i>	Broom grass (English); indabula, umthala (Ndebele)

### Less commonly used broom grasses

<i>Loudetia simplex</i>	Common russet grass (English); umthanyelo, uzungu (Ndebele)
<i>Pogonarthria squarrosa</i>	Herringbone grass, cross grass (English); nyakatswatswa (Shona), umadolwane (Ndebele)
<i>Sporobolus pyramidalis</i>	Cat's tail grass (English); dindindi, mungapunga (Shona); isikhaba, umsingizane (Ndebele)

the farmer and the brewing company. This arrangement sidelines small-scale farmers who may be seeking markets to sell their crops commercially.

A non-alcoholic brew, *mahewu* (Shona) or *amahewu* (Ndebele), is made by adding ground fermented grain from the same species to thin grain porridge and leaving this to stand overnight. The resulting sour flavoured brew is usually drunk with sugar added. *Mahewu* is now also produced commercially.

### Domestic Utility Items and Crafts

A variety of traditional domestic uten-

sils are grass-derived. These include such items as sleeping mats (rupasa (Shona); icansi (Ndebele)), carrying baskets, winnowing baskets (rusero (Shona)), containers (tswanda (Shona); incebethu (Ndebele)), and brooms (mutsvairo (Shona); umthanyelo (Ndebele)). Most of these items were, and still are, functional around the home. These days, however, there is a shift towards producing utensils and decorative crafts for sale, with some communities dominating the trade, such as the Tonga tribeswomen who make very popular decorative baskets. Both men and women do most of the craftwork, with the exception of specialized decorated baskets, mainly done by women. Other modern crafts

from indigenous grasses include door, wall, and floor mats, shopping baskets, washing baskets, dog baskets, trays, and basket chairs. Some of the grasses used for these purposes are listed below:

- *Aristida junciformis*: Bristle Grass (English); mutsvairo (Shona); inkonkoni (Ndebele). This is a popular grass for making traditional hand brooms, as is implied by the common Shona name (mutsvairo) which means broom. A photo of these brooms was used for the cover of the *Checklist of Zimbabwean Grasses* (Chapano 2002).
- *Miscanthus junceus* Broom Grass (English); indabula, umthala (Ndebele). Culms of this riverine grass are used for making brooms; bundles of dry culm portions are used as rattles or castañets (indabula) during traditional Ndebele dances. The culms (umtala) are also used in weaving.
- *Oxytenanthera abyssinica* Bindura Bamboo (English); muchenjere, mushenjere (Shona); umhlanga-malambo (Ndebele). Split culms of this grass are used in basketry, for making musical flutes and in decorative craftwork.
- *Phragmites mauritiana* Reed (English); tsanga (Shona); umhlanga (Ndebele). The culms of this riverine grass are split longitudinally and sewn together to make sleeping mats. It is also used to make basket chairs, large containers, washing baskets, shopping baskets, as well as fishing traps.

## Thatching Grasses

### Commonly used thatching grasses

<i>Hyparrhenia filipendula</i>	Thatching Grass or Three o'Clock Grass (English), zhengezhu or dangaruswa (Shona), or intungwa (Ndebele)
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### Less commonly used thatching grasses

<i>Andropogon gayanus</i>	Blue grass (English)
<i>Cymbopogon caesius</i>	Turpentine grass (English); imbanjana (Ndebele)
<i>Cymbopogon nardus</i>	Tambookie grass (English)
<i>Dichanthium annulatum</i> var. <i>papillosum</i>	Matopos marvel (English), ikhununu (Ndebele)
<i>Heteropogon contortus</i>	Spear grass (English); tsine (Shona); inzala (Ndebele)
<i>Hyparrhenia nyassae</i>	Bronze-awned thatching grass (English)
<i>Hyparrhenia hirta</i>	Thatching grass (English)
<i>Hyperthelia dissoluta</i>	Yellow thatching grass, yellow spike thatching grass (English)
<i>Pennisetum macrourum</i>	River bank pennisetum, Umfuli grass (English); nyakatswatswa (Shona)
<i>Setaria sphacelata</i>	Golden timothy (English), inguyu (Ndebele)

## Grasses Used for Construction

Grasses are also used in construction work, mainly to thatch traditional huts and other structures in village homesteads. Thatched roofs are now a trendy feature in urban home gazebos, safari chalets, and hotels in tourist resorts.

The most popular and widespread thatching grass is *Hyparrhenia filipendula*, commonly known as Thatching Grass or Three o'Clock Grass (English), zhengezhu or dangaruswa (Shona), or intungwa (Ndebele). Some grasses like *Andropogon gayanus* are only popular in localised areas where they can be gathered in large quantities.

Collecting thatching grass is the domain of women. Women cut the grass close to the base using a sickle and trim it to rid it of loose blades and racemes. The cut grass is then tied into bundles using strips of bark, with all the bases facing one end, and stored to dry. The men do the actual thatching.

Other construction work, such as supporting structures for chicken runs and drying racks, on the other hand, is done using the more robust-culmed grasses *Oxytenanthera abyssinica* and *Phragmites mauritianus*. Culms of these grasses are also used in modern agriculture as trellises and stakes to

support tomatoes, beans, and grapevines.

## Conclusion

By highlighting some of the traditional uses of indigenous grasses in Zimbabwe, we hope that this article, in addition to the contribution it makes to the process of documenting traditional knowledge, will make people more appreciative of the value of the indigenous plant resources around them and the need to use it sustainably. We believe that support for maintaining useful plant resources will contribute to the conservation of the indigenous grass genetic resources for generations to come. 🌱

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Modern grass products: crib and food storage basket in the background, and washing basket in the foreground. (Photo: Anthony Mapaura)



Modern grass product: doggy basket. (Photo: Anthony Mapaura)



Modern grass products: basket chairs made from *Phragmites* sp. (Photo: Anthony Mapaura)

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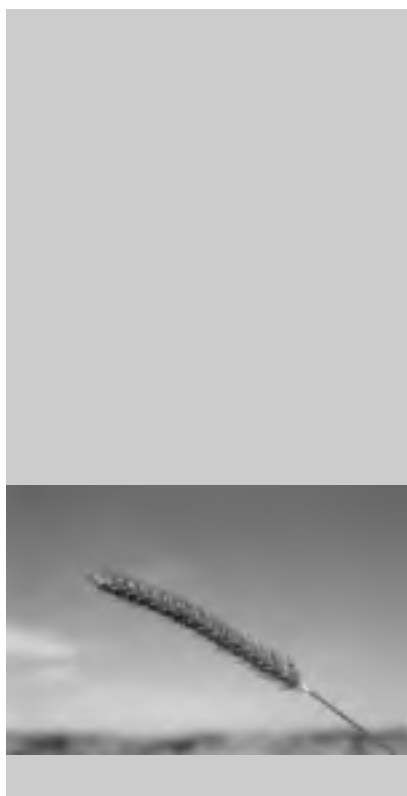
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# Does the Grassland Biome of South Africa have Endemic Grass Species and Genera?

With approximately 24 000 species on less than 2.5% of the world's land surface area, southern Africa is home to the richest temperate flora in the world. In addition, a very large component of this flora is endemic to the subcontinent (Van Wyk & Smith 2001). Although it was determined that an estimated 11 160 plant taxa are endemic to widely recognised sub-continental Regions and Centres of endemism, a significant further portion of the flora is restricted to southern Africa outside of these units (see footnote 4 to Table 1 in Van Wyk & Smith 2001). Estimates are that as much as 60% (Le Roux 2002), or more than 14 000 species, of the southern African flora is endemic to the region. It is an ongoing initiative of the Research Directorate of the National Botanical Institute of South Africa to accurately document the entire southern African endemic flora.

## The Poaceae in Southern Africa

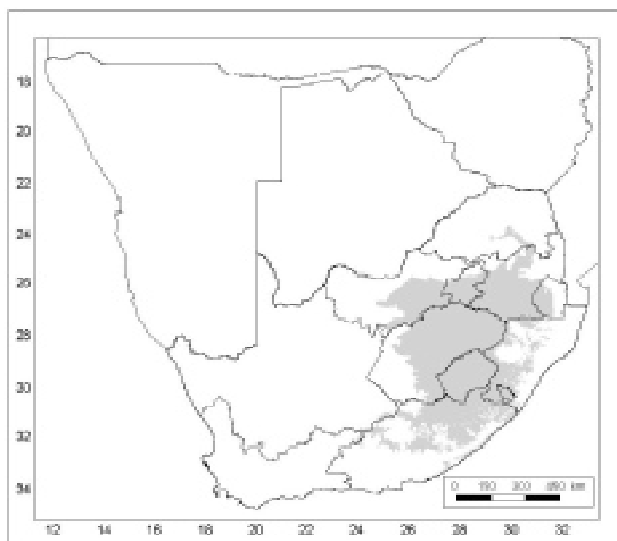
The Poaceae include some of the economically most important species used by humankind, and is often a very important component of local flora worldwide. The uses of grasses are indeed many, ranging from pasture for grazing domestic animals, to basket-weaving material, for building roofs, shelters, and houses, and as food (Van Wyk & Gericke 2000).

Although the rich and unique flora of the Fynbos Biome is known to have a number of endemic grass species and genera (Goldblatt & Manning 2000), the endemic grass component of the Grassland Biome has not yet been determined. In this article we report on the results of an investigation aimed at determining whether this most densely

populated and farmed part of South Africa harbours any endemic grasses.

## Methods

Two parallel approaches were followed to determine whether the Grassland Biome contains any endemic grass species and genera. First, the authoritative publication on the grasses of southern Africa by Gibbs Russell *et al.* (1990) was consulted. All species indicated as being endemic to the *Flora of southern Africa* (FSA) region (Botswana, Lesotho, Namibia, South Africa, and Swaziland)—and as occurring only in the Grassland Biome or in the sub-alpine montane grassland of the Great Escarpment—were noted. Second, the National Herbarium Pretoria (PRE) Computerised Information System (PRECIS) was queried to produce a list of grass species that occurred only in the quarter degree grid squares covering the Grassland Biome, and nowhere else in the study region covered by PRECIS, namely Angola, Botswana, Lesotho, Malawi, Mozambique, Namibia, South Africa, Swaziland, Zimbabwe and Zambia. This second list included several exotic grasses introduced for grazing purposes, which we excluded. The two lists were then



The grassland biome of South Africa, including afromontane grassland

crosschecked against each other to improve the degree of accuracy and certainty. To determine whether any genera were endemic to the Grassland Biome of South Africa, the global distribution of each genus (as described by Gibbs Russell *et al.* 1990) was analysed.

## Results

A total of 34 grass species and infraspecific taxa were identified as being endemic to the Grassland Biome of South Africa. (See list at end of article.)

Two of these species represent monotypic genera that are also endemic to the Grassland Biome, including montane grasslands within the borders of South Africa. The two genera are *Catalepis* Stapf & Stent, and *Polevansia* De Winter. No other Grassland-endemic genera were identified.

## Discussion

Though highveld and montane grasslands are usually classified under a single Grassland Biome (Bredenkamp 1999, 2002), a distinction between the two types is made here because of the very different environmental conditions under which they are found.

Highveld grassland is found at altitudes from sea level up to 2000 m above sea level, and is situated on the central highveld plateau, west of the Great Escarpment, in some places extending below the Escarpment down to the coast of KwaZulu-Natal and the Eastern Cape (Bredenkamp 1999, 2002).

Montane grassland is entirely restricted to the high altitude peaks of the Great Escarpment (up to 3000 m above sea level), including the Drakensberg and Soutpansberg Mountains. The cool, wet summer and cold, dry winter conditions on the high-altitude escarpment produce a floristic composition much different to that of the highveld grassland (Bredenkamp 2002). Of the endemic taxa listed, all occur in either the highveld grassland, or the montane grassland, but not in both. All are, however, endemics of the Grassland Biome. Most of the grasses endemic to the Grassland Biome occur in the montane grassland. Exceptions that occur in the highveld grassland are *Aristida sciurus* and *Cynodon bradleyi*

*Cynodon polevansii*  
*Colpodium drakensbergense* and  
*Festuca vulpioides*

The indigenous bamboo, *Thamnochloa tessellatus*, is also an endemic of the Grassland Biome.

Most of the endemic grass species and infraspecific taxa are members of the tribe Danthonieae of the subfamily Arundinoideae. Also contributing several members are the tribe Chloridae of the subfamily Chloridoideae, the tribe Aristideae of the subfamily Arundinoideae, and the tribes Bromeae, Aveneae, and Poeae of the subfamily Pooideae. The tribes Bambusae (subfamily Bambusoideae), Ehrharteae (subfamily Bambusoideae), Paniceae (subfamily Panicoideae), and Rottboelliinae (subfamily Andropogonodae) all have only a single taxon endemic to the Grassland Biome.

The relatively high number of endemics in the Grassland Biome is usually attributed to taxa other than grasses, even though grasses are the most visible element in the biome. It is estimated that more than half of the biomass of the Grassland Biome is made up from taxa other than grasses, including geophytes (bulbs, corms, rhizomes), geoxyllic suffrutices (underground trees (Steenkamp *et al.* 2001)), caudiciform succulents (Smith 1998, Crouch *et al.* 1999), and herbaceous wildflowers (Bredenkamp 2002). Of the 639 indigenous and naturalised exotic grass species and infraspecific taxa occurring in the Grassland Biome (PRECIS), 34 are endemic. Extrapolating from this number—taking into account that an estimated 3 378 plant species occur in the Grassland Biome (O'Connor & Bredenkamp 1997; Bredenkamp 1999, 2002)—one can expect that at least 179 plant taxa, other than grasses, might be endemic to the biome. For an upper estimate one can extrapolate from the estimated 60% endemism for the entire South African flora; meaning that up to 1 988 plant taxa, other than grasses, might be endemic to the biome. With such a large difference between the upper and lower estimates, it is clear that further research on the endemic plants of southern Africa, and the Grassland Biome specifically, is necessary. 🌱

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**The following 34 grass species and infraspecific taxa (presented with their infrafamilial classification) were identified as being endemic to the Grassland Biome of South Africa:**

**Subfamily: Pooideae**

Supertribe: Triticoideae

Tribe: Bromeae

*Bromus firmior* (Nees) Stapf  
*Bromus natalense* Stapf  
*Bromus speciosus* Nees

Supertribe: Poodeae

Tribe: Aveneae

*Agrostis burbuligera* Stapf var.  
*barbuligera*  
*Agrostis burbuligera* Stapf var.  
*longipilosa* Gooss. & Papendorf  
*Agrostis subulifolia* Stapf  
*Helichotrichon galpinii* Schweick.

Tribe: Poeae

*Colpodium drakensbergense* Hedberg &  
I.Hedberg  
*Festuca dracomontana* H.P.Linder  
*Festuca killickii* Kenn.-O'Byrne  
*Festuca vulpioides* Steud

**Subfamily: Bambusoideae**

Supertribe: Oryzodae

Tribe: Ehrharteae

*Ehrharta longigluma* C.E.Hubb

Supertribe: Bambusodae

Tribe: Bambusae

*Thamnocalamus tessallatus* (Nees)  
Soderstr. & R.P.Ellis

**Subfamily: Arundinoideae**

Tribe: Danthonieae

*Pentaschistis airoides* (Nees) Stapf subsp.  
*jugorum* (Stapf) Linder  
*Pentaschistis basutorum* Stapf

*Pentaschistis exserta* H.P.Linder  
*Pentaschistis galpinii* (Stapf) McClean  
*Pentaschistis microphylla* (Nees) McClean  
*Pentaschistis oreodoxa* Schweick.  
*Merxmuellera aureocephala*  
(J.G.Anderson) Conert  
*Merxmuellera drakensbergense*  
(Schweick.) Conert  
*Merxmuellera guillarmodiae* Conert  
*Merxmuellera macowanii* (Stapf) Conert  
*Merxmuellera stereophylla*  
(J.G.Anderson) Conert

Tribe: Aristideae

*Aristida monticola* Henrard  
*Aristida sciurus* Stapf

**Subfamily: Chloridoideae**

Tribe: Chloridae

*Eragrostis patentissima* Hack.  
*Catalepis gracilis* Stapf & Stent  
*Cynodon bradleyi* Stent  
*Cynodon polevansii* Stent  
*Polevansia rigida* De Winter  
*Stiburus conrathii* Hack.

**Subfamily: Panicoideae**

Supertribe: Panicodae

Tribe: Paniceae

*Setaria obscura* De Wit

**Subfamily: Andropogonodae**

Supertribe: Andropogonae

Tribe: Rottboelliinae

*Phacelurus franksiae* (J.M.Wood) Clayton





# Environmental Education in Grasslands

Learning about plants and animals in the Pretoria National Botanical Garden grassland.  
(Photo: National Botanical Institute)

# Why Teach about Grasslands?

Grasslands are found throughout the world. Each of these grasslands has its own unique collection of plants and animals, and supports a great diversity of plant and animal life, many of which are endemic to the biome.

Grasses are probably amongst some of the most important groups of plants for human survival. They keep the earth cool during the day and warm at night and protect the soil from erosion. Grasses provide people with staple foods such as rice, maize, millet, sorghum, wheat, oats, rye, and cane sugar. Meat and milk is an indirect product of grasses that are grazed by animals. Grasses also provide bamboos, reeds, and thatching material for construction, as well as pastures, hay, lawns, and sports fields.

Only patches of natural, undisturbed grasslands remain, because so much of the land has been used for farming and other human activities. The biodiversity has therefore been drastically altered. This poses a major threat to grassland ecosystems and may lead to the extinction of many plants and animals.

The most important challenge facing the present generation is to ensure that this precious natural resource is maintained and utilised in a sustainable way.

Education programmes on grasslands can create a better understanding of the grassland habitat and cultivate a more caring attitude to its conservation and the sustainable utilisation of its natural resources.

## Value of Grasslands

- Very rich biodiversity
- Soil conservation
- Water conservation
- Maintaining earth's atmosphere
- Food for livestock and game
- Material for crafts
- Building material
- Medicinal plants
- Tourism

## Threats to Grasslands

- Urbanisation and industrialisation
- Mining
- Commercial forestry plantations
- Cultivation/agriculture
- Bad farming practices, like overgrazing, frequent burning
- Invasion by alien plants
- Over-harvesting of medicinal plants
- Pollution
- Bush encroachment

There are about 10 000 different kinds of grasses on earth (30% of all plants).

Rice is the staple food of more than half the world's population, while maize provides food for almost 20% of the world's population.

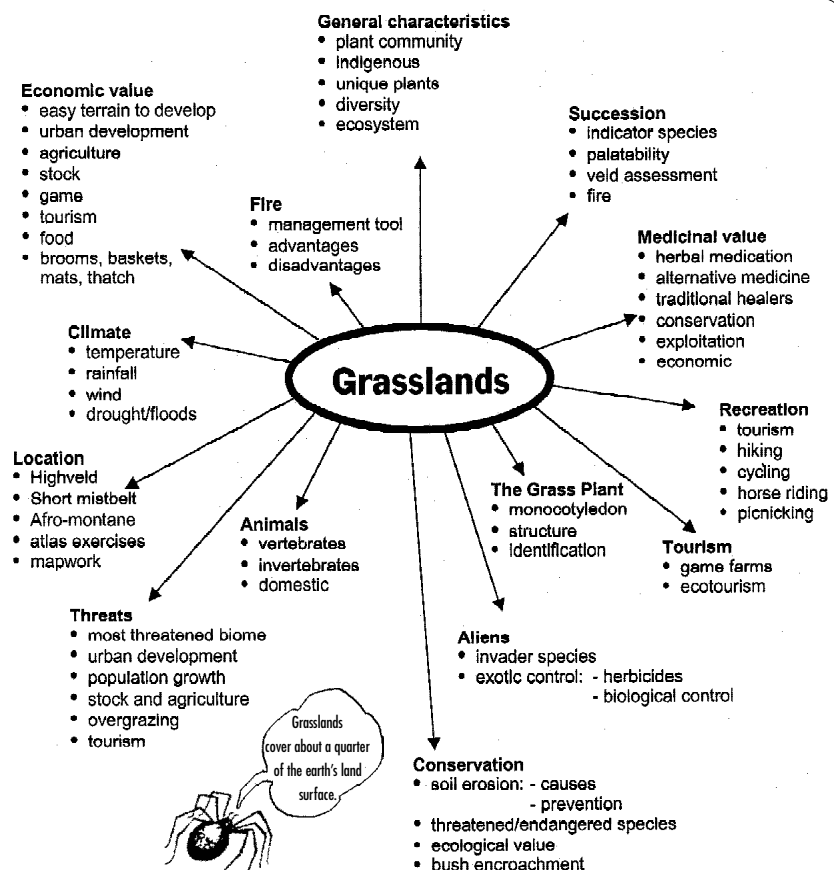
Grasslands are South Africa's most threatened biome.

Africa has 40 indigenous relatives of rice. Many other grain crops also originate in Africa, like Sorghum and Finger Millet.

## Grasslands as an Educational Resource

Grasslands provide great opportunities for interactions with children. Lessons can be structured in both a formal and informal way. The accompanying mind map was developed by some teachers attending a workshop on using grasslands as a teaching and learning resource:

I'm important enough... to be studied!



## Grasslands Education at the Pretoria National Botanical Garden

The Pretoria National Botanical Garden's Environmental Education Section presents hands-on activity-based programmes to visiting schools on a variety of topics. Many of these make use of the grassland: we look at a variety of ecology-based programmes and at the grassland as a biome and compare it to some other biomes represented at the Botanical Garden.

It is not necessary to use complicated worksheets or equipment. The grassland is your resource! Simply collecting insects and signs of animal life and listing the variety of plants in a small area of grassland will provide all you need for a study of a grassland ecosystem. A simple field guide (like Share-Net guide) can be used to identify plants and insects and a "pooter" (insect-collecting bottle) can help with the collection of small fast-moving organisms. Children love this activity and get very enthusiastic about the chase!

Remember to remind them that all bugs are to be released unharmed.

An example of one of our programmes for Senior Primary Level (ages 10–13) gives a good idea of some activities that can be done in grasslands.

We normally conclude by setting a scenario, which asks learners to debate some kind of development in the grassland they have just studied, for example, a casino to be built or a highway to be developed. This enables us to examine issues of sustainability.



**Grassland Life**

Grasslands often contain the most biodiversity. It is possible to observe many small and common life forms in a grassland. It is a good idea to observe the life forms in a grassland and to record them.

**an example of how to conduct your grassland study**

1. Select a small (1m x 1m) sample plot in a grassy area.

2. Record what you see as follows:

3. Record the following data:

4. Record the number of each plant you have counted (e.g. grass, daisy, etc.).

5. Record the following data:

6. Record the number of each plant you have counted (e.g. grass, daisy, etc.).

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66. Record the number of each plant you have counted (e.g. grass, daisy, etc.).

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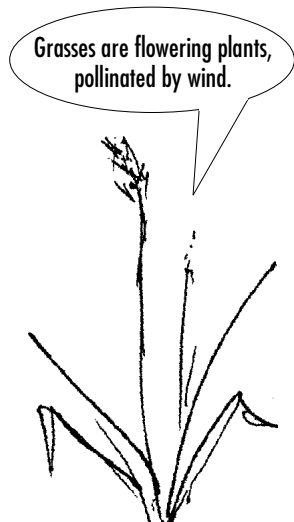
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99. Record the following data:

100. Record the number of each plant you have counted (e.g. grass, daisy, etc.).



**Can you figure out?**

The following questions are for you to answer. Use the information you have learned to answer them.

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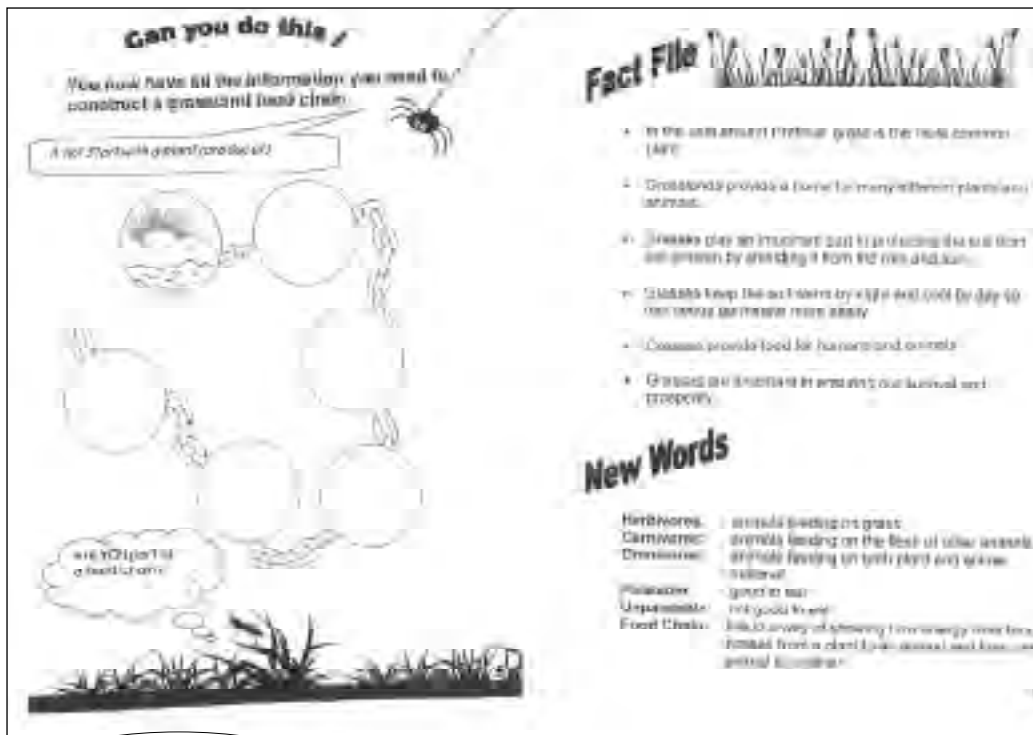
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By changing a few of the activities the programme can easily be simplified for younger learners or upgraded for older learners.



### What is the Educational Significance of these Activities?

By actively engaging in these activities learners get practice at collecting data, recording and comparing results, analysing data, solving problems, interpreting data, and making decisions. Vocabulary and communication skills are enhanced in the process.

After the programme, learners will be able to demonstrate an understanding of the following:

- Use of a field guide as a reference guide to provide information
- Construction of a food chain
- Interdependence of organisms in grasslands
- Value of grasslands
- Effect that different ways of utilisation or development have on grasslands
- Impact of different ways of utilising grasslands

Programmes should be structured in such a way that activities can easily be modified to suit different age groups and language abilities.

To make the most of the programmes at your Garden, it is ideal for teachers to prepare learners for their visit and to use the data collected for follow-up activities back in class. Liaising with teachers before a visit is important to assist both yourself and the teachers to prepare adequately for the outing.

Liaising with the education department in your area is important to ensure that your programme meets the education criteria required.

**Enjoy your grassland!** 🐞

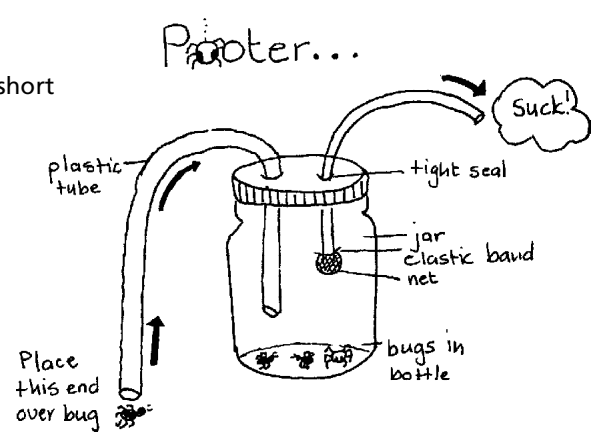
### How to Make a Pooter

You will need:

- A transparent jar (plastic for safety reasons)
- 2 rubber/plastic tubes (soft aquarium tubing): 1 long, 1 short
- Glue
- Net material

Cut holes in the lid, just large enough for the tube to fit really tightly. In this way no glue is needed. If the holes are too large, silicone sealant can be used to glue the pipes to the lid. Paste a small piece of net over one end of the short tube with glue. Push the tubes through the two holes in the lid and close the bottle. The netted side must be inside the bottle.

Now you can collect insects: place the end of the long pipe near a small insect (the insect must be smaller than the diameter of the pipe)—be careful not to put it on the insect, just close to it. Now suck on the short pipe. This creates a vacuum that sucks the insect into the bottle. The net prevents any insects being sucked into your throat.



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TAINTON, N. (ed.) 1991. *Hands-on Grassland Life: a field guide*. Share-Net, Howick.

VAN DEN BERG, I. 1995. *Hands-on soil and compost life: a field guide*. Share-Net, Howick.

### Useful Addresses

SHARE-NET, PO Box 394, Howick, 3290. Tel (033) 3303931

Grassland Society of Southern Africa, Post Net Suite 178, Private Bag X9118, Pietermaritzburg, 3200  
Tel.: (033) 342 5779  
[sc@futurenet.co.za](mailto:sc@futurenet.co.za)  
[www.gssa.co.za](http://www.gssa.co.za)

Botanical Society of South Africa.  
Private Bag X10, Newlands, 7725  
Tel.: (021) 797 2090  
[botsoc@gem.co.za](mailto:botsoc@gem.co.za)

—Arlene de Bruyn  
Principal Education Officer  
Head: Environmental Education  
Section  
Pretoria National Botanical Garden  
Tel.: (012) 804 3200 x222  
[arlene@nbipre.nbi.ac.za](mailto:arlene@nbipre.nbi.ac.za)

**Cynium  
adonense**

Grasslands do not consist only of grass—they also include beautiful herbs, bulbs, and shrubs.

(continued from page 192)

70% of southern Africa's electricity requirements.

### Species Diversity

- Grasslands support 81 plant species per 1 000 m<sup>2</sup>. This compares to 86 species in the Renosterveld and 65 in the Fynbos.
- Of every six plants found in pristine grasslands, only one is a grass.
- There are more than 100 endemic plant species in the grasslands of Mpumalanga, South Africa, alone.
- More than 40% of the plants listed as threatened are located in the moist areas of the Grassland Biome.
- Of the 40 bird species endemic to South Africa, 21 (53%) are found in the Grassland Biome; twelve (57%) of these are endemic to the biome.
- Of the 79 bird species considered threatened or near-threatened on a southern African scale, 31 (39%) are restricted to or substantially dependent upon grasslands.
- Of the 93 species of threatened reptiles and amphibians in South Africa, 13 (14%) occur in the Grassland Biome and 11 (85%) of these are endemic to the biome.
- Of the 195 reptiles endemic to South Africa, 42 (22%) are found in the Grassland Biome; of these, 20 species (48%) and a further seven subspecies are endemic to the biome.
- Of the 54 amphibians endemic to South Africa, 16 (30%) are found in the Grassland Biome; of these 8 species (50%) are endemic to the biome.
- Of the 102 threatened butterflies in South Africa, 31 (30%) occur in the Grassland Biome; one of these species is already extinct and 29 (94%) are endemic to the biome.
- Of the 34 mammals endemic to South Africa, 15 (44%) can be found in the Grassland Biome and four of these (27%) are endemic to the biome.
- Of the 92 threatened land mammals in South Africa 18 (20%) can be found in the Grassland Biome.

### Economics

The remaining grasslands of Mpumalanga and KwaZulu-Natal, South Africa, provide natural grazing to sheep producing more than 8 million kilograms of wool annually, with a value exceeding USD 8 million in 1995. With large numbers of endemic species in southern Africa's grasslands, they have a high, but as yet virtually untapped, eco-tourism potential, worth possibly as much as USD 6 million annually. Although not properly assessed, the economic value of the southern African grasslands to a sustainably-based traditional medicine industry must be considerable.

### Conservation Issues

Between 60% and 80% of South Africa's grassland Veld Types has been irreversibly transformed; less than 2% of South Africa's grasslands is formally conserved.

Of the 115 859 km<sup>2</sup> of grasslands in the northern provinces of South Africa:

- 56 782 km<sup>2</sup> was under cultivation by 1987.
- More than 7 000 km<sup>2</sup> was under plantations by the early 1990s and a further 5 000 km<sup>2</sup> is scheduled for tree planting by 2020.
- South Africa's major metropolitan area—the Gauteng Province with an area of 30 336 km<sup>2</sup> and 8 million inhabitants—lies almost completely within the area.
- 2 000 km<sup>2</sup> of the Highveld is taken up by South Africa's major gold and coal deposits, most of which are mined in opencast pits.

This leaves only 15 000 km<sup>2</sup> available for conservation initiatives in the northern provinces of South Africa.



Source: Southern African Water Crisis (SAWAC)  
[www.sawac.co.za/articles/GrasslandFacts.html](http://www.sawac.co.za/articles/GrasslandFacts.html)

# A Grassland in the *Heart of the City*

One of the greatest assets of the Pretoria National Botanical Garden is its natural grassland. Although the grassland area was disturbed by agricultural activities more than fifty years ago, it has recovered well by going through the natural succession process, to reach a natural climax that is typical of the Bankenveld, with a diverse mixture of wild flowers, climax grasses such as Red Grass, *Themeda triandra*, and Thatch Grass, *Hyparrhenia hirta*, and most of the biodiversity associated with a grassland ecosystem. The Bankenveld (Acocks 1988) is a transition area between the Cold Highland Grasslands of the Highveld and the Bushveld Savanna of Africa.

The Pretoria National Botanical Garden was formerly part of the agricultural research and experimental section of the University of Pretoria. After many negotiations, this piece of land was handed over to the Department of Agriculture in 1946 for an arboretum or botanical garden, where trees and other plants could be planted for research purposes. Many trees were planted, but the open, sunny, grassy areas to the southeast of the garden were kept untouched for experiments, such as burning programmes. Today this relatively pristine grassland forms part of a most valuable mini-nature reserve, just east of the Silverton Ridge. Unfortunately, the grassland has been cut off from the wetland area, opposite the Council for Scientific and Industrial Research to the east, by roads and a busy highway.

The grassland is home to various small mammals like rabbits, golden mongoose, hedgehogs, and even duiker. Birds typical of the Highveld grasslands, such as plover and guinea fowl, are abundant.

As in any typical grassland, various bulbs and orchids occur:

*Albuca setosa*  
*Boophone disticha*  
*Eulophia clavicornis*  
*E. ovalis* subsp. *ovalis*  
*Hypoxis hemerocallidea* and  
*H. rigidula*

Wild flowers pop up after winter, even before the first spring rains have fallen and they all produce seed, even the wild orchids, which is very useful for regeneration and research purposes. These wild flowers are not so dependent on the rain as some of the grasses, as they store their nutrients in modified underground organs to survive unfavourable times like winter or drought. They include

*Callilepis leptophylla*  
*Castalis spectabilis*  
*Clerodendrum triphyllum*  
*Elephantorrhiza burkei*  
*Indigofera sordida*

*Ipomoea crassipes* and  
*Sphenostylis angustifolia*

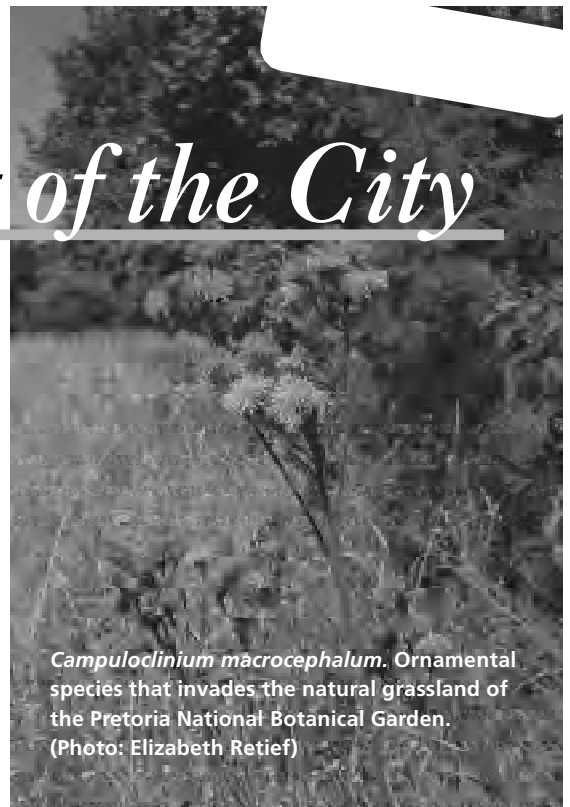
There are even some endemic and rare species, for example, *Hemizygia pretoriae*, that are only found around Pretoria.

A fascinating member of the family Asclepiadaceae, *Pachycarpus schinzi-anus* is also of great medicinal value and has fortunately managed to survive here in the garden, whereas in the wild they have disappeared rapidly like many other medicinal plants. Other valuable medicinal plants that grow here are

*Artemisia afra*  
*Asclepias* species  
*Boophone disticha*  
*Dicoma zeyheri*  
*Elephantorrhiza elephantina*  
*Felicia muricata*  
*Gazania krebsiana*  
*Hypoxis hemerocallidea*  
*Lippia javanica*  
*Monsonia attenuata*  
*Pollichia campestris*  
*Scabiosa columbaria*  
*Scilla nervosa*  
*Teucrium trifidum* and  
*Vernonia oligocephala*

The *Haworthia*-like highveld bulbous plant, *Chortolirion angolense*, also occurs here.

Important Bankenveld species, such as *Triumfetta sonderi* and *Triaspis hyperi-*



*Campulodinium macrocephalum*. Ornamental species that invades the natural grassland of the Pretoria National Botanical Garden. (Photo: Elizabeth Retief)



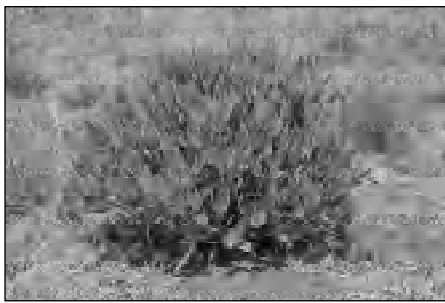
*Boophone disticha*. (Photo: Elizabeth Retief)



*Heliotropium amplexicaule*. A garden weed invading the natural grassland in the Pretoria National Botanical Garden. (Photo: Elizabeth Retief)



*Ledebouria ovatifolia*. (Photo: Jeremy Hollmann)



***Trichodesma physaloides*. Vegetative growth in spring when the natural grassland in the garden was not burnt. (Photo: Elizabeth Retief)**



***Trichodesma physaloides*. Profuse flowering in spring when the natural grassland in the garden was burnt. (Photo: Elizabeth Retief)**



***Callilepis leptophylla*. (Photo: Jeremy Hollmann)**

*coides*, have disappeared totally from the grassland, and others, such as *Clematopsis scabiosifolia*, *Boophone disticha*, and Chocolate Bells, *Trichodesma physaloides*, with its brown and white flowers, are disappearing.

The Ink Flower, *Cycnium adonense* appears in spring, giving a delightful display of a profusion of white flowers. There is still some Travellers' Joy, *Clematis brachiata*, which attracts many insects to an abundance of pollen and fragrant flowers. Then there is *Kohautia amatymbica* a nocturnal plant that fills the air with a delectable scent at night. Various *Helichrysum* and *Senecio* species are found all over the grassland.

In more open areas with less dense vegetation, flat-growing copper-coloured *Hermannia depressa* grow. There is a very close association between the copper butterflies, which feed only on these plants, and ants: the ants take the pupae of these butterflies to their nests where they remain until the adult emerges from the pupa.

Towards the rocky hill, the following plants occur:

*Aloe transvaalensis*  
*Rothmannia capensis*  
*Ochna pulchra*  
*Canthium mundianum*  
*Nuxia floribunda* and  
*Xerophyta retinervis*

There is a mixture of shrubs and mostly small trees on the ridge. Most of the shrubs have delicious edible fruit:

*Ximenia* (Sour Plum)  
*Englerophytum magalismontanum* (Milk Plum) and  
*Vangueria infausta*

The creeper, *Ancylobotrys capensis* (Wild Apricot), is also found amongst the rocks, producing orange-coloured, velvety round fruit in summer. Close to this rocky hill area, a delicate lilac-pink flowering herb, *Cleome maculata* (also known as Pretty Lady), is found.

During the last ten years, taller grasses have been taking over, owing to management practices in winter and good rains during the growing season. Hill-sides and wetlands should not be separated from the grassland, as all form integrated parts of the whole Bankenveld ecosystem. If split up or mismanaged, the species diversity will decline unavoidably, not only of plants, but also of all the other living creatures forming the network of life within the grassland. With fewer wild flowers, there will be fewer insects attracting fewer birds and fewer mammals, so that in the end the grassland starts to degenerate into an area of unpalatable, tall, or spiny grasses.

Fortunately, the natural grassland of the Pretoria Garden is being preserved with sensitivity and it is still a safe haven for many indigenous birds, small mammals, and many insects. 🌱

ACOCKS, J.P.H. 1988. Veld types of South Africa, 3rd edn. *Memoirs of the Botanical Survey of South Africa* No. 57. Botanical Research Institute, Pretoria.

—Priscilla Swartz  
 Pretoria National Botanical Garden  
 Tel.: +27 12 804 3166



**View across the grassland in spring. (Photo: Jeremy Hollmann)**



*Castalis spectabilis*, Asteraceae.  
(Photo: Elizabeth Retief)



*Hypoxis* sp. and *Aster harveyanus*. (Photo: Jeremy Hollmann)



Closeup of *Trichodesma physaloides*. (Photo: Jeremy Hollmann)



*Imperata cylindrica* (L.) Raeusch. is characterised by a cylindrical white panicle that is dense and silky; (Photo: M. Koekemoer)



Winter landscape in high altitude moist grasslands. Grasslands provide essential resources for cultural products. (Photos: Warwick Tarboton)

# THE EKANGALA GRASSLAND PROJECT

The Ekangala Grassland Project is an interprovincial initiative to secure important biodiversity and provide sustainable livelihoods in the threatened high-altitude moist grasslands of South Africa. The area targeted by the Ekangala Grassland Trust represents one of the largest contiguous pieces of untransformed grassland in southern Africa. The area hosts high levels of biodiversity and endemism, delivers numerous important ecosystem services, is not well represented in any network of formal protected areas, and is under constant threat of transformation through unsustainable land-use practices.

## Background

The Ekangala Project was born out of the realisation that the high altitude moist grasslands of the region are:

- **Very important from a biodiversity conservation and ecosystem service provision perspective**

It is a common belief that grasslands are wastelands that require some intervention in order to be useful, hence the agricultural classification 'unimproved grasslands', with reference to pristine areas of the biome. Contrary to this perception the grasslands host a very high diversity of indigenous species, second only to the Cape Floral Kingdom. A high degree of endemism also occurs, which further implies habitat diversity. What is more, this vegetation type provides a very important water catchment function; pristine grasslands ensure the sustained delivery of high quality water from the upper reaches of the country's catchments. Such an ecosystem service must be recognised for its importance when South Africa's water provision limitations are considered.

- **Have been neglected in terms of conservation strategies and the establishment of protected areas**

A little over 2% of the grassland biome of South Africa is formally protected, in contrast to the 10% suggested by the IUCN. At the international scale the situation is the same.

- **Highly threatened in terms of irreversible transformation by unsustainable land use practices**

Almost 60% of the grassland biome has already been irreversibly transformed. Activities contributing towards this transformation are monocultural agricultural crops, afforestation, and mining, among others. The unsustainable use of untransformed grasslands through overgrazing and injudicious burning also poses a serious threat.

It is also accepted that the stimulation and promotion of appropriate land use management strategies are essential to demonstrate the sustainability of the socio-economic benefits that will be derived from an area in which the integrity of ecosystem processes are maintained.

A process of gaining support for the need to address the situation was initiated locally in 1994. Numerous workshops and meetings between the relevant national and provincial bodies and NGOs have since been held. A product of these deliberations was the establishment of the "GRASS PLENARY". "GRASS" is an acronym for Grasslands Require Active Support to Survive and the plenary was made up of representatives from the above-mentioned bodies. The eventual outcome of these processes was the establishment of the Ekangala Grassland



The proposed Ekangala project area.



From left to right: Botha's Lark, one of three endemic bird species considered threatened on a global scale; Blue Cranes, South Africa's national bird; Blue korhaan; A Bald Ibis colony; Yellowbreasted Pipit; Endemic antelope, Blesbok; (Photos: Warwick Tarboton).

Trust in March 2000, as an independent body to drive and co-ordinate the necessary processes towards the enhancement of the conservation status of the area. "Ekangala" is a Zulu word that means "place of no trees". The name recognizes that the grassland biome is mostly and naturally a place of no trees, and that it is the intention of the initiative to maintain it in this way through standing against the unsustainable practice of further afforestation and other land transformation activities. A co-ordinator was appointed in March 2002 with funding provided by the Green Trust, ESKOM, and the Mazda Wildlife Fund.

While the initiative has had as its initial impetus the conservation needs of the biome, it has embraced the need to integrate socio-economic development objectives into its strategic plan. Without the effective alleviation of poverty, conservation efforts will be worthless. The integrated nature of the initiative also dictates the scope of participation, i.e. all relevant role-players and stakeholders at national, provincial, and local levels. The geographical scope has been determined by a measure of biodiversity and sensitivity to transformation. The high-altitude moist grasslands—those above the 1 700 m contour—meet these criteria and have thus been delineated as the area of focus. The need for an integrated approach is further emphasised by the fact that the area transcends the provincial boundaries of Mpumalanga, KwaZulu-Natal, and the Free State.

### Conservation Planning

The Ekangala Trust has recently obtained further funding from the Green Trust to initiate the first crucial conservation-planning phase of the project.

This phase's aims, using the approach of Margules and Pressey (2000) and the conservation planning tool C-PLAN, are to determine the conservation status of the terrestrial and other components of this region, and to develop clear priorities and a strategy for biodiversity conservation. This will include collating all the existing biodiversity data, including information on the opportunities and constraints presented by the socio-political and economic environment.

Although it is generally accepted that the grassland biome is highly threatened, poorly protected, and that a high degree of endemism occurs, it has become clear that there is insufficient collated data available to enable meaningful conservation planning for the region. The aim, therefore, is not only to address this need, but once we have that in hand, to create awareness in the region of the importance of biodiversity to the economy and long-term sustainability. Central to this is the identification and promotion of appropriate land-use management strategies, to demonstrate the sustainability of the socio-economic benefits that will be derived from an area in which the integrity of the ecosystem processes are maintained.

In line with the methods of Margules and Pressey (2000) the overall project output aims to be a planning tool that will allow for the identification of the most efficient set of conservation areas that allow for conservation target achievement in the planning region, whilst simultaneously minimising conflict with other land uses. Several measurable milestones can be identified:

- Current boundaries will be reviewed and adjusted to conform to

political boundaries in order to address bioregional and conservation planning needs. Quaternary catchments to be included will be determined, and water management authorities identified.

- Biodiversity data are compiled from existing sources on landscape and vegetation types, species distributions, ecological processes and the spatial extent and location thereof is quantified.
- Current and potential land uses (including threats) are determined and mapped.
- Further values, like water (major ecosystem function of area), landscape, social and cultural, are listed and mapped.
- Quantitative targets are set for minimum size and connectivity of land classes, viable species populations and processes (water). Qualitative targets are set for minimum preferences of disturbance, alien plants, erosion, over-grazing.
- Targets are determined in a subjective, transparent dialogue process, enabling us to do a GAP analysis in terms of representation and process, determine threats (and spatial distribution and imminence thereof) to unprotected elements, and to determine the total irreplaceability in terms of meeting targets.
- Based on the concept of irreplaceability, minimum areas are determined, which would effectively achieve conservation targets.
- A decision tool, which provides crucial information for planning for biodiversity conservation, bioregional planning, development, land use and determining a quality lifestyle for the region, is provided.

Finally, as part of the process, capacity for conservation planning will be de-

Vaal River Lily, *Crinum bulbispermum* (Photo: Warwick Tarboton); The rare endemic aloe, *Aloe hlangapies*, found in the Luneberg district of project area (Photo: Christine Lambrechts); *Zantedeschia aethiopica* (Photo: Warwick Tarboton); *Watsonia latifolia* (Photo: Warwick Tarboton); Fire lilies, *Cyrtanthus contractus* (Photo: Warwick Tarboton).





From left to right: Wakkerstroom town and wetland; Wakkerstroom Wetland Reserve; Transformed grassland; (Photos: Warwick Tarboton).

veloped in provincial conservation agency staff. A stakeholder and public participation process will also be developed and implemented to ensure buy-in to the process and acceptance of results.

Current protected areas within the project region consist of a few small provincial reserves:

KZN: Pongola Bush and Ncandu Reserves  
Mpumalanga: Wakkerstroom and Paardeplaats Reserves  
Free State: Seekoeivlei Reserve, which is a RAMSAR site

In addition, there are a limited number of Natural Heritage sites and a couple of Private Nature Reserves and Conservancies. With most of the project area in the hands of private landowners, the future success of this project relies heavily on their co-operation, support, and buy-in into the conservation planning process. To this effect the trust fully supports the current Conservation Incentives Project, which is being driven by the Botanical Society of SA.

## Conclusion

Although the activities of the Ekangala Grassland Trust are focused on the high-altitude moist grasslands, we are hoping that this initiative inspires further and more co-ordinated conservation efforts within the highly threatened southern African Grassland Biome. 🌱

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Erich van Wyk and Clare Tenner looking at *Aloe hlanguapies* in the field. (Photo: Christine Lambrechts)



*Ornithogallum* plants in a nursery. Ekangala hopes to initiate projects to address sustainability and alternative land use. The cultivation of commercial and medicinal bulbs is being investigated. (Photo: Christine Lambrechts)



From left to right: High altitude moist grasslands; Grasslands provide essential resources for cultural products; Grassland landscape in the Free State; (Photos: Warwick Tarboton).



# The *Grasses* of the **Licuatí Forest and Maputo Elephant Reserves, Mozambique**

At the end of 2001, the SABONET Project conducted a second regional plant collecting expedition, centered on the Maputo Elephant and Licuatí Forest Reserves in southern Mozambique, south of Maputo (Siebert *et al.* 2001). The expedition served to collect botanical information on a poorly sampled part of the Maputaland Centre of Endemism (Van Wyk 1996) and to make this information readily available to governments, conservationists, and the general public. Various activities and findings of this expedition have already been reported (Burrows & Burrows 2002, Govender 2002, Lötter 2002, Turner 2002, Uiras 2002); however, the synthesis of the data is still in an early stage and we hope to collate data into more tangible outputs in the near future.

To address the need for accurate inventories of the biodiversity of conservation areas in this part of the Maputaland Centre of Endemism, expedition members focused on specific plant groups. Two of us—Marianna Uiras and Stefan Siebert—decided to collect only grasses, as a preliminary checklist had too few records when compared to other regions in the Maputaland Centre of Endemism. After a very successful collecting trip, we are now presenting a second, updated grass checklist for the Maputo Elephant and Licuatí Forest Reserves (Appendix 1). In addition, this article serves to provide the reader with summarised details of the collecting localities for grass specimens collected during the expedition (Appendix 2). It also presents statistics on habitat, dominant vegetation types, and the occurrence of rare, invasive, or useful species that are characteristic for the six sub-families and eleven tribes recorded for the study area (Appendix 3).

## The Study Area

The study area that was sampled during the SABONET Southern Mozambique Expedition is defined as the

Maputo Elephant and Licuatí Forest Reserves and their surrounds (approximately 2 100 km<sup>2</sup>). The area comprises the six major vegetation types that were recognised and defined for this floristic region by Matthews *et al.* (1999, 2001), namely Coastal Woodland, Dune Forest, Licuatí Forest, Primary Dune Vegetation, Reed Beds, and Woody Grassland. Grass specimens were collected in all these vegetation types, but the Reed Beds were not sampled adequately, because of high water tables. Small-scale wetland systems that feed into the Reed Beds were, however, sampled, and we refer to these as Wetland Vegetation.

## Preliminary Findings

In the provisional checklist that was compiled from available literature for the expedition to the two reserves (Siebert *et al.* 2002), the Poaceae accounted for 52 species or infraspecific taxa and 36 genera. Currently, with 90% of the collected grass specimens identified, the Poaceae checklist comprises 101 species or infraspecific taxa and 50 genera for the two reserves. This is nearly double the figure of grasses previously recorded for this region. However, 23 species previously recorded for these reserves were not collected again, although approximately 280 grass specimens were collected in duplicate. Most of these 'missing' taxa either have disjunct occurrences (for example *Monocymbium ceresiiforme*), are locally rare (for example *Panicum genuflexum*), or are wetland species (for example *Leersia hexandra*) (Gibbs Russell 1990) and were not collected because high water tables made their localised habitats inaccessible and limited distribution information made it difficult to pinpoint exact localities.

Nevertheless, the collections that were made are extremely useful and for the

first time, provide us with data on which grass taxa are present in the reserves and what their habitat characteristics are. From the start it was evident that a specific grass flora occurred in southern Mozambique and that the species were associated with certain vegetation types. Interesting species were collected, many of which have a direct significance for conservation initiatives and reserve management. From a conservation/management point of view, thirteen species are of importance and should be noted.

## Endemics

Maputaland is a recognised Centre of Endemism (Van Wyk 1996) and it was therefore not surprising that three grass species endemic to the Maputaland region were collected; all three species belong to the Eragrostidae. *Brachychloa schiemaniana* occurs in Dune Forest only, *Eragrostis moggiivar. moggi* is associated with Licuatí Sand Forest and Dune Forest, and *Trichoneura schlechteri* is found in any treed environment, including Coastal Woodlands, Dune



Forest, and Licuati Sand Forest. *Brachychloa fragilis*, another typical sandveld endemic, was not recorded, and is better known from Nwambiya, Mkhuze, and False Bay in South Africa.

### Interesting Species

As for so many other Centres of Endemism in the world (Stohlgren *et al.* 1999), alien taxa have already invaded this ecological system. The five alien grass species that were recorded belong to the Chloridoideae and the Panicoideae. *Cenchrus brownii*, *Dactyloctenium australe*, and *Digitaria ciliaris* are associated with Primary Dune Vegetation, *Chloris gayana* is common where water collects in Coastal Woodland, and *Coix lacrymajobi* occurs in Coastal Woodland in the vicinity of villages.

One Red Data List grass species, *Panicum pleianthum* assessed as Low Risk (Least Concern) (Izidine & Bandeira 2002), was recorded within Dune Forest. It is locally common and is known to occur as far north as Kenya and Tanzania. Five grass taxa are assessed as Threatened for Mozambique, but none of these occur in the Maputaland Centre (Izidine & Bandeira 2002).

Some grasses in the reserves are important components in the building of circular huts especially for the rural people living along the borders of the reserves. *Phragmites australis* is used to build the walls, while *Cymbopogon excavatus*, *Imperata cylindrica*, and *Hyperthelia dissoluta* are used for thatching roofs (Mangue 1999).

### Distribution Patterns

All known distributions of the six grass subfamilies extend into southern Mozambique. The Chloridoideae and the Panicoideae are especially common in the study area. The dominance of the Panicoideae (both  $C_3$  and  $C_4$  grasses) was expected and coincides with the centre of diversity of the subfamily in mesic summer rainfall regions (Gibbs Russell 1986). However, its diversity was much lower than expected (17% instead of the predicted 46–60%). The diversity of species of the Chloridoideae (mainly  $C_4$  aspartate formers) was as high as expected (16% of the subfamily's species was recorded), as this subfamily's centre of diversity is situated mainly within arid summer rainfall areas (Gibbs Russell 1986). The species diversity of the other four sub-

families were as expected (Gibbs Russell 1988).

The tribes Eragrostideae ( $C_4$  aspartate), Paniceae (both  $C_3$  and  $C_4$ ), and Andropogoneae ( $C_4$  malate) completely dominate the different vegetation types, because of specific regional climatic conditions exhibited at a local scale, which enables these groups to colonise definite habitats. The Eragrostideae and Paniceae dominate the Licuati Sand Forest and Dune Forest, the Eragrostideae the Primary Dune Vegetation, the Andropogoneae the Woody Grassland, and all three tribes the Coastal Woodlands and Wetland Vegetation.

Of the remaining eight tribes, the Aristideae and Cynodonteae are found in nearly all the vegetation types, but are restricted to a maximum of three species per vegetation type. This is low when compared to the maxima of 18, 16, and 10 recorded for the three dominant tribes. The remaining six tribes are solely restricted to single vegetation types. Three are associated with Licuati Sand Forest, two with Wetland Vegetation, and one with Coastal Woodland.

### Final Words

It proved useful to have collected only one group, in this case grasses, during the expedition—so much more collection data is available for further analysis if one commits oneself to a specific group, be it a plant family, endemics, plant communities, growth form, etc. Much work remains to be done to document and analyse all the grass data that we collected during the expedition. We are working on a paper that includes all the grass data of the two reserves and will submit it to a local botanical journal for possible publication in the near future. 📄

**A special word of thanks to Ms Teresa Martins (LUAI, Angola) and Ms Florence Nyirenda (UZL, Zambia) for the grass collections and identifications that they made during the expedition. We are grateful to the National Herbarium in Pretoria for identification of the pressed specimens. Mr Mario da Silva, Head of the Botany Department of INIA, Maputo, supported the SABONET Mozambique Expedition and allowed us to work in the LMA Herbarium.**

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## Appendix 1

### Checklist of grasses recorded for vegetation types of the Maputo Elephant and Licuati Forest Reserves during the SABONET Mozambique Expedition.

Poaceae classification is according to Clayton & Renvoize (1986). Species names follow Gibbs Russell *et al.* (1990) and *Flora zambesiaca* 10 (1-3). Specimens are housed at LMA and PRE, with duplicates in LMU, LUAI, NH and UZL. Numbers 1 to 21 refer to collecting localities. A cross (X) in a numbered column links the species to a specific collecting locality.

Checklist of grasses	Collecting localities																				
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
<b>Subfamily: Bambusoideae</b>																					
<b>Tribe: Ehrharteae</b>																					
<i>Ehrharta erecta</i> Lam. var. <i>natalensis</i> Stapf																X					
<b>Subfamily: Pooideae</b>																					
<b>Tribe: Aveneae</b>																					
<i>Agrostis lachnantha</i> Nees var. <i>lachnantha</i>					X																
<b>Subfamily: Centothecoideae</b>																					
<b>Tribe: Centothecoae</b>																					
<i>Megastachya mucronata</i> (Poir.) Beauv.															X	X			X		
<b>Subfamily: Arundinoideae</b>																					
<b>Tribe: Arundineae</b>																					
<i>Phragmites australis</i> (Cav.) Steud.						X				X											
<i>P. mauritianus</i> Kunth						X															
<b>Tribe: Aristideae</b>																					
<i>Aristida congesta</i> Roem. & Schult. subsp. <i>barbicollis</i> (Trin & Rupr.) De Winter	X								X	X											
<i>A. congesta</i> Roem. & Schult. subsp. <i>congesta</i>												X							X		
<i>A. stipitata</i> Hack. subsp. <i>graciliflora</i> (Pilg.) Melderis		X								X		X		X	X	X	X		X		
<b>Subfamily: Chloridoideae</b>																					
<b>Tribe: Pappophoreae</b>																					
<i>Enneapogon scoparius</i> Stapf													X				X				
<b>Tribe: Eragrostideae</b>																					
<i>Bewisia biflora</i> (Hack.) Gooss.						X												X			
<i>Brachychloa schiemaniana</i> (Schweick.) S.M. Phillips										X											
<i>Dactyloctenium aegyptium</i> (L.) Willd.							X														
<i>D. australe</i> Steud.		X					X														
<i>D. geminatum</i> Hack.		X	X					X		X	X							X			
<i>D. giganteum</i> Fisher & Schweick.						X				X				X							
<i>Dinebra retroflexa</i> (Vahl) Panz. var. <i>condensata</i> S.M. Phillips					X							X									
<i>Eleusine coracana</i> (L.) Gaertn. subsp. <i>africana</i> (Kenn.-O'Byrne) Hilu & De Wet							X														
<i>E. indica</i> (L.) Gaertn.								X								X					
<i>Eragrostis capensis</i> (Thunb.) Trin.			X	X																	
<i>E. ciliaris</i> (L.) R. Br.			X			X												X			
<i>E. gummiiflua</i> Nees																			X		
<i>E. heteromera</i> Stapf												X		X			X				
<i>E. inamoena</i> K. Schum.						X												X			
<i>E. lappula</i> Nees			X		X			X		X	X	X									
<i>E. moggii</i> De Winter var. <i>moggii</i>								X		X						X			X		
<i>E. pallens</i> Hack.															X		X			X	
<i>E. sarmentosa</i> (Thunb.) Trin.												X									
<i>E. species</i>										X	X										
<i>E. superba</i> Peyr.										X			X				X				
<i>Pogonarthria squarrosa</i> (Roem. & Schult.) Pilg.										X			X	X			X				
<i>Sporobolus africanus</i> (Poir.) Robyns & Tournay		X				X				X											
<i>S. fimbriatus</i> (Trin.) Nees								X		X		X		X	X		X				
<i>S. sanguineus</i> Rendle																	X				
<i>S. subtilis</i> Kunth			X			X		X			X	X									
<i>S. subulatus</i> Hack.					X																
<i>S. virginicus</i> (L.) Kunth		X									X										
<i>Trichoneura grandiglumis</i> (Nees) Ekman	X								X												
<i>T. schlechteri</i> Ekman													X	X	X				X		
<i>Triraphis andropogonoides</i> (Steud.) Phill.	X			X																	
<i>T. schinzii</i> Hack.				X						X		X									

(continued on page 216)

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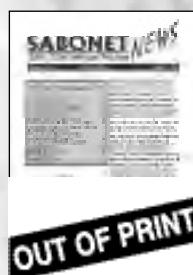
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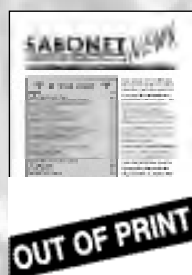
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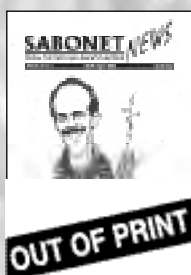
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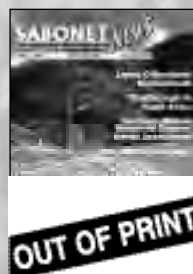
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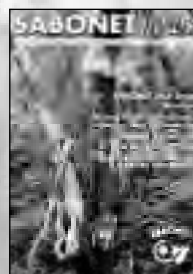
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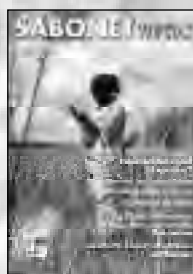
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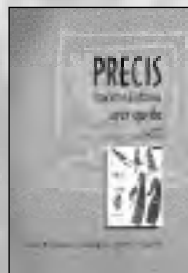
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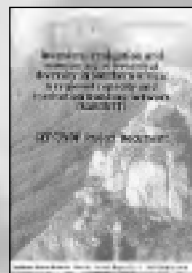
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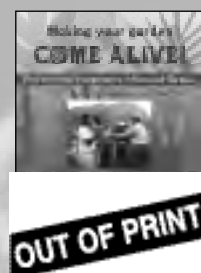
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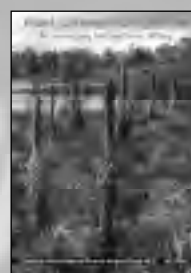
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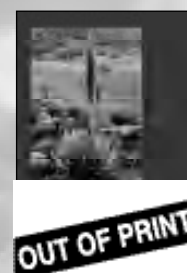
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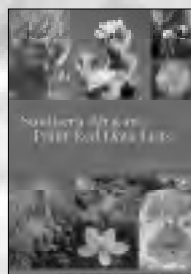
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Checklist of grasses	Collecting localities																				
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
Tribe: Cynodonteae																					
<i>Chloris gayana</i> Kunth																				X	X
<i>C. virgata</i> Sw.																	X				
<i>Cynodon dactylon</i> (L.) Pers.		X				X	X			X											
<i>Eustachys paspaloides</i> (Vahl) Lanza & Mattei	X			X				X	X												
<i>Perotis patens</i> Gand.	X			X				X	X				X	X			X			X	X
Subfamily: Panicoideae																					
Tribe: Paniceae																					
<i>Alloterpis papillosa</i> Clayton														X	X	X			X		
<i>Brachiaria chusqueoides</i> (Hack.) Clayton			X					X		X		X			X	X					
<i>B. deflexa</i> (Schumach.) C.E. Hubb. ex Robyns												X									
<i>B. humidicola</i> (Rendle) Schweick.											X							X			
<i>B. nigropedata</i> (Ficalho & Hiern) Stapf						X								X				X			
<i>Cenchrus brownii</i> Roem. & Schult.							X														
<i>C. ciliaris</i> L.																			X	X	
<i>Digitaria argyrorhiza</i> (Andersson) Chiov.			X					X		X		X									
<i>D. ciliaris</i> (Retz.) Koeler		X					X														
<i>D. debilis</i> (Desf.) Willd.					X	X															
<i>D. eriantha</i> Steud.	X				X														X		
<i>D. gymnostachys</i> Pilg.																	X				
<i>D. longiflora</i> (Retz.) Pers.																X					
<i>D. natalensis</i> Stent	X		X					X				X									
<i>Echinochloa colona</i> (L.) Link																				X	X
<i>E. pyramidalis</i> (Lam.) Hitchc. & Chase						X															
<i>Eriochloa meyeriana</i> (Nees) Pilg. subsp. <i>meyeriana</i>																				X	X
<i>Melinis repens</i> (Willd.) Zizka subsp. <i>grandiflora</i> (Hochst.) Zizka															X						
<i>M. repens</i> (Willd.) Zizka subsp. <i>repens</i>			X										X				X				X
<i>Oplismenus hirtellus</i> (L.) Beauv.															X	X					
<i>Panicum coloratum</i> L. var. <i>coloratum</i>																				X	X
<i>P. deustum</i> Thunb.			X					X		X		X							X		
<i>P. heterostachyum</i> Hack.													X	X			X				
<i>P. infestum</i> Peters					X	X					X							X			
<i>P. kalaharensis</i> Mez															X			X	X		
<i>P. laticomum</i> Nees										X						X			X		
<i>P. maximum</i> Jacq.			X			X				X				X	X	X					
<i>P. pleianthum</i> Peters								X		X		X									
<i>Paspalum scrobiculatum</i> L.					X	X					X							X			
<i>Sacciolepis curvata</i> (L.) Chase			X							X		X									
<i>Setaria incrassata</i> (Hochst.) Hack.																				X	
<i>S. megaphylla</i> (Steud.) Dur. & Schinz										X		X									
<i>S. sphacelata</i> (Schumach.) Moss var. <i>sericea</i> (Stapf) Clayton									X	X											
<i>Stenotaphrum dimidiatum</i> (L.) Brongn.		X					X														
<i>Urochloa mosambicensis</i> (Hack.) Dandy														X			X	X		X	
Tribe: Arundinelleae																					
<i>Tristachya nodiglutinis</i> K. Schum.																X			X		
Tribe: Andropogoneae																					
<i>Andropogon eucomis</i> Nees											X							X			
<i>A. gayanus</i> Kunth var. <i>polycladus</i> (Hack.) Clayton											X	X		X			X	X		X	
<i>A. huillensis</i> Rendle						X	X														
<i>A. schirensis</i> A. Rich.				X					X												
<i>Bothriochloa insculpta</i> (A. Rich.) A. Camus.			X																		
<i>Coix lacryma-jobi</i> L.																	X				
<i>Cymbopogon excavatus</i> (Hochst) Stapf ex Burtt Davy											X										
<i>C. validus</i> (Stapf) Stapf ex Burtt Davy									X										X	X	
<i>Elionurus muticus</i> (Spreng.) Kunth					X	X				X	X			X							
<i>Hemarthria altissima</i> (Poir.) Stapf & C.E. Hubb.					X	X					X										
<i>Heteropogon contortus</i> (L.) Roem. & Schult.	X																				
<i>Hyparrhenia dichroa</i> (Steud.) Stapf					X		X														
<i>H. filipendula</i> (Hochst.) Stapf var. <i>filipendula</i>										X											
<i>Hyperthelia dissoluta</i> (Nees ex Steud.) Clayton				X					X												
<i>Imperata cylindrica</i> (L.) Raeusch.			X		X							X									
<i>Ischaemum fasciculatum</i> Brongn.				X	X						X										
<i>Sorghum bicolor</i> (L.) Moench subsp. <i>arundinaceum</i>																				X	X
(Desv.) De Wet & Harlan																					
<i>Themeda triandra</i> Forssk.	X		X	X		X			X												
<i>Trachypogon spicatus</i> (L.f.) Kuntze			X		X				X				X				X			X	
<i>Urelytrum agropyroides</i> (Hack.) Hack.	X		X	X					X				X	X							X

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## Appendix 2

### Collecting localities of grasses in the Maputo Elephant and Licuati Forest Reserves during the SABONET Mozambique Expedition

Collecting localities are numbered (1–21) and correspond with those in the checklist of grasses. These localities can serve as useful starting points for anyone who wishes to further investigate the grass diversity of protected areas in southern Mozambique.

1. South of Maputo Elephant Reserve; Area between Ponta du Ouro and Ponta Malongane; Woody Grassland (*Salicia kraussii*); Well-drained sandy soil; Full sun on a gentle slope; 26°47'51"/32°53'07".
2. South of Maputo Elephant Reserve; Ponta Mamoli Beach; Primary Dune Vegetation on first line of coastal dunes; Well-drained sandy soil; Full sun on a gentle slope; 26°42'34"/32°55'00".
3. South of Maputo Elephant Reserve; Ponta Mamoli Beach; Dune Forest on coastal dunes; Slightly disturbed; Well-drained sandy soil; Partial shade on a gentle slope; 26°42'31"/32°54'58".
4. South of Maputo Elephant Reserve; Dune cordons around Ponta Malongane; Woody Grassland (*Vernonia natalensis*) on ancient dunes; Recently burned; Well-drained sandy soil; Full sun on a gentle slope; 26°47'05"/32°51'10".
5. South of Maputo Elephant Reserve; Dune cordons around Ponta Malongane; Grass-dominated Wetland between ancient dunes; Seasonally waterlogged sandy soil; Full sun on level ground; 26°47'00"/32°51'00".
6. South of Maputo Elephant Reserve; Along road to the west of Lake Zitundo; Sedge dominated Wetland between ancient dunes; Seasonally waterlogged loam soil; Full sun on a gentle slope; 26°42'19"/32°48'23".
7. South of Maputo Elephant Reserve; Ponta Malongane; Disturbed grass cover behind first coastal dune —Primary Dune Vegetation; Well-drained sandy soil; Partial shade on level ground; 26°47'45"/32°53'45".
8. Maputo Elephant Reserve; Ponta Milibangala; Dune Forest behind first coastal dune; Well-drained sandy soil; Partial shade on level ground; 26°26'58"/32°55'49".
9. Maputo Elephant Reserve; Hills around Ponta Milibangala; Woody Grassland (*Vernonia natalensis*) on ancient dunes; Well-drained sandy soil; Full sun on a gentle slope; 26°26'49"/32°54'34".
10. Maputo Elephant Reserve; Area between Main Camp and Ponta Milibangala; Dune Forest on ancient dunes; Well-drained sandy soil; Partial shade on a gentle slope; 26°25'33"/32°53'57".
11. Maputo Elephant Reserve; Area between Main Camp and Ponta Milibangala; Sedge-dominated Wetland between ancient dunes; Seasonally waterlogged loam soil; Full sun on level ground; 26°29'32"/32°44'23".
12. Maputo Elephant Reserve; Area between Main Camp and Ponta Milibangala; Dune Forest on ancient dunes; Slightly disturbed; Well-drained sandy soil; Partial shade on a gentle slope; 26°29'14"/32°44'11".
13. Maputo Elephant Reserve; Area between Main Camp and Ponta Milibangala; *Terminalia sericea* Coastal Woodland on ancient dunes; Well-drained sandy soil; Partial shade on a gentle slope; 26°29'20"/32°43'56".
14. Northern areas of the Licuati Forest Reserve; Dune Forest along Sand Forest margin on ancient dunes; recently burned; Well-drained sandy soil; Partial shade on level ground; 26°21'10"/32°28'33".
15. Northern areas of the Licuati Forest Reserve; Licuati Sand Forest on ancient dunes; recently burned; Well-drained sandy soil; Partial shade on level ground; 26°21'07"/32°28'38".
16. Western areas of the Licuati Forest Reserve; Along western bypass; Licuati Sand Forest on ancient dunes; Well-drained sandy soil; Partial shade on level ground; 26°38'51"/32°40'52".
17. Western areas of the Licuati Forest Reserve; Along western bypass; Open Coastal Woodland along Sand Forest margin on ancient dunes; Slightly disturbed; Well-drained sandy soil; Full sun on level ground; 26°38'57"/32°40'44".
18. Western areas of the Licuati Forest Reserve; Along western bypass; Wetland in depressions between ancient dunes; Seasonally waterlogged loam soil; Full sun on level ground; 26°38'47"/32°40'55".
19. Eastern areas of the Licuati Forest Reserve; Along eastern bypass; Open Licuati Sand Forest between ancient dunes; Well-drained sandy soil; Partial shade/full sun on level ground; 26°27'39"/32°30'03".
20. Northern areas of the Licuati Forest Reserve; Area between Licuati Forest Reserve and Salamanga; *Terminalia sericea* Coastal Woodland in depressions between ancient dunes; Seasonally waterlogged loam soil; Full sun on a gentle slope; 26°28'40"/32°31'40".
21. Northern areas of the Licuati Forest Reserve; Area between Licuati Forest Reserve and Salamanga; *Terminalia sericea* Coastal Woodland in depressions between ancient dunes; Moist loam soil; Full sun on a gentle slope; 26°28'30"/32°31'50".

### Appendix 3

Subfamily/Tribe	Major associated vegetation types*	Endemic species	Red Data List taxa	Alien species	Tribes	Genera	Species	Species/intra-specific taxa	Percentage of subfamily
Ehrharteae [EHRH]	LF	0	0	0	1	1	1	1	-
<b>Bambusoideae</b> [BAMB]	<b>LF</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>1</b>	<b>1</b>	<b>1</b>	<b>1</b>	<b>8%</b>
Aveneae [AVEN]	WV	0	0	0	1	1	1	1	-
<b>Poideae</b> [POOI]	<b>WV</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>1</b>	<b>1</b>	<b>1</b>	<b>1</b>	<b>1%</b>
Centothecae [CENT]	LF	0	0	0	1	1	1	1	-
<b>Centothecoideae</b> [CENT]	<b>LF</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>1</b>	<b>1</b>	<b>1</b>	<b>1</b>	<b>-</b>
Arundineae [ARUN]	WV	0	0	0	1	1	2	2	-
Aristideae [ARIS]	DF, LF	0	0	0	1	1	2	3	-
<b>Arundinoideae</b> [ARUN]	<b>DF, WV</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>2</b>	<b>2</b>	<b>4</b>	<b>5</b>	<b>2%</b>
Pappophoreae [PAPP]	CW	0	0	0	1	1	1	1	-
Eragrostidae [ERAG]	DF, WV, CW	3	0	1	1	10	30	31	-
Cynodontae [CYNQ]	CW, DF, WG	0	0	1	1	4	5	5	-
<b>Chloridoideae</b> [CHLO]	<b>DF, WV, CW</b>	<b>3</b>	<b>0</b>	<b>2</b>	<b>3</b>	<b>15</b>	<b>36</b>	<b>37</b>	<b>16%</b>
Panicaceae [PANI]	DF, WV, LF	0	1	2	1	14	34	35	-
Arundinellae [ARUL]	LF	0	0	0	1	1	1	1	-
Andropogoneae [ANDR]	WV, WG, DF	0	0	1	1	15	20	20	-
<b>Panicoideae</b> [PANI]	<b>DF, WV, CW, WG</b>	<b>0</b>	<b>1</b>	<b>3</b>	<b>3</b>	<b>30</b>	<b>55</b>	<b>56</b>	<b>17%</b>
<b>TOTAL</b>		<b>3</b>	<b>1</b>	<b>5</b>	<b>11</b>	<b>50</b>	<b>98</b>	<b>101</b>	

\*CW, Coastal Woodland; DF, Dune Forest; LF, Licaudi Sand Forest; WG, Woody Grassland; WV, Wetland Vegetation

Subfamilies Tribes	BAMB EHRH	POOI AVEN	CENT CENT	ARUN ARUN	ARUN ARIS	PAPP	CHLO ERAG	CYNO	PANI ARUL	PANI ANDR	Total number of species per vegetation type
<b>Vegetation types*</b>											
CW	-	-	-	-	1	1	8	3	-	7	28
DF	-	-	-	-	3	-	18	3	-	9	49
LF	1	-	1	-	2	-	6	-	10	-	21
PD	-	-	-	-	-	-	6	1	3	-	11
WG	-	-	-	-	1	-	3	2	-	9	18
WV	-	1	-	2	-	-	12	1	11	10	37

\*CW, Coastal Woodland; DF, Dune Forest; LF, Licaudi Sand Forest; PD, Primary Dune Vegetation; WG, Woody Grassland; WV, Wetland Vegetation

# Useful Poaceae Literature

This article lists the main literature sources I have found useful for grass taxa from the SABONET countries. I will give reasons why I use these works in particular, as well as some hints of caution or pitfalls I have encountered. It must be understood that these are books or papers to which I have had easy access over the years or of which I am aware, but I am sure there are many more. I would appreciate it if readers would share with me any other useful sources of information. I know, for instance, that the National Herbarium and Botanic Garden in Zimbabwe has a cupboard full of grass books among which there surely must be some great works.

I have to apologise to colleagues in Angola as I have nothing specific on their country, mainly because I am seldom called upon to identify Angolan specimens. Moreover, we do not have much literature on the flora of Angola and what we do have is usually in Portuguese. Unfortunately languages are not a strong point of mine! But much of the literature given below can be used successfully for many genera and species in Angola.

**Hint:** I have found that it is a good idea to photocopy books or papers most often used. This saves the original from becoming dog-eared and tattered from use. The photocopy also gives one the freedom to add notes and additional information, which is often very useful.

## Generic Information

■ CLAYTON & RENVOIZE 1986. *Genera Graminum: grasses of the world. Kew Bulletin Additional Series* 13.

This is a useful book for identifying a totally unknown specimen, especially if it is a grass alien to your region. The distributions give a clue as to whether you are on the right track with your identification. Beware: grasses of the whole world are dealt with and often the exceptions do not key out easily or not at all, and are mentioned only in the description. Somehow it often hap-

pens that the plant you have to identify is the exception.

■ LEISTNER, O.A. (ed.) 2000. *Seed plants of southern Africa: families and genera. Strelitzia* 10.

Keys to genera (pages 661–680) are useful for those working in the FSA region (Botswana, Lesotho, Namibia, South Africa, and Swaziland). A similar book for the SABONET countries is in preparation. I suggest you use these keys to genera, which I think is easier than those in Gibbs Russell *et al.* (1990) with which most people have problems.

■ VARIOUS AUTHORS, *Flora zambesiaca* (FZ) 10,1 (1971); 10,2 (1999); 10,3 (1989).

■ VARIOUS AUTHORS, *Flora of Tropical East Africa* (FTEA), Gramineae Part 1 (1970), 2 (1974), 3 (1982).

## Species Information

Where possible, use keys, preferably recent ones, for your particular region. They should give the best coverage of the species occurring there. Also look at keys for other regions and compiled by other authors that cover some or many of the species from your region.

Because of the way keys are constructed, different authors use different characters to get to the same genera or species. You may therefore find one key or section of a key more helpful or easier to use than another. Remember, you have to work with a key for a while to understand how the author has interpreted the various characters. For example, one author may say that there are three nerves on the lower glume, counting only those that reach to the edge of the margin at the apex, while another author gives five nerves for the same glume, having counted all the visible nerves on the glume even those not reaching all the way.

Always read the notes that are given at the end of the species information;

these notes often contain the most useful information. Cited specimens make good reference material and are therefore invaluable for identification and scientific curation.

Beware: Check that a mistake has not been made somewhere along the line, especially if the specimen in your herbarium is not the one seen by the author.

■ VARIOUS AUTHORS. *Flora of Tropical East Africa*, Gramineae Part 1 (1970), 2 (1974), 3 (1982).

Useful for species descriptions and has a comprehensive synonym list, giving information on the type, the country, region, collector's name and number, and where the type specimens are housed. Once again such specimens can be used as reference specimens. Under the name in use there is a list of literature relevant to the species.

■ VARIOUS AUTHORS, *Flora zambesiaca* 10,1 (1971), 10,2 (1999), 10,3 (1989).

Information similar to that in FTEA, but in some instances less information is given. Descriptions are fairly meagre and if a type is from outside the FZ region, it only states the country of origin: no other information is given, which is not helpful to Angola, Swaziland, Lesotho, and South Africa. In FZ 10,3 there are a few pages of illustrations of *Digitaria* spikelets that are very useful.

■ GIBBS RUSSELL *et al.* 1990. *Grasses of southern Africa. Memoirs of the Botanical Survey of South Africa* 58.

This book covers only the FSA region. The key to genera is not easy, and I recommend the one in *Seed plants of southern Africa, Strelitzia* 10. Besides the keys to species, the most useful feature is the distribution maps. If the distribution of your specimen does not match the map for the species in question, the chances are that your identification is wrong. However, remember

that these maps were generated from data on specimens in PRE and that allow collecting intensity, not wrong identification, may also be the reason.

Other literature I find very useful includes the following books, floras, and articles:

- JACKSON, B.D. 1928. *A glossary of botanic terms* fourth edition (there are other editions). Any good botanical glossary is essential.
- STAPE, O. 1917–1937. *Flora of Tropical Africa* 9 & 10. Old, but has very good descriptions. The only problem is that it is incomplete, the names are old and it is often difficult to find the names in use.
- DE WINTER, B. 1965. The South African Stipeae and Aristideae (Gramineae). *Bothalia* 8: 1–404.
- CLAYTON, W.D. 1969. A revision of the genus *Hyparrhenia*. *Kew Bulletin Additional Series* 2. This is a very difficult genus and the information given after each species is invaluable.
- LAUNERT, E. 1970. *Prodromus einer Flora von Südwestafrika* 160: 1–228.
- LINDER, H.P. & ELLIS, R.P. 1990. A revision of *Pentaschistis* (Arundineae: Poaceae). *Contributions from the Bolus Herbarium* 12: 0–124.
- WATSON, L. & DALLWITZ, M.J. 1994. *The grass genera of the world*. Revised edition.
- PHILLIPS, S. 1995. *Flora of Ethiopia and Eritrea* 7. Apart from the general usefulness, the information on particularly *Eleusine* and *Sorghum* should be noted.
- LINDER, H.P. & DAVIDSE, G. 1997. The systematics of *Tribolium* Desv. (Danthonieae: Poaceae). *Botanische Jahrbücher* 119: 445–507.
- SMITH, G.F. & WILLIS, C.K. 1999. Index herbariorum: southern African supplement. Second edition. *SABONET Report* 8. A wonderful help when one has to contact people in the region, though some of the e-mail addresses are outdated\*, but it is still a good source from which to start. 📧

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\* See our e-mail list on page 251 for updated addresses. Eds.

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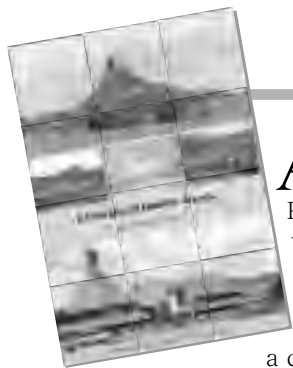
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## News from Lesotho

# Lesotho Poaceae Checklist Report



As part of the SABONET Project, the institutions of each participating country have been charged with the task of compiling a complete checklist of the Poaceae (grasses) for their country. Each checklist is intended to provide currently accepted names and key synonyms, as well as an indication of the occurrence of each species in the major ecological zones of the country.

In Lesotho, Mr Khotso Kobisi (National University of Lesotho) is undertaking this task with the collaboration of Mr Peter Phillipson (Rhodes University, South Africa). No up-to-date checklist for Lesotho grasses currently exists, although several very important reference works are available.

Unfortunately these sources of information are either out-of-date or incomplete in some way, and our initial task was to compile the available information from these sources before searching for additional information elsewhere. However, we decided that it would be useful to add references to relevant page numbers for these books to our checklist, since some of them provide illustrations and descriptions that are invaluable for species identification.

Our preliminary step was to extract records of grasses for Lesotho listed by Arnold and de Wet (1993), the most up-to-date of our primary sources of nomenclature; this provided us with a list of 182 species. In the herbaria in Lesotho, much practical use is made of the guidebook of Van Oudtshoorn (1992); from this book we added another 12 grass species recorded within Lesotho as well as 30 additional references. A further 12 species recorded by Schmitz (1984) were also added.

Because of the mapping technique used by Gibbs Russell *et al.* (1990) (plotting occurrence in quarter degree squares), it was impossible to determine whether species shown on the Lesotho border actually occurred in Lesotho. Since the data in this book are based on the PRECIS database at the South African National Herbarium,—the same data source used by Arnold and de Wet (1993)—we assumed that these records do not add to records for Lesotho. However, the record of a species very close to the Lesotho border (within a quarter degree square that overlaps the border) is a strong indication that the species is very likely to occur in Lesotho. Records of this kind were therefore added to the checklist. It should be noted that species recorded with the source as Gibbs Russell *et al.* (1990) were not definitely recorded within Lesotho, but probably do occur within the country. This was done to help promote further exploration of Lesotho for these grasses, and to facilitate the identification of new specimens that do not match species known to occur in Lesotho. This process added 86 species to the checklist.

The *Flora of Lesotho* (Jacot Guillarmod 1971) is the standard work on our flora, although it is little more than a checklist. This book, now about 30 years old and out-of-date, remains a valuable compilation, and we have attempted to correlate all grass species names used in it with currently accepted names. In some cases, well known genera such as *Andropogon* and *Cymbopogon* are easily confused when considering older sources, so a list of synonyms adds to the usefulness of the new grass checklist.

When Amy Jacot Guillarmod departed Lesotho for Rhodes University in Grahamstown, she took her collection of herbarium specimens from Lesotho with her; they became part of the Rhodes University Herbarium collection (now

incorporated in the Selmar Schonland Herbarium, GRA). Specimens from Lesotho at GRA were checked against records in the Jacot Guillarmod (1971) list, and many were cited there. However, it was noted that several of these specimens had been incorrectly identified. Many grass genera were less well known at the time when the identifications were done and we now have vastly superior literature available to us. In the case of incorrectly identified specimens at GRA, we have added collection details and relevant annotations to the checklist to highlight these errors.

Work on the checklist is not yet finished and the next assignment is to go on field trips in Lesotho to find specimens of species—only if they can be positively identified—that were tentatively included. We also plan to conduct some field work to target species that are widely distributed in neighbouring areas, but are not positively recorded for Lesotho. The data are currently stored on the herbarium databases at ROML and GRA and can be generated in a variety of formats. 📖

ARNOLD, T.H. & DE WET, B.C. 1993. *Plants of southern Africa: names and distribution* National Botanical Institute.

GIBBS RUSSELL, B.E. *et al.* 1990. *Grasses of Southern Africa. Memoirs of the Botanical Survey of South Africa* No. 58.

JACOT GUILLARMOD, A. 1971. *Flora of Lesotho*. J. Cramer.

SCHMIDTZ, M.O. 1984. *The grasses of Lesotho*. National University of Lesotho.

VAN OUDTSHOORN, F.P. 1992. *Guide to grasses of southern Africa* Briza Publications.

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# Threatened Plants Programmes

At a workshop held in March 2001, it was decided that one of the key outputs of the botanical garden initiative of the SABONET Project would be the development of Threatened Plants Programmes in each of the participating gardens. Subsequently, the SABONET Project allocated USD 3 000 to each of its 22 participating botanical gardens in southern Africa. It was hoped that the provision of these funds would encourage each of the participating botanical gardens to initiate a Threatened Plants Programme.

Applications were circulated to SABONET Steering Committee members for comment and they evaluated the proposals according to the following main criteria:

- A threatened species from a Plant Red Data List must be targeted.
- The selected species must have horticultural potential.
- Cultivation techniques must be developed for the selected species.
- A viable *ex situ* population must be established in the garden.

Currently eleven botanical gardens' project proposals have been successful and they are developing their projects further. In *SABONET News* 7(2) we reported on three; subsequently, eight more projects have been approved, one of which is described in more detail below:

- Botswana National Botanical Garden (working on *Orbea knobelii*, *O. rogersii*, and *O. tapscottii*)
- The combined effort of the INIA, University, and Tunduru Botanical Gardens in Maputo, Mozambique (working on *Encephalartos ferox* E.

*lebomboensis*, *Warburgia salutaris*, and *Raphia australis*)

- The National Botanic Garden of Namibia (working on *Hoodia currorri*, *H. gordonii*, and *H. parviflora*)
- The Lowveld National Botanical Garden in South Africa (working on *Dioscorea* sp. nov. and *Acacia* sp. nov.)
- Durban Botanic Gardens in South Africa (working on *Stangeria eriopus*)
- The Zimbabwe National Botanical Gardens (working on *Lobelia stricklandae* and *Scadoxus pole-evansii*)

## *Dioscorea*

Recent plant exploration in a remote area of Ebutsini in Mpumalanga has led to the discovery of a very unique and extremely localised plant community. This community consists largely of two hitherto undescribed plant species: *Dioscorea* sp. nov. (P.J.H. Hurter & A.E. van Wyk, in ed. 2002), and *Acacia* sp. nov. (P.J.H. Hurter & A.E. van Wyk, in ed. 2002). The *Dioscorea* species in particular is under a great deal of pressure as it is being used in traditional medicine. The plant also has substantial horticultural value as a collector's item owing to its pachycaul growth form, reminiscent of that of *D. elephantipes*.

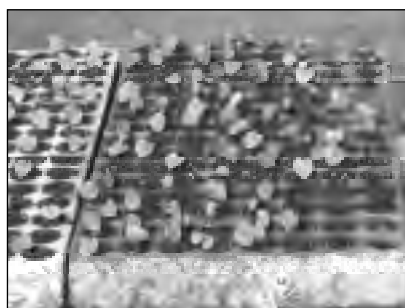
Despite a search of almost three years, no further plants or communities similar in structure and floristic composition have been found in the vicinity. Hence it is accepted that this community is unique, with both new species restricted to a very small area. The total size of the community is less than 5

ha, and this is also the total known extent of occurrence of the two undescribed taxa.

The objective of the Lowveld NBG programme is to conserve these two extremely rare plant species and their unique plant community.

## Action Plan

- In consultation with the local government and community, secure the unique Ebutsini plant community by restricting access and over-utilisation of both taxa for medicinal purposes.
- Establish a community-run, on-site, *ex situ* conservation project for both taxa at the Ebutsini Communal Nursery.
- Establish a gene bank of each taxon at the Ebutsini Communal Nursery (now already in place), so that germplasm for the commercial nursery would no longer be needed from the wild population.
- Establish an off-site, *ex situ* programme for both taxa at the Lowveld National Botanical Garden and at least one other garden for the *Dioscorea* species.
- Secure both taxa through cryo-storage at the Millennium Seedbank Project, Wakehurst Place, United Kingdom.
- Sensitise the southern African public to the plight of these two taxa, and the methods used to try and conserve them, through display and interpretation at the garden.



From left to right: Three thousand *Dioscorea* seedlings! This represents a 900-fold increase in the total world population of this threatened, as yet undescribed, plant species; A seedling tray filled with tiny *Dioscorea* sp. nov. plants; A close-up of the seedlings; (Photos: Lowveld NBG).

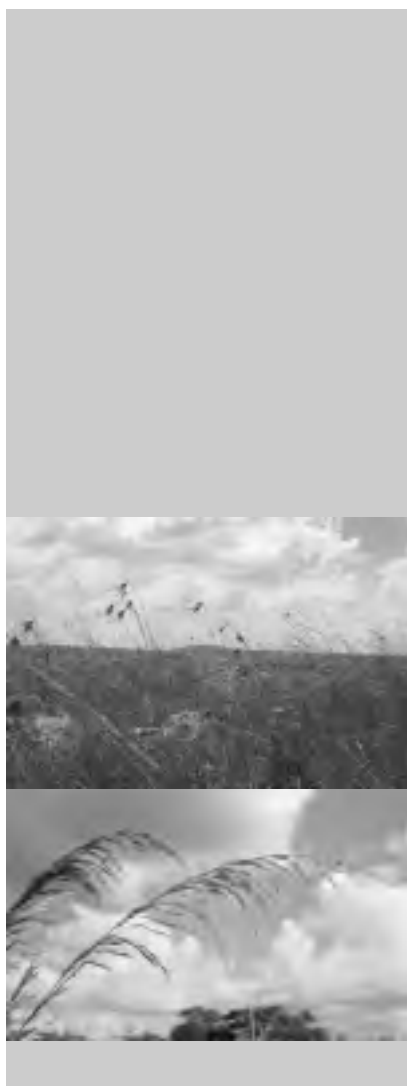
## Progress

Approximately 3 000 seedlings of the undescribed *Dioscorea* species have now been cultivated and will be placed at the Ebutsini Communal Nursery. This is a 900-fold increase in the total world population of this threatened plant species!

The description of this species is nearing completion and should be ready for peer review through a recognised scientific journal at the end of October 2002. 🌱

—Johan Hurter

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# Angolan Workshop on Plants Threatened with Extinction

A Vehicle for the Discussion of General Biodiversity Issues in Angola

*Conclusions and Recommendations*

*Agostinho Neto University, SABONET and the*

*Ministry of Fisheries and Environment*

28–29 May 2002, Forum Hotel, Luanda, Angola

This second national Red Data List workshop to implement the findings of the SABONET Project's Red List initiative was arranged by Dr Esperança Costa (Luanda Herbarium, Agostinho Neto University). The first workshop took place in Maputo, Mozambique (see *SABONET News* 6(3), pages 170–172).

The workshop was attended by specialists from the Luanda Herbarium, National Centre of Phytogenetic Resources, Institute of Marine Research, Institute of Forestry Development, Institute of Agronomic Research, technical staff from the Ministry of Agriculture and Rural Development, Ministry of Fisheries and Environment, UNDP, Ecological Youth of Angola (Juventude Ecológica Angolana), the former Regional SABONET Red List Coordinator, the SABONET-Mozambique Red List Coordinator, and the Coordinator of the SADC-Biodiversity Support Programme.

The Minister of Fisheries and Environment presented the opening address of the workshop. The presentations delivered at the workshop showed that, despite the circumstances in the country, institutions have been concerned with conducting research around conservation issues. The participants reached consensus that the following eight issues are necessary and urgent:

- Elaborate and expand the list of plants that are threatened with extinction (Red List), having as its guide the information presented by the Luanda Herbarium and the Institute for Forestry Development. This work should be done in collaboration with the IUCN Species Survival Commission and other parties with expertise in this area.
- Develop legal instruments that provide for the sustainable use of threatened species and critical ecosystems, with appropriate law enforcement.
- Introduce concepts of biodiversity

conservation and disseminate this information at different levels (environmental associations, churches, youth organisations, political parties, and other organs of society) through Education Programmes.

- Continue to build and initiate pilot projects dealing with taxonomy, ecology, and socio-economic issues in areas of Huila Province with the support of specialists such as Mr Jose Maria Daniel.
- Take every national, regional, and international opportunity to collaborate with conservationists, taxonomists, and other scientific experts.
- Promote the conservation of species and ecosystems within the Framework of the National Strategy for the Conservation of Biological Diversity (through two initiatives, UNDP and SADC-Biodiversity Support Programme), including aspects of legislation, law enforcement, delimitation of protected area networks, awareness, education, and community participation.
- Develop collaboration protocols with institutions that can assist and facilitate the rapid development of Angolan specialists to expand and strengthen knowledge on the national flora.
- Establish opportunities in biodiversity programmes to look at the creation of botanical gardens and so deal with aspects around *in situ* conservation, and to be concerned with threatened species as well as invasive species.

The Minister of Education and Culture delivered the closing address of the workshop.

—Prof Esperança Costa

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### Presentations

Objectives of a programme for inventorying biodiversity—Prof. Esperança Costa

The importance of herbaria in the protection and conservation of national flora—Dr Elissaveta Loutshanska

The history of the growth of herbaria in Angola—Joaquim César

The system of the IUCN Red List categories: experiences in southern Africa in the compilation of plant Red Lists—Janice Golding

Experiences in Mozambique in compiling national plant Red Lists—Samira Izidine

Threatened plants in Angola. Results of the first study in Huíla Province—André Dombo

Importance of databases in the maintenance of herbaria—Teresa Martins

The Convention on Biological Diversity (CBD): perspectives in Angola—Dr João Vintám

The importance of forest legislation in the protection of threatened plant species—Representatives from the Institute of Forestry Development

The role of the National Committee and the National Centre for Phytogenetic Resources in the conservation of threatened plants of Angola—Liz Matos

A vision for environmental associations in the conservation and protection of flora—Abias Huong

The importance of the SECOSUD Programme in the conservation and protection of vegetation resources in the SADC region—Ana Teresa Silva 📍

## from the web

### World Summit

[www.johannesburgsummit.org/html/documents/summit\\_docs.html](http://www.johannesburgsummit.org/html/documents/summit_docs.html)

After the final meetings of the 2002 World Summit, it has become rather difficult to unravel the mountain of paperwork that was left behind. However, for taxonomists, perhaps the most important of the Plan of Implementation is Paragraph 42, which addresses Biodiversity. Paragraph 42 of the Plan acknowledges the critical role of biodiversity in overall sustainable development and poverty eradication. Its 20 sub-sections detail the activities required for “...more efficient and coherent implementation of the three objectives of the Convention on Biological Diversity, and the achievement by 2010 of a significant reduction in the current rate of loss of biological diversity...”. Further, it recognizes that to achieve its goals, it “...will require the provision of new and additional financial and technical resources to developing countries...”. Of particular importance also, is that it notes under point (s), the requirement to “...Promote the implementation of the programme of work of the Global Taxonomy Initiative...”, possibly the first time taxonomy as such has been recognized at a high political level. Now we, as taxonomists and plant diversity specialists, have a tool to pressure the politicians to honour these commitments and to ensure that the relevant sections of the Plan are actually implemented. Remember also that the taxonomy issue is only a drop in the bucket, as one of 20 major actions. We will have to work really hard to be noticed.

The full documentation, which contains a wealth of information (as well as very useful summaries) is available in downloadable format at the World Summit website.

Paragraphs that relate to conservation issues:

40. Mountain ecosystems support particular livelihoods, and include

significant watershed resources, biological diversity and unique flora and fauna. Many are particularly fragile and vulnerable to the adverse effects of climate change and need specific protection.

41. Promote sustainable tourism development, including non-consumptive and eco-tourism, in order to increase the benefits from tourism resources for the population in host communities while maintaining the cultural and environmental integrity of the host communities and enhancing the protection of ecologically sensitive areas and natural heritages. Promote sustainable tourism development and capacity-building in order to contribute to the strengthening of rural and local communities.

43. Sustainable forest management for timber and non-timber products is essential to achieving sustainable development and is a critical means to eradicate poverty, significantly reduce deforestation, halt the loss of forest biodiversity and land and resource degradation, and improve food security and access to safe drinking water and affordable energy. It highlights the multiple benefits of forests and trees and contributes to the well-being of the planet and humanity. Achievement of sustainable forest management, nationally and globally, including through partnerships among stakeholders is an essential goal of sustainable development.

### Botanical Artists' Association of Southern Africa

[www.baasa.co.za](http://www.baasa.co.za)

Everything you want to know about botanical art activities in the region.

### BioNET-International Acronym List

[www.bionet-intl.org](http://www.bionet-intl.org)

BioNET has compiled an acronym list with over 1 000 entries. You can view, contribute to, or download the list on the website.

## Lycaeum Images

<http://leda.lycaenum.org/Images/>

Lycaeum is the ancient school of Aristotle, where many scholars, including Theophrastes, the founder of many basic botanical concepts, taught. This site is still one of free exchange of ideas. Many of the 1 284 images posted on the site are related to botanical medicine.

## New Publications from Australian Biological Resources Study

[www.publish.csiro.au](http://www.publish.csiro.au) and

[www.ea.gov.au/biodiversity/abrs/](http://www.ea.gov.au/biodiversity/abrs/)

AusGrass: Grasses of Australia (2002) CD-ROM.

## Plant of the Week

[www.plantoftheweek.org/](http://www.plantoftheweek.org/)

You can search by either species name or family name or common name.

South African plants like the African Aloe and Natal Plum are also included. The website also gives information on the culture and propagation of each plant.

## SANProTA Southern African Natural Products Trade Association

[www.sanprota.com](http://www.sanprota.com)

SANProTA is a membership organisation that represents producers of natural products in Botswana, Malawi, Namibia, Zambia, and Zimbabwe. SANProTA provides trade promotion, research and development, and market linkages, among other services, to enhance rural livelihoods through commercial utilisation of natural resources. E-mail: [info@sanprota.co.zw](mailto:info@sanprota.co.zw)

## Tropilab Inc.

[www.tropilab.com/](http://www.tropilab.com/)

Tropilab Inc. is a supplier of botanicals and tropical seeds. Their web site provides useful free information on a variety of plants. This site emphasises medicinal plants, vegetable and garden plants, plant products, tropical herbs and seeds, rhizomes and bulbs and palms from the Amazon rainforest in Surinam. The individual plant descriptions provide common names, synonyms, families, habit, medicinal lore, hardiness, propagation information, and at least one image. This is a useful online resource for tropical plants. 🌿

Information supplied by

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Our SABONET Steering Committee Chairperson, Prof. Brian Huntley, wandering in the streets of London, well outside the safe botanical environment he is so used to. Here he is attacked by a statue, but quickly makes friends, proof of his superb diplomacy and networking ability. (Photos: Alan Rogers)



## Free State National Botanical Garden

The Free State National Botanical Garden (FSNBG) is one of eight gardens managed by the National Botanical Institute (NBI) in South Africa, concentrating exclusively on cultivating and propagating South Africa's indigenous flora. The Garden lies about 12 km north of the centre of Bloemfontein, the capital of the Free State Province. It is within a 130 km radius of Kimberley, the Free State Goldfields, and Maseru, Lesotho. The Bloemfontein City Council purchased the farm, Winters Valley, in 1965. It later transferred control to the Board of Trustees of the NBI, which officially opened the Garden on 22 February 1969. The 67 ha Garden straddles a valley between the Bloemfontein plateau to the south and a range of 200-m-high hills to the north. The most prominent of these, Monk's Head, is at the western end of the range. It is linked to the Eastern Hill by a rocky ridge, known as the Central Hill. The Garden is divided into two main sections—the developed garden and the natural vegetation area.

### Climate

At an altitude of 1 400 m and 420 km from the sea, the Garden has a continental climate. Temperatures range from well below freezing in winter to over 38°C in summer. Winter drought usually lasts six to seven months. It is followed by summer rain that may be as little as 200 mm or as much as 1 200 mm per annum. These variable condi-

tions determine that the Garden must be used for hardy plants suited to southern Africa's central plateau.

### Natural Vegetation Area

Ecologically this site is of great significance as it supports relics of three vegetation types. The vegetation is broadly classified as Transitional *Cymbopogon–Themeda* Grassveld, but it also includes woodland on the southern slopes of hills and an outlier community of karroid (semidesert) plants on a spur of the Bloemfontein plateau.

On the wooded southern slopes of the hills one finds species like *Buddleja saligna* (False Olive) *Rhus lancea* *R. ciliata* *R. erosa* *Olea africana* (Wild Olive) *Euclea crispa* (Bush Guarri) *Grewia occidentalis* *Cussonia paniculata* (Mountain Cabbage Tree) *Rhigozum obovatum* (Yellow Pomegranate)

At ground level are tufts of *Themeda triandra* interspersed with *Aloe grandidentata*, *Senecio radicans*, and *Cheilanthes eckloniana* (Resurrection Fern).

Valleys and kloofs have deeper, richer soils and sup-

port larger trees:

*Acacia karroo* (Sweet Thorn)

*Celtis africana* (White Stinkwood)

*Ziziphus mucronata* (Buffalo Thorn)

Plants forming the undercover:

*Asparagus* species

ferns

*Stapelia flavirostris*

*Pterodiscus speciosus*

The grassland area to the east of the hills is a relic of the vegetation that covered the area when a presumably cooler, wetter climate prevailed over the region in prehistoric times. Dominant species here are *Themeda triandra* and species of *Eragrostis*, reaching a *Themeda–Cymbopogon* climax. Bulbous plants that occur amongst tussocks are *Boophane disticha* *Brunsvigia radulosa* *Nerine laticoma*



An aerial view of the Free State NBG. (Photo: High Shots)

*Haemanthus humilis*  
*Ammocharis coranica*  
*Hypoxis hemerocallidea* and  
*Albuca setosa*

It is believed that at a later stage, extremely warm, dry conditions prevailed and semikarroid vegetation covered the area. The Karoo hill in the northwestern corner of the Garden has



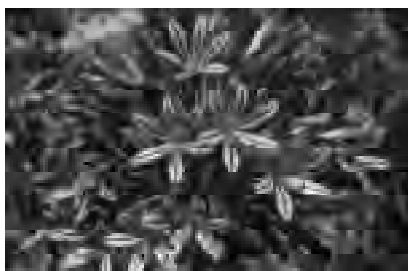
***Aloe polyphylla*, a red-listed endemic from Lesotho, is successfully cultivated in the garden. (Photo: Hans Heilgendorff)**



***Hypoxis* sp. growing in the natural, protected grassland of the garden. (Photo: Hans Heilgendorff)**



***Olea africana* is a very prominent tree in both the developed garden and the surrounding natural vegetation. (Photo: Pitta Joffe)**



***Agapanthus praecox* is one of the few bulbs that can be grown with success in the open parts of the garden. (Photo: Hans Heilgendorff)**

gravelly dolerite soil, confined to small shallow depressions. *Eberlanzia spinosa* dominates with *Euphorbia mauritanica*. Colonies of small plants grow around them and amongst these are species of *Euryops*, *Crassula*, and *Duvalia*. Bare ground colonisers on the hill are *Stomatium mustellinum*, *Anacampseros ustulata*, and *Ruschia griquensis*.

## The Developed Garden

The central portion of the garden has been laid out for the display and cultivation of as many attractive and frost-hardy species of the interesting and varied flora of the Free State as possible. The developed garden includes the following collections:

- Bulb collection
- Medicinal plants collection
- Herbaceous collection
- Clivia collection
- Tree and shrub collection

## Bulb Collection

The bulb collection comprises approximately 25 species. Bulbous plants from all parts of South Africa are cultivated, but most are summer-rainfall and frost-hardy species, tolerant of the extremely low temperatures experienced in winter. Part of the collection is housed under cover in the nursery, as many of the species cannot withstand frost during winter in the garden. Only the toughest bulbs, such as species of *Hypoxis*, *Agapanthus*, *Scilla* and *Gladiolus*, can be grown with success in the open. The main function of the collection is display.

## Medicinal Plant Collection

The medicinal plant collection includes perennials, bulbs, trees, and shrubs that are cultivated for their medicinal value. Two traditional buildings form part of the landscape design, highlight-



**The Medicinal Demonstration Garden, opened in March 2001, showcases the traditional medicinal plants of the Free State and is used extensively for educational activities and cultural display. (Photo: Hans Heilgendorff)**



**Numerous trails have been laid out along the koppies in the garden. (Photo: Hans Heilgendorff)**

ing South Africa's diverse cultures. The main purposes of the collection are educational and display.

## Herbaceous Collection

The herbaceous collection includes plants such as *Diascia*, *Plectranthus*, *Leonotis*, *Nemesia* and a range of free-flowering plants that are used to great effect in the most visited parts of the garden. The collection includes some of the most frost-hardy species. Though very much restricted by climatic conditions, this relatively young collection is growing rapidly. The function of the collection is display, with the main emphasis on spring and summer when most of our 25 000–30 000 annual visitors come to the garden.

## Clivia Collection

The *Clivia* collection is currently being built up, but it is still a relatively young collection. The objective is to accumulate as many forms of *Clivia* as possible throughout their known distribution ranges, and augment the material

collected for display in the garden. The following species are represented:

*C. miniata*  
*C. nobilis*  
*C. gardenii*  
*C. caulescens*

## Tree and Shrub Collection

This is a collection of trees and shrubs mainly from the central parts of South Africa. The emphasis is on plants with horticultural potential and those that are very hardy. It is represented throughout the garden with the main *Rhus* collection—the largest and most complete collection in a botanical garden in South Africa. It serves as material for display, research, and education. Specimens from this collection are propagated for sale to the public and distribution to other botanical gardens.

## Maintenance of the Collections

Plant collections held in the Free State NBG are a valuable asset. A large amount of time and resources is dedicated to developing and researching them. Two horticulturists are responsible for collections in the garden and at the nursery, respectively. A maintenance plan is being established to ensure progress with the documentation of the collections. 📌

Ms Elizabeth Retief and Ms Emsie du Plessis of the National Botanical Institute in Pretoria are thanked for their comments and editorial corrections to an earlier version of this paper. Mr Christopher Willis is thanked for his assistance with the development of the article.

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Vumba Botanical Gardens and Bunga forest are found within the Bvumba Mountains, 32 km from the city of Mutare, Zimbabwe. The chain of highland areas is on the eastern border of Zimbabwe and adjacent to Mozambique. The Bvumba Mountains face the Indian Ocean across the Manica platform and the Mozambique coastal plain.

## Vumba Botanical Gardens

The garden and reserve are established on a portion of the farm that was known as 'Manchester', where Mr F.J. Taylor built a small dam in 1940 and developed a portion of the farm into a garden around it. Friends and casual visitors began to enthuse over Taylor's garden and persuaded him to open it to the public. Known as Manchester Park, the gardens became a tourist attraction and were visited by many thousands during World War II and afterwards. In 1957 Taylor was crippled with arthritis and he began to feel the task maintaining the gardens was beyond him. He then sold the 201 ha of Manchester Park to the government. In 1960 the name of the garden was changed to Vumba National Park and again in 1975 to Vumba Botanical Gardens. Over the past years the extent of the gardens has been greatly increased: the Gardens now include 159 ha of developed area and 42 ha of botanical reserve, with many kilometres of footpaths giving access to every corner of the gardens and forest.

## Bunga Forest Reserve

The Bunga Forest reserve was donated to the state by the late Mr Lionel Cripps for the protection of indigenous forest and covers an area of 1 558 ha. It became a national park in 1970 and a botanical reserve in 1975. A botanical reserve is constituted to preserve and protect rare or endangered indigenous plants or representative plant communities growing naturally in the wild for the enjoyment, education, and benefit of the public. The Bunga Forest is representative of the flora occurring in the Eastern Highlands of Zimbabwe.

The forest also supports a large population of butterflies, blue duiker, samango monkeys, and wild pigs. A dwarf chameleon, which is relatively rare, is also well represented in the reserve. A wide variety of birds can be seen, with more than 130 known species recorded.



*Rhus erosa* is a common small tree in the garden. The *Rhus* collection is the largest and most complete collection in a botanical garden in South Africa. (Photo: Hans Heilgendorff)



The grassland area to the east of the hills is a relic of the vegetation that covered the area when a cooler, wetter climate prevailed over the region in prehistoric times. A natural grassland patch is managed and protected in the garden and is used for educational purposes. (Photo: Hans Heilgendorff)



## Vumba Botanical Gardens and Bunga Forest Reserve

### Climate

Vumba Botanical Gardens is located in the Bvumba Mountains. Bvumba means 'mist' which is quite common throughout the year. The highest point in the Bvumbas is 1 911 m above sea level. The Bvumba Mountains receive moisture-laden southeasterly winds from the Indian Ocean. Temperatures are generally cool, with an average minimum of 6°C and a maximum of 26°C. Vumba receives more than 2 000 mm of rain throughout the year.

### Vegetation

A collection of exotic plants occupies about 40% of the developed area of Vumba Botanical Gardens, including displays of hydrangeas, dome-shaped azaleas, proteas, palms, fuchsias, begonias, aloes, and cycads. Large collections of indigenous tree ferns also contribute to the beauty of the garden. Dotted Cypress, pines, Griviera, and Silver Oak are also found in the gardens. The water garden contains water lilies, arum lilies, agapanthus and watsonias.

The shade garden is mainly composed of begonias, cinerarias, and orchids. A small rose garden contains Bulgarian roses. As one wanders around the garden, well-designed annual beds catch the eye. Winter annuals normally flower in August/September and these include Cineraria, Phlox, Stocks, Statice, Ageratum, Larkspur, Petunia,

English Poppy, Rudbekia, Felecia, Namaqualand White, and Linaria. Summer annuals flower during the Easter holiday in April/May. Marigold, Zinnia, Alyssum, Cosmos, Calendula, Globe Amaranthus, Cleome, Strawberry, and Closia all provide colour to complement the dominant green of the garden.

Bunga Forest and Vumba Reserve contain 100% indigenous vegetation. The central core of the forest is dominated by *Macaranga mellifera*, *Polyscias fulva*, *Albizia schimperana*, *Sapium ellipticum*

*Maesa lanceolata* is also a common evergreen forest species found in the reserves. The northwest corner of the Vumba reserve is an area of grassland with shrubs, including *Philippia* and *Anthospermum* species, with oc-

casional evergreen saplings. *Brachystegia* woodland also occurs at the southern end of Bunga Forest. Indigenous orchids and moss are abundant. Other shrubs include *Psorospermum febrifugum*



General view of the central garden displaying tree ferns, camellias, aloes, and indigenous trees.



Dome-shaped azaleas, a major feature of the garden.

*Dodonaea viscosa*  
*Rhus chirindensis*

## Herb Garden

A small herb garden, mainly for educating the general public, has been established within the developed area. Herbs include salvia, spike lavender, thyme, mint and comfrey, to name a few; more than 30 species are propagated here.



**Main entrance to the Gardens.**

## Specially Protected Indigenous Plants Collection

Vumba Botanical Gardens is empowered by the Parks and Wildlife Act to control movement or trade of specially protected species. According to this act, the following are specially protected indigenous plants that have been propagated and conserved in the gardens:

*Acristuchum aureum* (Mangrove Fern)  
*Raphia farinifera* (Raffia Palm)  
*Alsophila* sp. (Tree fern)  
*Gloriosa superba* (Flame Lily)  
Orchids  
*Platycerium alcinorne* (Staghorn Fern)  
*Encephalartos* sp. (Cycad)

A cycad section including species in the following genera:

*Ceratozamia*  
*Cycas*  
*Dicon*  
*Encephalartos*  
*Macrozamia*  
*Zamia*

An aloe section also contains different species of aloes peculiar to the Eastern Highlands.

## Other Activities

In addition to providing an interesting collection of plants for visitors, the garden also provides camping, caravan and picnic facilities. Every site is

equipped with an ablution block and electricity power points. Two self-catering lodges with two bedrooms each are also available. There is also a swimming pool. To provide visitors with refreshments and light meals, a tea garden is situated in the central part of the botanic garden.

## The Future

Although our garden is already popular and attractive, more has to be done on plant collection. Other indigenous plants peculiar to the Eastern Highlands of Zimbabwe are not well represented in the garden. Development towards collections of these plants and others, which can do well in the garden, should be emphasized. 🌱

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**Small dam located at the heart of the gardens.**



The Rev. Dr P.J. Mott established the University Botswana Herbarium in 1973 as part of the University of Botswana, Lesotho and Swaziland (UBLS). In 1980 the herbarium was registered and listed in the Index Herbariorum. Two years later it became the Herbarium of the University of Botswana (UCBG).

UCBG is a teaching and research facility administered by the Department of Biological Sciences. It serves both students and staff members who require assistance, mostly in plant taxonomy. In addition, the herbarium offers assistance to government institutions, non-governmental organizations, other researchers, and members of the public. The herbarium charges a fee for commercial or private consultancy.

## The Herbarium Plant Collection

The herbarium contains about 10 000 specimens collected from different parts of Botswana, and a few from neighbouring countries such as Lesotho, Zimbabwe, and South Africa. The collection is made up of carefully collected, preserved, dried, mounted, and labelled plant specimens. The collection is arranged by family according to the Cronquist Classification System. Most of the collections in the herbarium are by J.M. Woollard and P.J. Mott.

## Activities and Services

Some of the main activities and services provided by UCBG:

- Collecting and preserving plant specimens from different regions of Botswana.
- Encoding herbarium specimens using the PRECIS database.
- Serving as a standard reference for identifying newly collected plant

specimens, hence offering assistance in accurate identification of plants for individuals dealing with plants under different fields of research and study.

- Serving as a reference collection for plant taxonomy and other botanical courses offered by the University, and also trains students in herbarium practices.
- Providing information on plant diversity, distribution, and also promotes awareness in plant conservation and utilisation.
- Providing information on plant vernacular names (where available).

## Funding

UCBG functions, activities, and equipment are budgeted for under the Department of Biological Sciences. SABONET has not only provided financial assistance, but also employment opportunities and training in database management. SABONET funding has made it possible to acquire a considerable amount of equipment for the herbarium; a computer and the provision of PRECIS Database software, which is being used to encode and keep records of the specimens in the herbarium, is only one example. The Project has employed staff members who have been trained in database use. Further training has been provided to teach the staff members on how to design queries and compile meaningful reports from the database. The training was done through the provision of short periodic courses at-



UCBG/SABONET staff, Ludo & Neo, sorting out specimens from the collection. (Photo: M.P. Setshogo).



Ludo, SABONET employee, working on the PRECIS database. (Photo: M.P. Setshogo)

tended by the SABONET staff members from different parts of southern Africa, held at the National Herbarium of Pretoria (South Africa). SABONET is also assisting UCBG and GAB in the compilation of the Poaceae Checklist, National Tree List, and National Checklist.

## Other Projects

UCBG has been involved in other projects:

- A compilation of vernacular plant names (in collaboration with the National Herbarium (GAB), Sebele, and Peter Smith). This project has been completed and a book has been published.
- The Flora of Botswana project.
- Inventory of useful indigenous plants of Botswana.

## Association with Other Herbaria

In addition to working with local herbaria, UCBG works hand in hand with other herbaria in the world, such as the

Royal Botanic Gardens Kew (UK) and New York Botanical Gardens (USA), through its specimen exchange/loan programme. These herbaria have helped in augmenting the collection at UCBG and have offered assistance in identifying some plant specimens.

## Literature

UCBG is well equipped with a small literature collection of about 1 000 books. The library collection has been built up using donations by SABONET, the exchange programme with other herbaria, research reports, and so on. Some of the literature is used as reference material by students doing plant taxonomy courses and other botanical courses. These are taken out of the herbarium by the lecturer in charge, or used within the herbarium under supervision of the curator.

## Staff

Herbarium Curator: Mr M. Muzila (on SABONET-funded study leave)

## SABONET Staff

Temporary Herbarium Research Officer: Ms L.G. Matenge

Temporary Data Capturer: Ms N. Lekomola

## Associated Staff

Plant taxonomist/diversity specialist: Dr M.P. Setshogo. Presently Herbarium Caretaker during Mr Muzila's absence.

Botany Technician: Mr J. Madome

Botany Technician: Mr J. Phiri. Currently on study leave. 📧

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# Australia Network for Plant Conservation Recovery:

**F**ifth Australian Network for Plant Conservation National Conference and Plant Conservation Techniques Workshops

Tuesday 25 February to Saturday 1 March 2003

Geelong, Australia

Hosted by City of Greater Geelong

Endorsed by IUCN Species Survival Commission Plant Conservation Committee

Members and non-members welcome

## Introduction

It is now just over 10 years since the ANPC was formed and the Endangered Species Protection Act 1992 was enacted. This fifth ANPC conference heralds the next decade of development of the ANPC in delivering on the charter to conserve and protect plant life in Australia. The chal-

lenges for plant conservation into the next decade are many; they include planning for the conservation of complex ecosystems and populations as well as individual species, and applying the recently enacted Global Plant Conservation Strategy under the United Nations Convention on Biological Diversity to dynamic, and often human-influenced, landscapes and populations.

## Themes

- Recovery planning ten years on
- Conservation of ecological communities in human landscapes
- Cryptogams—conserving hidden essentials of biodiversity
- Restoration—the challenges of big and small
- Threat abatement planning in stochastic and variable environments
- Australasia's response to the CBD Global Plant Conservation Strategy
- Geelong Region Biodiversity Study and other regional conservation initiatives

## Program

The conference program will include paper presentations, posters, workshops, field trips, and workshops on conservation techniques.

## Conservation Techniques Workshops

Two days of conservation techniques workshops will be held owing to the success of the ANPC Plant Conservation Techniques Courses, and the enormous interest in the techniques workshops at the ANPC's fourth national conference. These workshops will have a practical focus, offering a unique opportunity for delegates to further tap into and share knowledge and expertise in a range of specialisations.

## Field Trips

Conference field trips will be held, giving delegates a chance to see local areas of conservation significance, and to experience local projects first-hand.

## Abstracts

We encourage abstracts from Australia as well as other countries. Broad conference themes are listed above; however, abstracts addressing other issues are also welcome. You may be interested in organising a symposium of several speakers on a particular theme, or a discussion workshop to stimulate debate on an issue. If you are interested in presenting a paper, symposium, poster, workshop, or conservation techniques workshop, please send an extended abstract of no more than one A4 page with a 250-word summary by 15 October 2002. Submit abstracts in Word 2000 or Rich Text Format, electronically if possible, as an email attachment or on disk. Otherwise send by fax or post.

## Organising Committee

- John Arnott, Geelong Botanic Gardens
- John Delpratt, The University of Melbourne, Burnley College
- Dr Kingsley Dixon, Kings Park and Botanic Garden; President, Australian Network for Plant Conservation
- Elizabeth James, Royal Botanic Gardens Melbourne
- Colin Knight, Zoological Parks and Gardens Board of Victoria
- Michael Looker, Trust for Nature
- Jeanette Mill, Australian Network for Plant Conservation
- Anna H. Murphy, Department of Natural Resources and Environment, Vic.
- Rob Small, City of Greater Geelong
- Dr Judy West, Centre for Plant Biodiversity Research
- Suzanne Woolford, Conservation Volunteers Australia

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# The Paper Chase

The object of this column is to keep an eye open for literature which SABONET users may find useful. This will mostly be new publications, but may well include older information in answer to questions such as "what's the best key to ...". It is neither possible nor desirable that the flow of such information should be one-way, from Pretoria outwards, so please feel free to submit notes and useful information to the address at the end of this column.

The citation of an item here does not imply any guarantee of its contents or even its existence; very often the compiler has not seen the documents referred to.

## Mary Gunn Library: Theses

■ BREDENKAMP, C.L. 2002. A monograph of the genus *Passerina* L. (Thymelaeaceae). PhD thesis, University of Pretoria, Pretoria. 360 pages.

■ KOEKEMOER, M. 2002. Systematics of the *Metalasia* group in the Relhaniinae (Asteraceae–Gnaphalieae). PhD thesis, Rand Afrikaans University, Johannesburg. 284 pages.

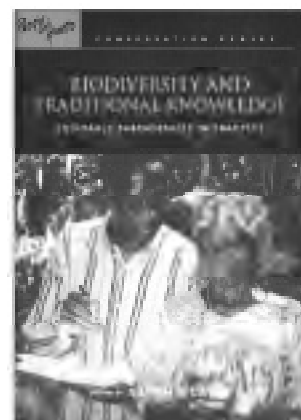
■ MANYANGA, P. The systematics of *Hypodontium* MSc dissertation, University of Cape Town, Cape Town. 61 pages.

## Mary Gunn Library: New Books

■ LAIRD, S. (ed.) 2002. *Biodiversity and traditional knowledge: equitable partnerships in practice* Earthscan Publications, London. Soft cover, 504 pages, A5. ISBN 1-85383-698-2.

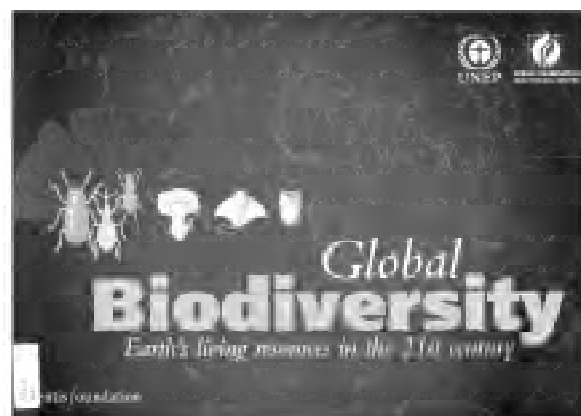
■ Planta Europa. 2002. *European Plant Conservation Strategy: Saving the plants of Europe*. Soft cover, 39 pages. ISBN 1-872613-59-4.

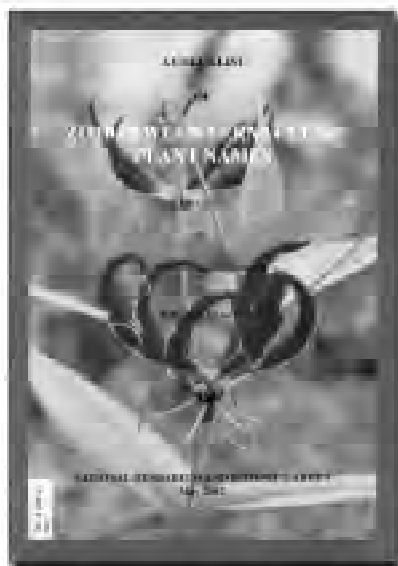
The Global Strategy for Plant Conservation has been developed to provide a framework for action at the global, regional, national, and local levels. Targets of this strategy address five major objectives: understanding and documenting plant diversity, using plant diversity sustainably, promoting education and awareness about plant diversity and building capacity for the conservation of plant diversity. The European Plant Conservation Strategy was developed specifically to save the plants of Europe. The strategy has been recognised as a contribution to the GSPC, which was adopted at the Conference of Parties in April 2002. It is hoped that botanical institutions throughout Europe will be able to play an active part in its implementation. Botanical institutions in southern Africa may find it useful model for the development of similar strategies in their own countries or region. Copies of this publication can be ordered from [liz.radford@plantlife.org.uk](mailto:liz.radford@plantlife.org.uk) and also visit [www.plantaeuropa.org](http://www.plantaeuropa.org).



■ GROOMBRIDGE, B. & JENKINS, M.D. 2000. *Global Biodiversity: earth's living resources in the 21st century*. World Conservation Press, Cambridge. Soft cover, 246 pages, A4 landscape. ISBN 1-899628-15-0.

■ HAMMER, S. 2002. *Dumpling and his wife: new views of the genus Conophytum*. EAE Creative Colour, England. Hard cover, 398 pages, A4. ISBN 0-9539326-1-3.





■ GWINYAI, E. & TAKAWIRA R. 2002. *Zimbabwean vernacular plant names* (2<sup>nd</sup> edn). National Herbarium and Botanic Garden, Harare. Soft cover, 192 pages, A4. No ISBN.

■ RAYMOND, R.F. 2002. *Common names of some KwaZulu-Natal plants*. Cairncross Bookbinders, Pretoria. Hardcover, 375 pages, A4. No ISBN.

■ EGGLI, U. (ed.) 2002. *Illustrated handbook of succulent plants: Dicotyledons*. Springer-Verlag, Berlin. Hard cover, 545 pages + 487 colour photos, A4. ISBN 3-540-41966-7.

■ BALJNATH, H. & SINGH, Y. 2002. *Rebirth of science in Africa: a shared vision for life and environmental sciences* Umdaus, Hatfield. Hard cover, 246 pages, A4. ISBN 1-919766-23-5.

## Mary Gunn Library: New Parts of Floras

### Flora of Tropical East Africa

■ Compositae (Part 1), edited by H.J. Beentje & S.A.L. Smith (2000).

■ Compositae (Part 2), edited by H.J. Beentje & S.A.L. Smith (2002).

■ Cymodoceaceae, by H.J. Beentje (2002).

■ Gentianaceae, by S. Nemomissa (2002).

■ Lomariopsidaceae, by J.T. Mickel (2002).

■ Portulacaceae, by S.M. Phillips (2002).

## Recently Published Papers

All publications marked with ♦ deal with the biology, taxonomy and ecology of the Poaceae.

### Agriculture, Ecosystem & Environment 89(3) (2002)

♦ Appropriate agricultural management practices required to ensure conservation and biodiversity of environmentally sensitive grassland sites designated under Natura 2000. S. Muller. Pages 261–266.

### Annals of the Missouri Botanical Garden 89(2) (2002)

■ The seven great questions of systematic biology: An essential foundation for conservation and the sustainable use of biodiversity. J. Cracraft. Pages 127–144.

■ Taxonomy and herbaria in service of plant conservation: Lessons from Madagascar's endemic families. G.E. Schatz. Pages 145–152.

■ The Global 200: priority ecoregions for global conservation. D.M. Olson & E. Dinerstein. Pages 199–224.

■ The genus *Justicia* (Acanthaceae) in the southern region of South America. C. Ezcurra. Pages 225–280.

■ Plant diversity of the Cape Region of southern Africa. P. Goldblatt & J.C. Manning. Pages 281–302.

### Austral Ecology 27(1) (2002)

■ Depth distribution and composition of seedbanks in alien-invaded and uninvaded fynbos vegetation. P.M. Holmes. Pages 110–120.

### Biodiversity and Conservation 11(4,5,6,7,8) (2002)

■ High plant endemism in an Indian hotspot—eastern Himalaya. M.D. Behera, S.P.S. Kushwaha & P.S. Roy. Pages 669–682.

■ A multicriteria approach to reserve selection: Addressing long-term biodiversity maintenance. B. Reyers, D.H.K. Fairbanks, K.J. Wessels & A.S. van Jaarsveld. Pages 769–793.

■ Inter- and intra-genetic variation of four wild populations of *Prosopis* using rapid-pcr fingerprints. J. Juarez-Munoz, G. Carrillo-Castaneda, R. Arreguin & A. Rubluo. Pages 921–930.

■ Forest ecosystems: Threats, sustainable use and biodiversity conservation. J.M. Thiollay. Pages 943–946.

■ The quillworts (*Isoetes*) of India: Distribution, endemism and species radiation. Pages 959–973.

♦ Diversity of management practices required to ensure conservation of rare and locally threatened plant species in grasslands: A case study at a regional scale. S. Muller. Pages 1173–1184.

■ An integrative approach for the conservation and management of South Africa's floristic diversity at the provincial level. M.F. Pfab. Pages 1195–1204.

■ Reproductive ecology and the persistence of an endangered plant. T.M. Carlsen, E.K. Espeland & B.M. Pavlik. Pages 1247–1268.

■ Application of IUCN criteria and Red List categories to species of five Anacardiaceae genera in Madagascar. A. Randrianasolo, J.S. Miller & T.K. Consiglio. Pages 1289–1300.

■ Revisiting Green Data species lists. M. Keith & A.S. van Jaarsveld. Pages 1313–1316.

■ Contribution by farmers' survival strategies to soil erosion in the Linthipe River Catchment: Implications for biodiversity conservation in Lake Malawi/Nyasa. F.X. Mkanda. Pages 1327–1359.



■ Tree and shrub diversity and abundance in fragmented littoral forest of southeastern Madagascar. M.W. Cadotte, R. Franck, L. Reza & J. Lovett-Doust. Pages 1417–1436.

■ Conservation of biodiversity in the Arabuko Sokoke Forest, Kenya. S. Muriithi & W. Kenyon. Pages 1437–1450.

◆ Persistence of species in a fragmented urban landscape: the importance of dispersal ability and habitat availability of grassland butterflies. B.C. Wood & A.S. Pullin. Pages 1451–1468.

### **Biological Conservation 104(2,3) (2002)**

◆ The challenge of conserving grassland insects at the margins of their range in Europe. N.A.D. Bourn & J.A. Thomas. Pages 285–292.

◆ The historical and socio-economic perspective of calcareous grasslands—lessons from the distant and recent past. P. Poschlod & M.F. Wallis De Fries. Pages 361–376.

### **Biological Conservation 105(2,3) (2002)**

◆ Association between lowland grassland plant communities and soil properties. C.N.R. Critchley, B.J. Chambers, J.A. Fowbert *et al.* Pages 199–215.

◆ Habitat loss and the habitat fragmentation threshold: An experimental evaluation of impacts on richness and total abundances using grassland invertebrates. M. Parker & R. MacNally. Pages 217–229.

### **Biological Conservation 107(2) (2002)**

◆ Managing intensive and extensive land uses to conserve grassland plants in sub-tropical eucalypt woodlands. S. McIntyre & T.G. Martin. Pages 241–252.

### **Biological Education 36(3) (2002)**

■ Community education for biological diversity conservation in the Shiselweni Region of Swaziland. B.S. Nkosi. Pages 113–115.

### **Bothalia 32(2) (2002)**

■ Systematics of the genus *Daubenya* (Hyacinthaceae: Massonieae). J.C. Manning & A.M. van der Merwe. Pages 133–150.

■ The genus *Trichodesma* (Boraginaceae: Boraginoidea) in southern Africa. E. Retief & A.E. van Wyk. Pages 151–166.

■ Six new species and one new subspecies of *Erica* (Ericaceae) from Western Cape, South Africa. E.G.H. Oliver & I.M. Oliver. Pages 167–180.

■ Studies in the liverwort family

Aneuraceae (Metzgeriales) from southern Africa. 4. *Riccardia obtusa*. S.M. Perold. Pages 181–184.

■ Reduction of *Foveolina albidato* *Foveolina dichotoma* J.B.P. Beyers. Pages 185.

■ A new species of *Arctotheca* from Northern Cape, South Africa. J.B.P. Beyers. Pages 185–187.

■ Mesembs with nut-like schizocarpic fruit and *Ruschianthemum* Friedrich sunk under *Stoeberia* Dinter & Schwantes. P. Chesselet & A.E. van Wyk. Pages 187–190.

■ A new species of *Lachenalia* from Namaqualand, South Africa. G.D. Duncan & T.J. Edwards. Pages 190–192.

■ A distinctive new species of *Felicia* (Astereae) from Western Cape, South Africa. J.C. Manning & P. Goldblatt. Pages 193–195.

■ A new fern record for the *Flora of Southern Africa* region. J.E. Burrows & S.M. Burrows. Pages 195–196.

■ The synonym of *Ceraria namaquensis* (Sond.) H. Pearson & E.L. Stephens. H.F. Glen. Pages 196–197.

■ The typification of *Cyrtanthus smithiae* Watt ex Harv. J.P. Rourke. Pages 197–199.

■ A study of ovule-to-seed development in *Ceratosicyos* (Achariaceae) and the systematic position of the genus. E.M.A. Steyn, A.E. van Wyk & G.F. Smith. Pages 201–210.

◆ The grasslands and wetlands of the Sekhukhuneland Centre of Plant Endemism, South Africa. S.J. Siebert, A.E. van Wyk, G.J. Bredenkamp & F. du Plessis. Pages 211–231.

◆ Chromosome studies on African plants. 17. The subfamilies Arundinoideae and Danthonioideae. R. Roodt, J.J. Spies, A.F. Malan *et al.* Pages 233–240.

◆ Chromosome studies on African plants. 18. The subfamily Chloridoideae. R. Roodt & J.J. Spies. Pages 240–249.

### **Conservation Biology 16(1,2,3,4) (2002)**

■ Outreach and partnership programs for conservation education where endangered species conservation and research occur. C. Brewer. Pages 4–6.

■ Ecoregions in context: A critique with special reference to Indonesia. P. Jepson & R.J. Whittaker. Pages 42–57.

■ Ecoregions in ascendance: Reply to Jepson and Whittaker. E. Wikramanayake, E. Dinerstein, C. Loucks *et al.* Pages 238–243.

■ Conservation of biodiversity in a changing climate. L. Hannah, G.F. Midgley, T. Lovejoy *et al.* Pages 264–268.

■ Bridging the gap between private landowners and conservationists. S.M. James. Pages 269–272.



■ Importance of farmland habitats for conservation of plant species. K.E. Freemark, C. Boutin & C.J. Keddy. Pages 399–412.

◆ Species-richness correlations of six different taxa in Swedish seminatural grasslands. K. Vessby, B. Söderström, A. Glimskär & B. Svensson. Pages 430–439.

■ The Kyoto Protocol: An opportunity for biodiversity restoration forestry. S.C. Stier & S.F. Siebert. Pages 575–576.

■ Enlisting taxonomists to survey poorly known taxa for biodiversity conservation: A lichen case study. M.L. Hunter & S.L. Webb. Pages 660–665.

■ Evaluating the extinction risk of a perennial herb: Demographic data versus historical records. R. Lindborg & J. Ehrlén. Pages 683–690.

■ Habitat loss and extinction in the hotspots of biodiversity. T.M. Brooks, R.A. Mittermeier, C.G. Mittermeier *et al.* Pages 909–923.

◆ Timescale of perennial grass recovery in desertified arid grasslands following livestock removal. T.J. Valone, M. Meyer, J.H. Brown & R.M. Chew. Pages 995–1002.

■ Species lists in ecology and conservation: abundances matter. O. Balmer. Pages 1160–1161.

#### **Ecological Applications 12(2) (2002)**

◆ Species composition and diversity affect grassland susceptibility and response to invasion. J.S. Dukes. Pages 602–617.

#### **Ecological Research 16(5) (2002)**

◆ Community diversity and invasion resistance: An experimental test in a grassland ecosystem and a review of comparable studies. A. Hector, K. Dobson, A. Minns *et al.* Pages 819–831.

#### **Forest Ecology Management 160(1–3) (2002)**

◆ Invasive alien trees and water resources in South Africa: Case studies of the costs and benefits of management. D.C. Le Maitre, B.W. Van Wilgen, C.M. Gelderblom *et al.* Pages 143–159.

#### **Forest Ecology Management 161(1–3) (2002)**

■ Successful vegetative propagation techniques for the threatened African pencil cedar (*Juniperus procera* Hochst. ex Endl.). L. Negash. Pages 53–64.

#### **Ingens Bulletin 26 (2002)**

■ The cycad is doomed. G. Du Venage. Pages 1–6.

■ Friedrich Welwitsch: Commemorated in *Welwitschia* B. Elliot. Pages 7–11.

■ A 1973 checklist of the aloes in the vicinity of the National Parks in the Melsetter area. E.J. Bullock. Pages 16–21.

■ The technique of hand pollination of Zimbabwe's cycads. B. Schlachter. Pages 36–41.

#### **Journal of Applied Ecology 39(2) (2002)**

◆ Restoration of species-rich grassland on arable land: Assessing the limiting processes using a multi-site experiment. R.F. Pywell, J.M. Bullock, A. Hopkins *et al.* Pages 294–309.

#### **Journal of Bioscience 27(4) (2002)**

■ Persistence and vulnerability: Retaining biodiversity in the landscape and in protected areas. K.J. Gaston, R.L. Pressey & C.R. Margules. Pages 361–384.

■ The role of trade-offs in biodiversity conservation planning: Linking local management, regional planning and global conservation efforts. D.P. Faith & P.A. Walker. Pages 393–407.

#### **Journal of the Royal Society of New Zealand 32(1) (2002)**

◆ Alluvial grasslands of Canterbury and Marlborough, eastern South Island, New Zealand: Vegetation patterns and long-term change. Pages 113–147.

#### **Journal of Wildlife Research 32(1) (2002)**

■ The status and population structure of the marula in the Kruger National Park. O.S. Jacobs & R. Biggs. Pages 1–12.

#### **Koedoe 45(1) (2002)**

■ Natural woodland vegetation and plant species richness of the urban open spaces in Gauteng, South Africa. C.H. Grobler, G.J. Bredenkamp & L.R. Brown. Pages 19–34.

■ Floristic analysis of the Mountain Zebra National Park, Eastern Cape. U. Pond, B.B. Beesley, L.R. Brown & H. Bezuidenhout. Pages 35–58.

#### **Landscape Ecology 16(8) (2002)**

◆ Landscape cover type and pattern dynamics in fragmented southern Great Plains grasslands, USA. B.R. Coppedge, D.M. Engle, S.D. Fuhlendorf *et al.* Pages 677–690.

#### **Local Environment 7(2,3) (2002)**

■ The Role of Information in Environmental Management and Governance in Lesotho. E. Nthunya. Pages 135–148.

■ Multi-function landscape plans: A missing link in sustainability planning? P. Selman. Pages 283–295.

■ From Rio to Johannesburg and beyond: A long and winding road. E. Göll & M. LaFond. Pages 317–324.



### ***Mycorrhiza* 12(3) (2002)**

- ◆ Mycorrhizal plants of traditionally managed boreal grasslands in Norway. M. Eriksen, K.E. Bjureke & S.S. Dhillon. Pages 117–123.

### ***New Scientist* 175 (2361) (2002)**

- Africans go back to the land as plants reclaim the desert. F. Pearce. Pages 4–5.

- UN is slipping modified food into aid. F. Pearce. Page 5.  
Is there a safe limit for weed killers? E. Samuel. Page 10.

- Boom to bust for rare species. B. Holmes. Page 18.

- Who should balance the risks and benefits of a researcher's work? S. Bloom. Page 25.

- ◆ Grass equals happiness. J. Smith. Page 26.

### ***New Zealand Journal of Botany* 40(2) (2002)**

- ◆ Regional endemism in New Zealand grasses. H.E. Connor. Pages 189–200.

- ◆ Phenotypic diversity in Argentinian populations of *Bromus catharticus* (Poaceae). M.B. Aulicino & M.J. Arturi.

### ***Plant Talk* 28,29 (2002)**

- How many plant species are there? D. Bramwell. Pages 32–34.

- South Africa: The flowering of the Rainbow Nation. B.J. Huntley. Pages 34–40.

### ***Restoration Ecology* 10(1) (2002)**

- ◆ *Aristida beyrichiana* (wiregrass) establishment and recruitment: Implications for restoration. M.K. Mulligan, L.K. Kirkman & R.J. Mitchell. Pages 68–76.

### ***Science* 297(5579,5583) (2002)**

- Taxonomic bias in conservation research. J.A. Clark & R.M. May. Pages 191–192.

- Economic reasons for conserving wild nature. A. Balmford, A. Bruner, P. Cooper *et al.* Pages 950–953.

### ***South African Journal of Botany* 68(1,2) (2002)**

- A review of ethnobotanical research in southern Africa. B-E. van Wyk. Pages 1–13.

- The sausage tree (*Kigelia pinnata*): Ethnobotany and recent scientific work. P.J. Houghton. Pages 14–20.

- The status of bark in South African traditional health care. O.M. Grace, H.D.V. Prendergast, J. van Staden & A.K. Jager. Pages 21–30.

- The physical environment and major vegetation types of Sekhukhuneland, South Africa. S.J. Siebert, A.E. van Wyk & G.J. Bredenkamp. Pages 127–142.

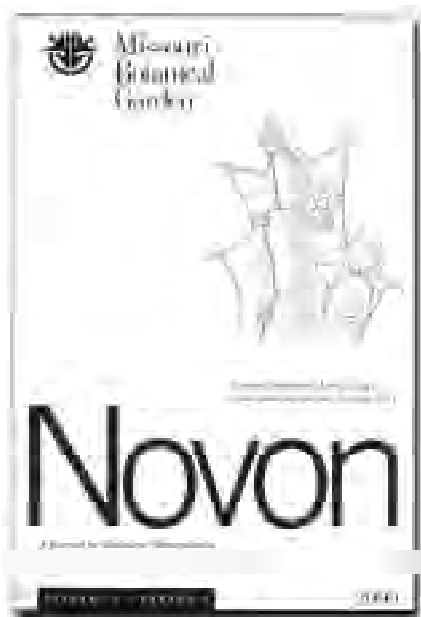
- Ovule, seed and seedling characters in *Acharia* (Achariaceae) with evidence of myrmecochory in the family. E.M.A. Steyn, A.E. van Wyk & G.F. Smith. Pages 143–156.

- The pollination of *Tritoniopsis parviflora* (Iridaceae) by the oil-collecting bee *Rediviva gigas* (Hymenoptera: Melittidae): The first record of oil-secretion in African Iridaceae. J. Manning & P. Goldblatt. Pages 171–176.

- Vegetation morphology and anatomy of *Cissampelos* in South Africa. H. de Wet, P.M. Tilney & B-E. van Wyk. Pages 181–190.

- Diversity and distribution of seagrasses around Inhaca Island, southern Mozambique. S.O. Bandeira. Pages 191–198.

- *Valeriemaya seagriefii* sp. nov. (Delesseriaceae, Rhodophyta) from South Africa. O. de Clerck, M.J. Wynne & H. Stegenga. Pages 199–204.



### ***Novon* 12(2) (2002)**

- Nomenclatural clarification in *Aristea* Section *Racemosae* (Iridaceae) in the Cape Flora of South Africa. P. Goldblatt, J.C. Manning & R.E. Gereau. Pages 190–195.

- ◆ A new species of *Homozeugos* (Poaceae) from Angola. G.F. Guala. Pages 196–199.

- New combinations and a new name in *Syzygium* (Myrtaceae) from Madagascar and the Comoro Islands. J.N. Labat & G.E. Schatz. Pages 201–205.

- Three new sections and a new subgenus of *Phyllanthus* (Euphorbiaceae). G.L. Webster. Pages 290–298.

### ***Oryx* 36(1,2) (2002)**

- The impact of war on forest areas in the Democratic Republic of Congo. D. Draulans, E. van Krunkelsven. Pages 35–40.

- World Bank assistance to transboundary reserves. K. MacKinnon. Page 115.

- Flagship species fund. S. Mickleburgh. Page 116.

- The Uluguru Mountains of eastern Tanzania: The effect of forest loss on biodiversity. N. Burgess, N. Doggart & J.C. Lovett. Pages 140–152.

■ Hawkmoth-pollination in *Crinum variable* (Amaryllidaceae) and the biogeography of sphingophily in southern African Amaryllidaceae. J. Manning & D. Snijman. Pages 212–216.

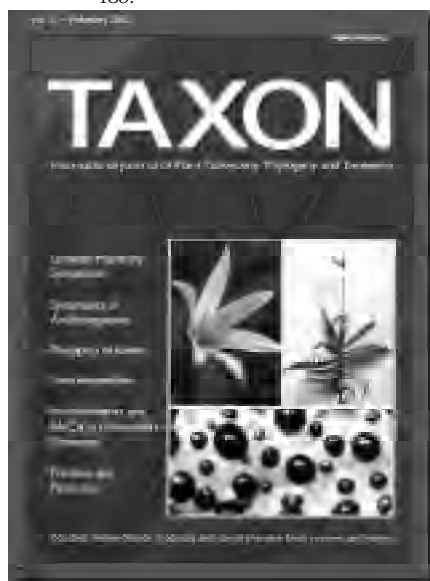
■ Antibacterial activity and isolation of active compounds from fruit of the traditional African medicinal tree *Kigelia africana* O.M. Grace, M.E. Light, K.L. Lindsey *et al.* Pages 220–222.

### **South African Journal of Science 98(3,4) (2002)**

■ Inducing sex change and organogenesis from tissue culture in the endangered African cycad *Encephalartos woodii* (Cycadales, Zamiaceae). R. Gorelick & R. Osborne. Pages 114–116.

■ Progress in southern African systematics. G.F. Smith. Pages 139–141.

■ A submerged Late Cretaceous podocarpaceous forest, west coast, South Africa. M.K. Bamford & I.R. Stevenson. Pages 181–185.



### **Systematic Biology 51(2) (2002)**

■ Integrating biosystematic data into conservation planning: Perspectives from southern Africa's Succulent Karoo. P.G. Desmet, R.M. Cowling, A.G. Ellis & R.L. Pressey. Pages 317–330.

### **Taxon 50(4) (2001)**

■ How many species of seed plants are there? R. Govaerts. Pages 1085–1090.

### **Taxon 51(2) (2002)**

■ A southern perspective on the All Species Project and the Global Taxonomy Imperative. G.F. Smith & R.R. Klopper. Pages 359–361.

### **Veld & Flora 88(2,3) (2002)**

■ A farmer's viewpoint on conservation. T. de Villiers. Page 42.

◆ The quartzite ridges of Gauteng: The fascinating and distinctive koppies of the most highly urbanized area of South Africa are afforded protection. M. Pfab. Pages 56–59.

■ *Aloe arborescens* and its nine cultivars: Nine jazzy winter-flowering aloes. E. van Jaarsveld. Pages 63–65.

■ The Goudini Sage: The brand new species, *Salvia thermara*, hits the nurseries. E. van Jaarsveld. Pages 66–67.

■ Dwarf watsonias: Ten of the best dwarf *Watsonia* species for containers and rock gardens. G. Duncan. Pages 94–99.

■ South African sages: *Salvias* for winter and summer rainfall gardens. E. van Jaarsveld. Pages 102–104.

■ *Nerine gracilis* A rare nerine from Mpumalanga. C. Craib. Pages 105–107.

■ *Felicia elongata* A West Coast daisy. L. van der Walt. Pages 108–110.

■ From Namaqualand 'viooltjies' to posh pot plant: Developing new *Lachenalia* hybrids for export. R. Kleynhans. Pages 111–113.

■ The bees' needs: Conserving the pollinators. S. Gess. Pages 114–116. 🐝

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## **MSc Degree Programme in Systematics and Conservation Evaluation**

In keeping with its strong focus on biodiversity in human-influenced landscapes, the Department of Zoology and Entomology and the Department of Botany, University of Pretoria, jointly present a taught MSc course in Systematics and Conservation Evaluation in Zoology, Entomology and Botany. The course focuses on specialized topics and deals with the description of biodiversity and the tools necessary for conservation evaluation and planning.

The course is presented in all collaborating departments and includes specialized course work blocks presented by internationally recognized specialists. On completion of the course, graduates will have state-of-the-art knowledge and skills, and will be highly competitive in the international Systematics and Conservation markets. Apart from preparing graduates for careers in natural history museums, herbaria, universities and other centres of biodiversity science, the course is also designed to provide the basis for PhD research in systematic biology and biodiversity science.

### **Entrance Requirements**

- BSc (Hons) or equivalent.
- Candidates who have not previously passed a course in Biometrics, Statistics or Research Methodology at the BSc (Hons) level

are required to attend and pass the Research Methods module (ZEN 702), presented by the Department of Zoology and Entomology, to qualify for the MSc degree.

### **Course Format**

- The MSc course consists of four prescribed modules of 20 lecture days.
- Completion of all course work and passes in each module, followed by completion and pass in a research project, qualifies the student for the MSc degree.

### **Course Modules**

1. Biogeography and Macroecology.
2. Morphometrics or Plant Systematics.
3. Conservation: Planning and Monitoring.
4. Phylogenetics: Morphological and Molecular Approaches.

### **Research Project**

After the course work, there is a period of five months allocated to full-time work on the research, although project selection and research design should start as soon as possible during the coursework.

(continued on page 242)

# book review

## *World Atlas of Biodiversity: Earth's Living Resources in the 21<sup>st</sup> Century*

B. Groombridge & M.D. Jenkins (eds). 2002.

Prepared by the UNEP World Conservation Monitoring Centre  
University of California Press,  
Berkeley

ISBN 0-520-23668-8

English. 340 pp. 25 figures, 49 tables,  
33 colour photographs

Hard cover, 280 x 220 mm

Price: USD 55

Available from University of California Press

[www.ucpress.edu/books/pages/9941.html](http://www.ucpress.edu/books/pages/9941.html)

Contact: Rachel Holdsworth

Tel.: +44 (0) 1954 202 789

Fax: +44 (0) 1954 232 022

[Rachel@holdsworth-associates.co.uk](mailto:Rachel@holdsworth-associates.co.uk)

Being very interested in biodiversity issues myself, I couldn't wait to open this book. I was definitely not disappointed—the 340 jam-packed pages are a treasure trove for anyone wanting to find out more about the Earth's biodiversity. I was struck by the rich plant diversity in southern Africa; South Africa is one of the countries with the highest number of plant species in the world (23 420) after Brazil, Colombia, China, Indonesia, and Mexico (all of which are developing countries). We have a heritage we should really be proud of. Many more statistics of this kind on plants and other major groups are presented in various tables and figures in the atlas.

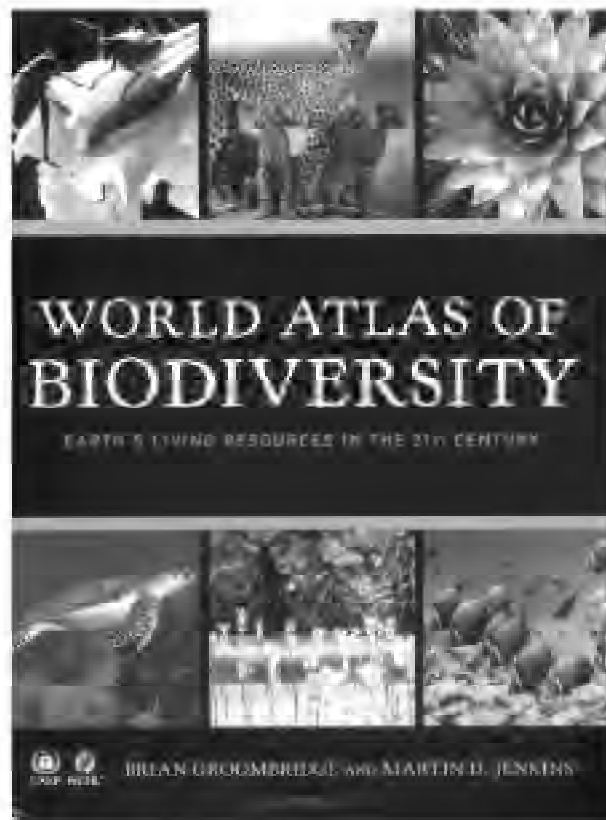
This book is a thorough and up-to-date account of the variety of life on earth and how fast it is shrinking. It is probably the best current synthesis of the latest research and analysis by UNEP-WCMC and the conservation community worldwide. The publication contains an amazingly comprehensive and accessible view of the diverse collection of available global biodiversity data. Furthermore, it has been effectively analysed and displayed, which makes it easy for anyone to understand the key global issues in biodiversity. To summarise, it presents an indispensable

source of information on the state of the earth's species and ecosystems.

The publication contains many new findings, including maps showing global variation in family level diversity of flowering plants, freshwater fishes, and land vertebrates. Numerous useful maps provide an indication of areas of special value. The atlas addresses the growing concern at all levels for living organisms and the environment.

Opening with an outline of some fundamental aspects of material cycles and energy flow in the biosphere, the book goes on to discuss the expansion of biodiversity through geological time and the patterns of its distribution over the surface of the earth. The rise and expansion of the human species, some key issues of biodiversity, and the long history of human environmental impacts are covered in detail. Separate chapters describe the biodiversity of terrestrial, marine, and inland water ecosystems, and trends in condition and species status. The book closes with an outline of constructive responses that humankind has made, aiming to maintain existing biodiversity and to visualise possible future scenarios.

Of particular interest to the SABONET Project is the support the authors give for the documentation of biodiversity. They feel taxonomy is important, as the description of species gives a sound appreciation of the full baseline range of biodiversity at different scales, which enables policymakers and conservationists to pin-point species-rich areas that are threatened and in need of protection and sustainable management.



To conclude, the book is an exciting piece of work, well written and well researched. It is an indispensable resource on information about the earth's biodiversity and why its conservation is crucially important for human survival and well-being. This publication should be in the hands of all biologists, policymakers, and educators around the world. I will go so far as to say that anyone in the general public concerned with the global environment should have a copy. The only problem and my main criticism of this publication, is that at USD 55 per copy, it lies beyond the budget of many an interested party in the developing world! USD 30 would probably be more in line, specifically when considering southern Africa. 🐼

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# book review

## *Cultivated Plants of Southern Africa*

H.F. Glen. 2002.  
Publisher: Jacana, Johannesburg  
ISBN 1-9199931-17-1  
English 448 pp.  
Soft cover, 165 x 235mm  
Available from High Branching  
Tel.: +27 11 788 6287  
paule@jacana.co.za  
www.highbranching.co.za

Dr Roger Spencer, Horticulture Taxonomist, Royal Botanic Gardens, Melbourne, Australia, has the following to say about this book in his Foreword:

Cultivated plants now cover a large proportion of the world's arable land. They are the basis of human subsistence. Ornamental plants, a subset of these economic plants, now form part of a vast global horticultural industry.

Naturally, the scientific focus of botanical taxonomists is on wild plants, but cultivated plants can never be ignored; they are far too important for many reasons: taxonomic, ecological and horticultural.

This inventory of cultivated plants in southern Africa forms the necessary foundation and framework around which much can be built.

The underlying role of taxonomy is unquestioned: before we can make sensible decisions about plants, we must be confident about their identification and this, in essence, is what this publication is all about.

But there are many important ecological benefits. As time passes, the distinction between natural and man-made landscapes becomes obscured and we should monitor this interface carefully. At a planning level, documents like this should assist the formulation of plant introduction policy, as transporting plants always carries with it the twin dangers of disease and the potential for new introductions to invade wild populations.

Plants that have been deliberately altered by human intention need to ap-

pear in the record books along with wild plants. The process of plant selection, often directly from the wild, which has been followed for thousands of years, has evolved rapidly over the last few decades into hi-tech science. The era of complex genetic engineering has arrived with its transgenic crops and ornamentals. We need inventories of garden plants, as they help us to keep track of this rapid change by recording what was around at a particular time.

On the horticultural front, ornamental plants will always give us great pleasure in our gardens and urban landscapes. For the horticulturist there is the exciting prospect of a technical *Garden Flora for southern Africa*. These are just a few benefits of this publication. Dr Glen is to be congratulated on this scholarly compilation.

Dr Hugh Glen, senior research scientist at NBI Pretoria, explains the origins and details of the text in his Introduction to the book:

The origin of this book is in a database written in DataEase, recording some 37 000 specimens of cultivated plants in southern Africa. In addition to names supported by these specimens, others have been added from the National List of Introduced Trees, lists of Plant Breeders' Rights, as well as a few nursery catalogues.



In this book is a list of plant names, and indexes to family, genera, and common names, as well as the countries of origin of each of the species. Each genus is numbered, using those of De Dalla Torre and Harms (1900-07), but with extensions to allow for genera described since that conspectus was published.

There are extensively researched references for each family and genus, which are in effect the literature held in the cultivated collection of the National Herbarium, Pretoria (PRE).

Botanical and horticultural academics and practitioners, landscapers, and ardent gardeners will delight in the catalogue of names, origins, and references. Anyone with a serious interest in plants will be referring to this as their bible for many years to come. 📖

—Val Thomas

# book review

For a 10% discount, order directly from Jacana and mention that you read about the book in SABONET News.

## *Sappi Tree Spotting Lowveld (Second edition)*

Rina Grant and Val Thomas. 2001.  
Illustrations: Joan van Gogh  
Sponsored by SAPPI  
Published by Jacana, Johannesburg  
ISBN 1-919777-77-6  
English. 350 pages  
Soft cover, 235 x 165 mm  
Price: R190 (incl. VAT)  
Available from Jacana at:  
[www.jacana.co.za](http://www.jacana.co.za)  
For more information contact  
Amanda Thoane  
Tel: +27 (11) 648 1157  
Fax: +27 (11) 648 5516  
[marketing@jacana.co.za](mailto:marketing@jacana.co.za)

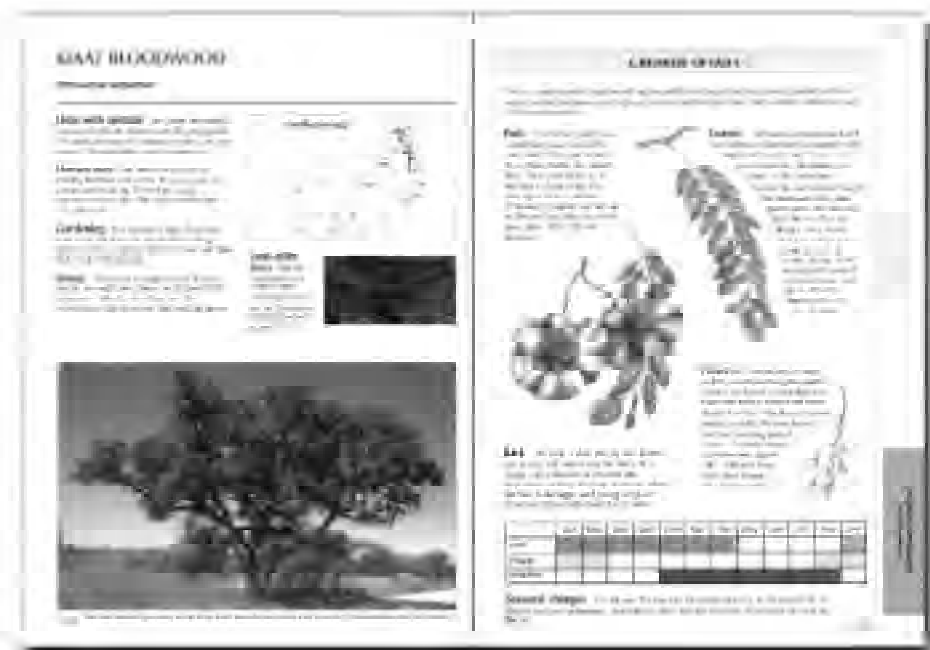
This totally revised second edition of *Sappi Tree Spotting Lowveld* first published in 1997, is designed as a guide to introduce outdoor enthusiasts or scientists to the wealth of indigenous trees inhabiting the Lowveld. In this book the Lowveld is defined as a low-lying area between two mountain ranges—the Drakensberg in the west and Lebombo in the east—with a narrow tongue extending through Swaziland to northern KwaZulu-Natal. Northwards the Lowveld and its vegetation patterns are evident well into Zimbabwe. The altitude ranges from 150–600 m above sea level and this summer-rainfall area receives 200–600 mm per annum.

The diverse geology of the Lowveld forms the basis of the habitats and ecozones that influence the distribution of different tree species. In the first section of the publication the various habitats and ecozones are discussed. Crests, valleys, seepines, riverine vegetation, brackish flats, rocky outcrops, and pans are habitat types occurring in the region. An ecozone is an area where there is uniform landform, rainfall, and geology, leading to rela-

tively uniform soils. As a result, one can expect to find specific trees in each ecozone, but they are still subject to changes in the habitat. The Lowveld is divided into 16 different ecozones, depicted on maps and fully described. To name a few:

- Mixed Bushwillow Woodland (on granite)
- Thornveld (on gabbro)
- Mopane Shrubveld (on basalt)
- Alluvial Plains
- Sandveld

Before anyone interested in identifying trees can start doing some spotting, they must have some knowledge



about the different characters of a tree. In the next section of *Sappi Tree Spotting Lowveld*, distinctive striking features of trees are discussed in detail. This covers information on trunks, canopies, bark, leaves, flowers, and fruit.

The trees themselves are discussed under various headings such as:

- Trees with unique forms (*Adansonia digitata* Baobab)
- Brack lovers (*Gardenia volkensii* Bushveld Gardenia)
- Easy river canopies (*Nuxia oppositifolia* Water Nuxia)

Information on links with animals, uses by humans, gardening, wood, look-alike trees, and details about growth form, bark, leaves, flowers and fruit are also given.

The book also includes the common names of trees occurring along the routes of eleven trails in the Kruger National Park. This is a follow-on to Jacana's other easy-to-use Kruger National Park publications such as *Make the Most of Kruger*.

Good quality photographs, as well as colour and black-and-white drawings greatly contribute to the value of this publication for the amateur enthusiast or scientist travelling through the Lowveld,

The pleasure of observing southern Africa's rich diversity of tree species is not restricted to particular areas. It is possible to observe our wealth of indigenous trees throughout the region—in the country, in gardens, parks, and along the streets of towns. *Sappi Tree Spotting Lowveld* has been created as one of a series—*Sappi Tree Spotting KwaZulu-Natal, Coast and Midlands* (1998), *Bushveld* (2000), and *Highveld* (2002).

*Sappi Tree Spotting Lowveld* is a valuable contribution for each and everyone who would like to know the names of the indigenous trees in this lush and most spectacular region of southern Africa. 🌳

—Elizabeth Retief  
National Herbarium  
National Botanical Institute, Pretoria

(continued from page 238)

The research topic is open to selection by the student and supervisor within the field of Systematics and Conservation Evaluation.

#### Assessment

Continuous assessment, essays and/or examinations.

#### Course Duration

The course normally runs from February to December each year. Students may choose to take the coursework component (the four modules) in one year and complete the research component in the following year, as long as both components are completed within two years.

#### Funding

Currently, funding opportunities may only be available to South African applicants. Foreign students need to organize their own funding as well as all appropriate visa requirements before their applications can be processed.

#### Application Deadline

Applicants should submit their applications and proof of funding before 15 December 2002.

#### Contact:

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### *Rebirth of Science in Africa: A Shared Vision for Life and Environmental Sciences*



# book review

## *Rebirth of Science in Africa: A Shared Vision for Life and Environmental Sciences*

Edited by Himansu Baijnath and Yashica Singh  
185 mm x 260 mm (portrait)  
256 pages  
More than 100 colour illustrations  
ISBN 1-919766-23-5  
SADC countries R 298; other countries US\$ 40  
Packaging & Postage: SADC countries R 25; other countries US\$15

An anthology of 20 papers presented at the African Renaissance Conference held in Durban in March 2002. The book illustrates how advances in the biological and environmental sciences constitute the basis for socio-economic development. Papers highlight how Africa's historical past calls for renewed efforts for the renaissance of science—a renaissance that would combine traditional strengths

with modern science to solve problems on the continent. The book is of relevance to resource managers, urban and rural planners, health care workers, students, programme designers, educators, and global funders. It provides insight into a broad spectrum of topics for all those involved in the environment and its diversity.

UMDAUS PRESS  
P.O. Box 11059  
Hatfield  
0028  
South Africa  
Tel.: +27 11 880-0273  
Fax: +27 11 788-1498  
umdaus@succulents.net  
www.succulents.net

—Information supplied by Dr Hugh Glen



# book review

## *The Forests of Taraba and Adamawa States, Nigeria: an Ecological Account and Plant Species Checklist*

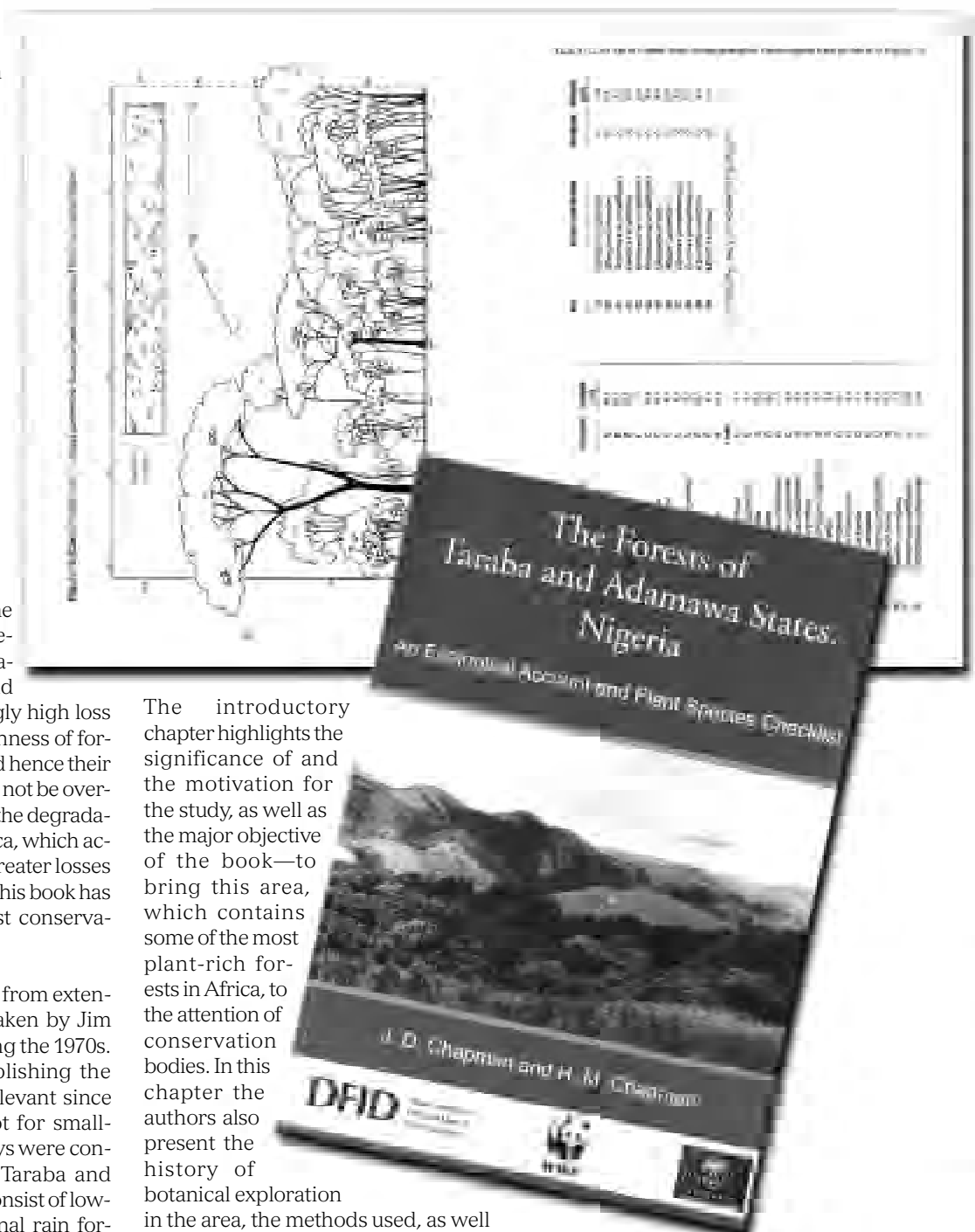
J.D. Chapman & H.M. Chapman (eds). 2001.  
Prepared with funds from  
WWF and DFID  
University of Canterbury,  
Christchurch  
ISBN 0-473-07419-2  
English. 146 pp + 75 pp  
(checklist)  
Soft cover, 295 mm x 205  
mm  
Price: £20  
Available from Hazel  
Chapman at:  
Department of Plant &  
Microbial Sciences  
University of Canterbury  
PB 4800  
Christchurch, New  
Zealand  
Tel.: +64 3 366 7001  
Fax: +64 3 364 2083

During the late 1970s the first concrete measurements of global deforestation rates were made, and they revealed a disturbingly high loss of habitat. The floristic richness of forests, their vulnerability, and hence their need for conservation, can not be over-emphasized. Considering the degradation of forests in West Africa, which according to the IUCN has greater losses than other parts of Africa, this book has high significance to forest conservation bodies.

The book is based on data from extensive field surveys undertaken by Jim Chapman in Nigeria during the 1970s. Despite the delay in publishing the work, the data are still relevant since little has changed, except for small-scale disturbances. Surveys were conducted in the forests of Taraba and Adamawa States, which consist of lowland rain forest, transitional rain forest, and transitions from lowland to montane forest, and which vary in size from small fragments of less than 1 ha to riverine strips and stands of over 40 km<sup>2</sup>. All these occur in southeastern Nigeria on the border with Cameroon and are described and illustrated in seven chapters (chapters 2 to 8).

The introductory chapter highlights the significance of and the motivation for the study, as well as the major objective of the book—to bring this area, which contains some of the most plant-rich forests in Africa, to the attention of conservation bodies. In this chapter the authors also present the history of botanical exploration in the area, the methods used, as well as an inventory of the Red Data List Plant species known from the area. Notes on the first plant checklist of these forests complete the first chapter. A more comprehensive edition of the species list is planned for the future.

The seven forest regions (chapters 2–8) include the Mambilla Plateau, Gotei Mountains, Cabbal Hendu, Shebshi Mountains, Transitional and High Forest, High Forest Outliers in the Middle Donga Valley, and High Forest Outliers in Lowland Gashaka. Each of these



chapters has an introductory section in which the different forests of the region are listed with their altitude, size, and Red Data List species. A very useful inventory of the physical environment of each forest region is presented in approximately three introductory pages, after which a detailed account on the forest itself is presented. Notes on the location, diversity, floristic composition, ecology, conservation status, and structure of the forests in the region are included in the text. Descriptions of the forests do not consist of endless text pages—there are many well-drawn profile diagrams with accompanying keys and beautiful black-and-white photographs. Each chapter is concluded by a reference list that is extremely useful for anyone with an interest in forests.

Three appendices accompany this book:

- Native Authority Orders for Forest Reserves
- The Alantika Mountains
- Gangumi and Wurkam River Forest Enumeration Data

These are followed by the valuable first edition of the checklist.

This book is of immense value to those interested in forest conservation. It certainly forms the base for potential future projects in addressing the needs for forest conservation in Africa. I am sure this publication will inspire many field botanists to continue with the documentation of the plant diversity of our continent. Publications like this one provide tools with which conservationists can embark on appropriate initiatives, because the time has come to be pro-active in our approach to conserve the dwindling pristine forests of Africa, before it is too late. 🌳

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## Regional News Update



### News from South Africa

I am indeed fortunate that airlines no longer weigh their passengers along with their baggage, as was once the case. If they did, the kilos I put on as a result of WIND's marvellous hospitality during a week's internship would have cost an arm and a leg to bring home! From 1–4 July I tried to guide the Windhoekers through the intricacies of plant nomenclature. Spare a thought for poor Sonja Schubert, who joined their staff about half an hour before being subjected to this course. It says much for her intestinal fortitude that she was still there at the end of the course, reminding the lecturer that he wasn't alone in having a warped sense of humour! I am indeed most grateful to Sonja for taking vast amounts of her own time to scour Windhoek for an out-of-print Namibian tree-of-the-year book that I was unaware of until I saw it in WIND's library.

For three mornings I drew my hosts' attention to the intricacies, requirements, and occasional absurdities of the current version of the International Code of Botanical Nomenclature. The fourth morning was devoted to some of the amazing collectors who have laid the foundations of our knowledge of southern Africa's rich flora.

We started with Gonasus de Keyser, who set the fashion by helping himself to some bulbs from what is now the Golden Acre in Cape Town, but which was surely pristine fynbos when he saw it in about 1600. Taking a circuitous route through Flora's garden (Ferrari 1623), the Eastern Cape (in the company of Clemenz Heinrich Wehde mann, circa 1820), Delegorgue's Bush, home of Gueinzus in 1864, and the Transvaal Museum's Division of Botany expedition to the Soutpansberg (1930), we eventually found a collector I knew who had been to Namibia. Dear old Daddy Mogg went there with the South African troops in 1915, and was duly sent to East Africa with a Very Important Order signed by General Smuts himself—the general import of which was “Keep this impossible

man out of my hair!” Thank goodness my hosts showed no sign of being as annoyed by me, at least while I was listening.

Afternoons were spent examining the relatively small collection of specimens of cultivated plants at WIND. I brought back notes that added some 250 specimen records and a mercifully small number of taxon records (because my “Cultivated Black Book” was already being typeset) to PRECIS-cult. Most of these specimens belonged to three groups: one collected in about fifteen years starting in 1942 by E. Metz, first at Andalusia Internment Camp, later at Lüderitz, and a Lutheran mission station northwest of Pretoria. The next was Herr Giess's collection of ornamentals grown by himself and his acquaintances in Windhoek (how I wish that more of us would make collections like this!), and last, but at least equally important, was a set of R.J. Rodin's specimens of crop plants from Ovamboland.

Friday and Saturday were spent on a brief trip to Swakopmund, which yielded pictures of several otherwise-difficult tree species for a projected CD guide to trees in southern Africa (work), and some lovely old German banknotes such as would have been used in Namibia before World War I (not-work)—many thanks to Mesdames Mannheimer and Bartsch for arranging this and being tour guides. And CM found the very **wurst** (or maybe best) place in Windhoek to let me loose in in search of souvenirs, namely a splendid German delicatessen. Thank goodness we have a customs union with Namibia, and I could bring my sausages home legally!

More seriously, much gratitude is due to the Mannheimer family and all my colleagues (and friends both old and new) at the Namibian National Botanical Research Institute for their lavish hospitality and exemplary kindness during a most delightful and productive week. It served to convince me more than ever that the very best way to advance the cause of systematic botany in southern Africa is to work together, as SABONET has enabled us to do. 🌳

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## News from South Africa

### SABONET Internship at Natal Herbarium

One of the primary objectives of SABONET is the production of a strong core of professional botanists and plant diversity specialists in the ten countries of southern Africa. This program has enabled staff based at various institutions to interact through programmes such as grass identification courses, herbarium management courses, database management courses, and through internships. This type of interaction has certainly encouraged many networking opportunities and has enabled staff to share their skills and expertise.

I have recently had the pleasure of visiting the beautiful city of Durban. The main objective of my visit was to offer guidance and training to the new leader of the Natal Herbarium computerisation team, Hassina Aboobaker. This was made possible through a herbarium internship offered by SABONET.

The computerisation of the herbarium specimens for the ten southern African countries has been another of the major objectives of SABONET, and the PRECIS database has been the tool used to achieve this objective. One of the advantages of PRECIS is that it was designed to be user-friendly when inputting information. But outputting the data from the database requires some skill. We addressed issues such as constructing queries and how to draw up reports from the outputs in Microsoft Access.

Initial discussions were focussed on the set-up of the PRECIS database and dealt with issues such as sharing and mapping folders. After we had worked through most of the features of the database, we started doing some trou-

bleshooting. We looked at the different types of database access problems that could occur, with regard to the server and the different workstations, and ranging from networking problems between machines to problems which could occur to the database files itself (such as corruption of the front end or the database files), and addressed possible remediation. Our aim was to bring Hassina up to speed sooner, so that she could manage the database with increased accuracy and consistency. We also looked at managing a small database team, with the SABONET team.

Going to the Natal Herbarium also gave me a chance to appreciate the city I was in. Being primarily familiar with the low shrubby fynbos vegetation of the Western Cape, I was immediately struck by the contrast in vegetation types. A walk in the Durban Botanic Gardens just below the Natal Herbarium revealed lush subtropical vegetation, with huge (by Cape standards at least) trees dominating. Another feature of special interest was the large and colourful displays of flowers and fruits produced by some of these trees. Adding to this already lovely display of form and colour were the heavy fragrances that pervaded the air.

In one of the photographs Hassina is standing in front of one of the famous attractions to the Durban Botanic Gar-



**Hassina Aboobaker standing in front of one of Durban Botanic Gardens' famous attractions, *Encephalartos woodii*. (Photo: Fatima Parker)**

dens, namely Wood's Cycad (*Encephalartos woodii*). This "tree" is one of the original cycads discovered in 1895 at the edge of the Ngoye Forest in Zululand by John Medley Wood, then Curator of the Botanic Gardens. The reason for this cycad's acclaim is that it was one of a group of cycads that are all male, and no female plants have ever been found. 🌿

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**The SABONET team at Natal Herbarium. From left to right: Zoleka Dimon, Hassina Aboobaker, Fatima Parker (Cape Town) and Meetha Nathoo. (Photo: Yashica Singh)**

### Lesotho to Cederberg

During September an all-girl team from PRE—Marinda Koekemoer, Priscilla Burgoyne and Hester Steyn—undertook a countrywide trip to do specialised and general plant collecting. The trip focused on under-collected grids as well as members of the

Asteraceae and Mesembryanthemaceae. We travelled the country from east to west, experienced winter and summer within a few hours, collected plants in five of the seven biomes, climbed mountains and drove on impassable and muddy roads, slept under the stars and watched the sunset at the Stadsaal caves (Cederberg),

changed our itinerary several times due to cold fronts and accompanying rains, were attacked by hundreds of gad-flies, and enjoyed ice cream at Komaggas.

All in all, we covered 5 735 km and brought back over 900 specimens!



From left to right: SABONET goes skiing (Photo: M. Koekemoer); A *Babiana* species from Bloukop (Photo: P. Burgoyne); Priscilla perfected the press puzzle on the roof rack (Photo: P. Burgoyne).

### Highlands Meander

(Pretoria–Tweeling–Golden Gate Highlands National Park–Lesotho–Matatiele–Maclear–Elliot)

Our first stop was at an under-collected grid near Tweeling in the Free State. Although we were a bit early in the season to find the majority of plants in flower, we still managed to add a few new distribution records to PRE. The eastern Free State was still in winter colours but the sandstone mountains are a magnificent sight—whatever the season!

Entering Lesotho at Caledonspoort border post, we made our way through the northeastern part of Lesotho to Sani Top via Oxbow and Mokhotlong. This was a very scenic drive that took us past numerous streams and waterfalls, small villages with pink clouds of peach blossom and blanket-clad children rushing to the roadside, yelling “SWEETS, SWEETS!” Near Sani Pass snow was evidence of the cold winter and we needed *glühwein*, hot chocolate and a (priceless) hot shower at Sani Top that night to combat the freezing weather and gale-force winds. The following day we drove down the magnificent Sani Pass and spent the day collecting mainly daisies and *Crassulas* while a dark bank of clouds moved in from the northwest.

While heading for another under-collected grid between Underberg and

Matatiele, we had a flat tyre (the only one on the trip) and had to spend the night in Matatiele in order to get the tyres fixed. In the meantime, the lurking cold front caught up with us and it was now raining cats and dogs! Due to the rain and construction work, the road between Matatiele and Maclear was extremely muddy and slippery and we all heaved a sigh of relief as we reached the luxury of a tarred road near Maclear and made quick progress towards Grahamstown.

### Botanising in the Border

(Queenstown–Fort Beaufort–Grahamstown–Ecca Pass–Port Elizabeth)

It was still raining when we reached Grahamstown and we had to retrace our steps the following day to do some collecting in the Ecca Pass. This deviation from our original plans was worthwhile—almost everything was in flower and we spent the whole morning collecting in a relatively small area. We found lots of interesting plants (especially mesembs) and saw *Strelitzia reginae* in full flower.

The rest of the windy afternoon was spent trying to get the specimens pressed before they (or the flimsies) were blown away. What a frustrating task!

The beautiful coastal fynbos at Skoenmakerskop was a treasury of flowering plants and introduced us to

the Fynbos part of this trip.

### Baviaanskloof and Soggy Little Karoo

(Elandsberge–Baviaanskloofberge–Willowmore–Oudtshoorn–Ladismith–Montagu–Worcester)

We filled up with diesel, bought some chocolates, and made a few last phone calls before heading for the mountains. Initially the vegetation was clogged with aliens but higher up in the Elands River Valley, we found ourselves in pristine fynbos where *Erica*, *Podalyria* and succulents abound. The narrow, rocky road, beautiful scenery, and excellent botanising opportunities caused us to take two full days to get from the Elandsberg turn-off to Willowmore (a mere 260 km). A zoological highlight from this stage of the trip was the brown-headed kingfisher, which caught a grasshopper in mid-air—right before our eyes!

The next day it was raining again and we had to cover the presses on the roof rack in plastic bags to keep them dry. Soon we were adapting our itinerary again to get to sunnier surroundings, as a soggy Little Karoo is any collector's nightmare!

### Delightful Cederberg

(Ceres–Sanddrif–Bloukop–Cederberg Wilderness Area–Sanddrif)

From left to right: SABONET in the Cederberg (Photo: P. Burgoyne); Priscilla plant-hunting in Bushmanland (Photo: M. Koekemoer); Camping in the “tension zone” (Photo: P. Burgoyne).





From left to right: The end of the road (Photo: M. Koekemoer); The SABONET vehicle being put to the test where the road washed away at the foot of Bloukop (Photo: P. Burgoyne); *Amphiglossa callunoides* in the Baviaanskloof River bed (Photo: M. Koekemoer).

On a lovely, sunny spring morning we reached the vicinity of Bloukop to search for a specific *Acmadenia* species. After a few hours of struggling through the restios and eventually ascending a steep slope we (especially Priscilla) returned to the vehicle with numerous specimens but no *Acmadenia*! As this species is only recorded from mountain summits, we gratefully accepted the lift Western Cape Nature Conservation offered us to Sneeuwkop hut the following day. We eventually found a plant that fitted the description and headed back to Sanddrif, enjoying the wonderful view from the shale band that is locally known as “Die Trap” (The Step) and the magnificent rock formations! It was a perfect day and we agreed that this was as good as it gets.

### Getting Lost in the “Tension Zone”

(Matjies River Nature Reserve)

The “Tension Zone” (transition between the Cederberg and Tanqua Karoo) is botanically special because of a marked decrease in rainfall and unique geology. Previous collecting

trips by Barry Low and his team resulted in the discovery of five new species and several new records for the area. From 13–15 September, the Cederberg Conservation Group organised a plant-collecting weekend at the Zuurfontein Farm (part of Matjies River Nature Reserve) and we were privileged to be part of this team.

The group met at 6 pm at the office of the Matjies River Nature Reserve for the one-hour drive to Zuurfontein Farm. What was thought to be a relatively quick drive took us approximately three hours owing to the condition of the road/track (we had a trailer filled with plant presses, remember) and the navigational skills of some party members! However, the motivated PRE staff had lots of fun and even botanised using the lights of the SABONET vehicle. At the point where everyone realised that we were totally lost, Marinda found a new distribution record for *Amphiglossa rudolphii*. We detached the trailer, turned around and a few kilometres later Priscilla dashed from the bakkie to collect a mesem with bright red flowers. No doubt the rest of the party seriously doubted our sanity.

We eventually reached camp at half past nine and pitched our tents on a more or less stoneless patch of ground, again using the lights of the vehicle. After unpacking and pressing the day's specimens, we settled down for a well-deserved rest at around midnight!

The next day was spent collecting specimens in the arid fynbos and again we pressed till long after dark.

The 4x4 club of Cape Town must be commended for their great patience in putting up with the numerous stops and continual botanising of the group collecting along the Doring River.

### Too Late for the Flowers

(Clanwilliam–Botterkloof Pass–Nieuwoudtville–Loeriesfontein–Vanrhynsdorp–Garies–Springbok–Komaggas–Gamoep–Aggeneys–Klein Pella)

From early August tourists had been flocking to Namaqualand and surroundings for the spring flower display, but we were into more serious botanical stuff, so we were just in time to see *Sparaxis tricolor* and *Geissorhiza*

*Euryops wagneri*—the most photographed species of the trip! (Photo: P. Burgoyne); A new *Crassula* species from the Cederberg (Photo: P. Burgoyne); *Ebracteola wilmaniae* at sunset (Photo: M. Koekemoer).



*splendida* in full bloom around Nieuwoudtville and the end of the season's Wahlenbergias.

We collected in several under-collected grids and searched for a threatened mesemb on the shale slopes around Loeriesfontein and still found a lot of beautiful flowering specimens to collect or admire.

As we were experiencing hot, dry weather in the Sandveld while searching for *Amphiglossa celans* (and any mesembs, of course) we were targeted by hundreds of gad-flies and it was rather difficult to take photos or collect specimens while having to protect ourselves from these pests.

We left the Springbok surroundings rather reluctantly to head home through Bushmanland and spent our last night on the road at Klein Pella, where we pressed specimens till late for the last time on this amazing trip.

#### New Records for PRE

The following species of succulent plants were collected and are new records for PRE.

*Crassula pageae*: Although widespread (found from the Richtersveld to Stilbaai), it is represented by only five specimens at PRE. We collected a *Crassula pageae* specimen from near Bloukop in the Cederberg, thus increasing PRE's holdings of this taxon.

*Scopelogena bruynsii*: Collected from Matjiesrivier, Cederberg.

No specimens were previously housed at PRE for

- *Ruschia marianae*: Matjiesrivier, new record for grid.
- *Cephalophyllum alstonii*: Matjiesrivier, new record for grid.
- *Ottosonderia monticola*: Southwest of Loeriesfontein, new record for PRE.
- *Peersia vanheerdei*: Southwest of Loeriesfontein, a new grid for PRE.
- *Phyllobolus prasinus*: Northwest of Kotzesrus, new record for PRE.
- *Cheiridopsis gamoepensis*: South of Gamoep, new record for PRE.

The trip was particularly rewarding as new distribution records could be added to four species of *Amphiglossa* (Asteraceae–Gnaphalieae).

- *Amphiglossa callunoides* was found

in the Baviaanskloof river course—it was previously only known from Uitenhage on a farm called Hoeree. Its presence in the Baviaanskloof extends its northern distribution boundary considerably.

- *A. rudolphii* was found in very large numbers on the Matjies River Conservancy and this locality links the northern (Botterkloof) and southern (Worcester) localities perfectly.
- *A. grisea* was also found at Matjies River and its distribution was extended southwards by several degrees from the original locality in the Pakhuis Pass.
- *A. thuja* was found somewhat farther north, near Gamoep. This find confirms the presence of the species in South Africa. Other localities for this species are in Namibia around Lüderitz.

All the new records we found stresses the importance to venture into unexplored areas and to make thorough representative collections in these areas.

Thanks to SABONET for funding the trip. 🌱

—Marinda Koekemoer  
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## News from Lesotho

### National Plant Expedition in Lesotho November 2001 to June 2002

The main objective of SABONET-Lesotho was to capture all flowering plants per season in order to equip the herbaria with quality specimens and photos for plant identification guides. Among the equipment that was used when collecting herbarium specimens, cameras were essential to interpret features of the

plants and characteristics of the localities.

Some places that were under-collected in four ecological zones—Lowlands, Foothills, Mountains, and the Senqu Valley of Lesotho—were covered. However, the Mohale rescue mission collection record that covers 75% of the specimens recently collected is not included here. During these expeditions live plants that were collected were planted in the Roma and Katse Botanical Gardens, and the specimens were shared equally by the three herbaria of Lesotho. An interesting thing about these expeditions is that we managed to make collections the whole year round and some species that had not previously been recorded from Lesotho were discovered, such as *Calamagrostis epigeios* var. *capensis* and *Stapelia leendertziae*.

#### Thaba Putsoa

Thaba Putsoa (Blue Mountain) is in the Maseru District along the mountain road to Mohale Dam. It is about 40 km

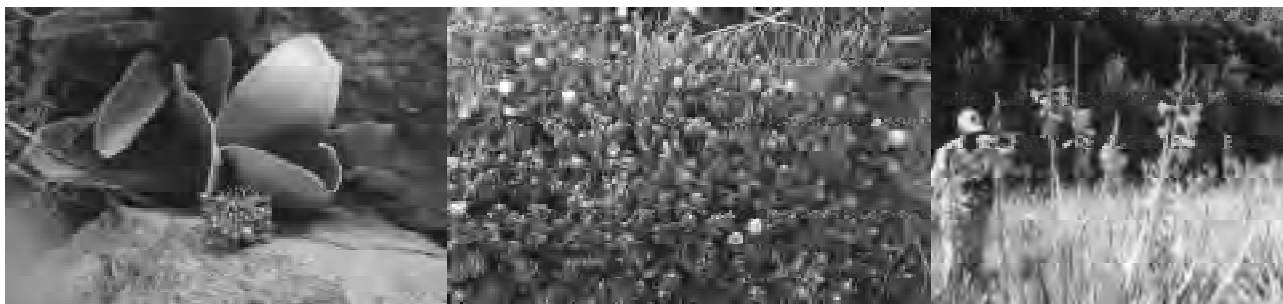
from Roma and its altitude ranges from 2 500 m to 2 902 m. Thaba Putsoa is climatically one of the coolest places in Lesotho. In summer, water oozes from the wetlands and seepage areas down towards the streams until it gets



**Qiloane Mountain near Qiloane Falls resembles the traditional Basotho hat. (Photo: K. Kobisi)**

### Lesotho Field Trips Summary of collected specimens

Families	56
Genera	77
Species	102
Specimens	1 235



From left to right: *Haemanthus humilis* from Semonkong (Photo: M. Polaki); *Helichrysum retortoides* from Semonkong (Photo: M. Polaki); *Watsonia densiflora* from Qiloane Falls (Photo: K. Kobisi).

to Makhaleng and Jorodane rivers. The predominant vegetation in Thaba Putsoa is grass and mixed shrubs in the sheltered valleys. Among the plants that beautify the entire area in summer are species of

*Kniphofia*  
*Sutherlandia*  
*Dierama*  
*Pentaschistis setifolia* and  
*Merxmuellera macowanii*

Some of the plant species that were collected from Thaba Putsoa include  
*Sutherlandia montana*  
*Ruschia* sp.  
*Muraltia flanaganii*  
*Erica algida*  
*Merxmuellera macowanii* and  
*Valeriana capensis*

#### Qiloane Falls

Qiloane Falls is also found in the Maseru District near Machache Mountain and Molimo Nthuse Pass (which means "God help me"). Qiloane offers wonderful scenery for tourists because of the beautiful waterfall and mysterious little hills that are symbolized by the Basotho national hat. The vegetation type of Qiloane is thickets of trees

such as  
*Leucosidea*  
*Rhamnus*  
*Diospyros*  
*Myrsine* and  
*Rhus*

Some of the plant species we collected include

*Kniphofia northiae*  
*Xerophyta viscosa*  
*Alepidea amatymbica*  
*Galtonia regalis*  
*Ranunculus baurii* and  
*Watsonia densiflora*

*Guthria capense*, known from only one locality in Sehlabathebe National Park, was found in a big colony on the south-facing slopes, and another three localities were mapped out during monitoring transects in Mohale catchments near Ha Mahana village and above Leropong in the Jorodane Valley.

#### Semonkong

Semonkong is in the Maluti Mountains at the end of the Thaba Putsoa Range. Maletsuinyane/Le Bihan Falls is one of the biggest waterfalls in southern Africa and therefore attracts tourists from

all over the world. The altitude of Semonkong ranges from 2 000 m to 2 955 m above sea level. Water flows from the mountains and hills that surround Semonkong town down to Maletsuinyane River. *Kniphofia caulescens* is very showy along the streams, on seepage areas, mountain slopes, and on the wetlands in summer. The predominant vegetation type of Semonkong is a variety of grass species with *Erica* species in the mountains. Semonkong Gorge has a mixed shrub vegetation type, including

*Rhus* sp.  
*Diospyros* sp.  
*Rhamnus prinoides*  
*Myrsine africana* and  
*Atemisia afra*

We collected the following species here:

*Disa fragrans*  
*Hyobanche sanguinea*  
*Helichrysum album*  
*Helichrysum retortoides*  
*Corycium nigrescens* and  
*Harveya pulchra*

#### Mokema

Mokema is located in the lowlands,

From left to right: *Solanum incanum* from Mokema; *Agapanthus campanulatus* from Ha Mohale; *Disa fragrans* from Semonkong; *Harveya pulchra* from Semonkong; (Photos: M. Polaki).







From left to right: Top row: *Melinis repens* is an annual of disturbed ground and rocky habitats; Racemes of *Themeda triandra*; A cultivar of



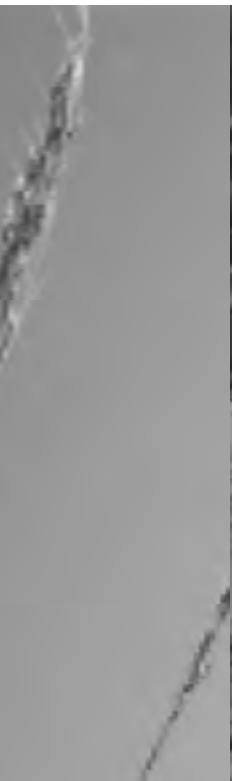
Middle row: *Pogonarthria squarrosa* is a perennial that is common on sandy soils; Inflorescence of *Loudetia simplex*; *Aristida transvaalensis*

Bottom row: Inflorescence of *Triraphis andropogonoides* (Photo: M. Koekemoer); Veld dominated by *Themeda triandra* is usually undisturbed (Photo: M. Koekemoer) A typical inflorescens of the genus *Setaria* P.Beauv., of which there are 20 species in southern Africa; (Photo: M. Koekemoer).





*Sorghum bicolor*, grown extensively as a food plant in southern Africa; (Photos: M. Koekemoer).



occurs on shallow soils in crevices and pockets on dry rocky outcrops; (Photos: M. Koekemoer).

and well managed (Photo: P. Burgoyne); *Imperata cylindrica* is characterised by a cylindrical white panicle that is dense and silky (Photo: M.



# Southern African Botanists' E-mail Addresses

The following list includes the e-mail addresses of staff working in some of the national/university herbaria, botany departments, botanical gardens, and biodiversity programmes of southern Africa. Thanks to all those who have sent their e-mail addresses to the editors for inclusion in this list.

**PLEASE NOTE** that this list gets updated every issue of our newsletter. In order to avoid frustration and possible disappointment, our readers are advised to use the most recent list available. Some of the addresses listed in previous editions of the newsletter may no longer be relevant.

**SPECIAL APPEAL:** Should you be aware of any changes to one or more of the addresses listed below, or would like to be added to the list, please notify Stefan Siebert, at stefan@nbipre.nbi.ac.za so that the list can be updated on a regular basis.

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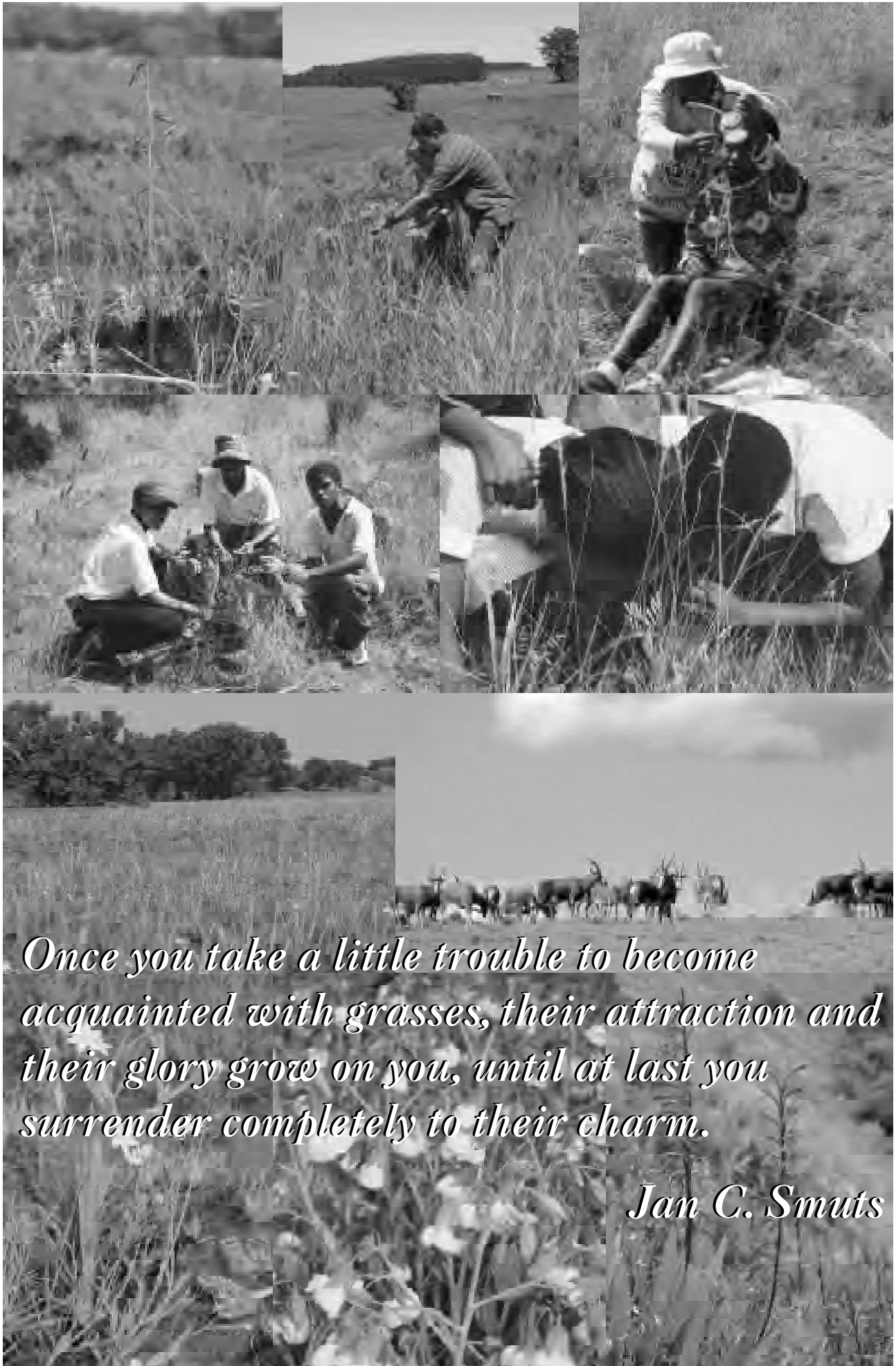
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*Last updated 18 November 2002*





*Once you take a little trouble to become acquainted with grasses, their attraction and their glory grow on you, until at last you surrender completely to their charm.*

*Jan C. Smuts*

*We thank the following people and organisations  
for help with preparing this issue of  
**SABONET News:***

Trevor Arnold	Leon Joffe	Estelle Potgieter
Virginia Berger	Pitta Joffe	Anelie Rabie
Rudi Britz	Dickson Kamundi	Elizabeth Retief
Antoinette Burkhardt	Khotso Kobisi	Mark Richardson
Priscilla Burgoyne	Marinda Koekemoer	Nyasha Rukazhanga-Noko
Chris Chimimba	Christine Lambrechts	Moffat Setshogo
Gillian Condy	MacImage	Soul Shava
Esperanca Costa	John Mapanga	Franci Siebert
Arlene de Bruyn	Anthony Mapaura	Yashica Singh
Lyn Fish	Ludo Matenge	Gideon Smith
Christopher Fominyam	Jeanette Mill	Yolande Steenkamp
Peter Gavhi	Amadeus Mogale	Hester Steyn
Lidia Gibson	Jenny Morrison	Priscilla Swartz
Hugh Glen	Norm Morrison	Warwick Tarboton
Janice Golding	Gladys Msekandiana	Val Thomas
Kath Gordon-Gray	Jo Onderstall	Sandra Turck
Hans Heilgendorff	S.M. Pandya	SAWAC
Lesley Henderson	Fatima Parker	Marianna Uiras
High Shots	T. Pherana	Braam van Wyk
Jeremy Hollmann	Peter Phillipson	Christopher Willis
Johan Hurter	Moretloa Polaki	John Zwar

**In the March 2003 edition of SABONET News...**



**Profiles:**

Nonofo Mosesane (Botswana)

Puleng Motebesi (Lesotho)

**Living Collections:**

University Botanical Garden, Zambia

**Herbaria:**

LUAI, Angola

**Remember to send us your submissions  
before 28 February 2003!**

# About SABONET

This publication is a product of the Southern African Botanical Diversity Network (SABONET), a programme aimed at strengthening the level of botanical expertise, expanding and improving herbarium and botanic garden collections, and fostering closer collaborative links among botanists in the southern African subcontinent.

The main objective of SABONET is to develop a strong core of professional botanists, taxonomists, horticulturists, and plant diversity specialists within the ten countries of southern Africa (Angola, Botswana, Lesotho, Malawi, Mozambique, Namibia, South Africa, Swaziland, Zambia and Zimbabwe). This core group will be competent to inventory, monitor, evaluate, and conserve the botanical diversity of the region in the face of specific development challenges, and to respond to the technical and scientific needs of the Convention on Biological Diversity.

To enhance the human resource capacity and infrastructure available in the region, SABONET offers training courses, workshops, and collaborative expeditions in under-collected areas. The programme produces a series of occasional publications, the *Southern African Botanical Diversity Network Report Series*, and a newsletter, *SABONET News*.

SABONET is co-funded by:

- The United States Agency for International Development (USAID/World Conservation Union—Regional Office for southern Africa (IUCN-ROSA))
- The Global Environment Facility (GEF)/United Nations Development Programme (UNDP)

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