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Grassroots
Newsletter of the Grassland Society of Southern Africa

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Dear Readers

Welcome to the first edition of Grassroots for 2013. I hope everyone had a good rest during the December holidays, and we are ready for the year. On behalf of the Grassroots team we wish all the GSSA family a productive 2013. Once again the annual GSSA Congress is approaching fast. It will be hosted by Limpopo province at Weesgerus Holiday Resort in Modimolle. By the way I am from Limpopo and we are usually good in everything. I am hopeful that Chris Dannhauser and team will organize an excellent congress. It is important that delegates who want to attend this year's congress must register and pay now.

If one looks at previous and current published papers in African Journal of Range and Forage Science, there are very few young scientist/researchers who contributed. This is probably because writing scientific papers is not easy for most of us. Let us use Grassroots as a platform to improve our writing skills. Remember a good piece of work is nothing until is peer-reviewed and shared with the science community. The time is now. Let us enjoy this selection of articles, news featured in this issue of Grassroots. Thank you to those who contributed articles, keep them coming.

Julius Tjelele

Biodiversity – It Takes More than Money

CGF Research and Wareham & Associates

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Biodiversity is an issue of global importance; it lies at the core of sustaining all forms of life known to mankind. And because there is no single party being held accountable for the depletion of the world's large variety of living organisms, the proper functioning of ecosystems is being continuously damaged by our daily activities and our unsustainable lifestyle practices.

Whilst the topic of biodiversity is often the center of controversial debate, few organisations in comparison have transformed their poor business practices to halt, or even reverse, the damage caused to the ecosystem and its fragile components. It doesn't help when people see themselves as 'microcosms', and claim their damage is "minimal" in the grand scale of this destruction. Neither does it help when blame is shifted to business, or governments; who may for example destroy forests for development and not replenish such resources in the quest for profit. The reality of this dire situation is that each of us - past, present and future generations has a role to play regarding the preservation of ecosystems and the biodiversity of our planet Earth. Indeed it is true that the Earth is, and has been, very 'forgiving' as regards the manner in which humans have abused and destroyed much of its animal and plant species, including the natural resources found in our rivers, oceans, forests and fertile land.

Just consider climate change over the last few decades; Green House Gas (GHG) levels are now higher than at any other time known to man, and are likely to rise between 2-5 degrees Celsius between 2030 and 2060. Scientists further state that climate change is regarded as a "market failure of the greatest scale the world has ever seen" and that by 2025, more than three billion people could be living in water-stressed countries.

And so answers are critically required from the perpetrators of this grand scale ecocide; ecosystems are collapsing across the world with 75% of fisheries being overfished, there's a 50% decline in global forest cover, 65% of agricultural land is in degradation, and many animal and plant species are simply being wiped out. As these ecocide atrocities continue without any signs of slowing down, so too are the perpetrators not being brought to book in any meaningful way. Expectedly, increasing levels of unemployment, poverty and poorly educated societies further exacerbate the balance of our ecosystems, as the delicate plant and animal life is plundered by people who literally struggle to survive. Research shows that 2% of the adult population across the globe own more than 50% of the global household wealth and that more than one billion people live on less than $1 per day.

The Millennium Development Goals (MDGs) have set lofty goals to amongst other; close the gap on ending poverty and hunger, improving child and maternal health, combating HIV/Aids and improving access to water and sanitation. The stark reality is that South Africa has fallen far behind its ability to achieve these goals by 2015. With this in mind, one can understand the need for millions of impoverished people to rely on the land. From a pure survival perspective, people in this unfortunate predicament will continue to deplete the components of the Earth's ecosystem. At the outset, one might assume that this situation is too big, and that it cannot be turned.

This is of course far from the truth, and the irony of a situation such as the one we are faced with at present could be stopped if, and only if, governments and big business across the globe were to begin behaving in a far more responsible manner, instead of remaining fixated upon matters such as political agendas, financial greed, market domination and poor leadership; these being just some of the stumbling blocks that prevent a sustainable biodiversity solution. Needless to say, governments worldwide are generally and noticeably quiet on the issues of biodiversity loss, and they appear inept regarding strict, enforceable penalties which should be applied when perpetrators disregard legislation, environmental policies or treaties which were intended to preserve the biodiversity and the balance of our ecosystems. Regrettably, biodiversity is generally not (or at best), even poorly being incorporated into the decision making processes and strategies of companies.

This even applies to those companies who ironically do have good intentions to protect the environment. Businesses in South Africa who are now expected to produce Integrated Reports (IR), will need to conduct an overall annual environmental impact study to understand the manner in which their business operations affect the ecosystem, either directly or indirectly. Indeed, it would be prudent that these studies are conducted by independent experts, save for also ensuring that not only is the correct information recorded in their IRs, but also that they are able to take precautionary and / or remedial action to preserve the biodiversity and negative impacts their operations may have caused.

One hopes that the governments of the developed and developing countries who attended the UN Convention on Biological Diversity (CBD) in October 2012 in Hyderabad, India, will overcome their differences of opinions regarding their finance issues. That said, the WWF International's Coordinator for Biodiversity Policy, Rolf Hogan said, "Developed countries do not want to commit more money to reach resource mobilisation targets, and developing countries are saying if no money is made available, that they will "walk away" from their Nagoya* commitments." What lunacy is this? A person has got to question the agendas being driven by these so-called leaders who are supposed to have their citizens best interests at heart, let alone those of the planet Earth upon which our very existence depends.

* The Nagoya Protocol was adopted by its signatories on 29 October 2010 in Nagoya, Japan. Its objective is the fair and equitable sharing of benefits arising from the utilization of genetic resources, thereby contributing to the conservation and sustainable use of biodiversity. South Africa is also a signatory to this protocol.

Conservation Plan for the Black Rhino Gazetted

Nedbank Green News

Water and Environmental Affairs Minister Edna Molewa has gazetted the eagerly awaited Conservation Plan for the Black Rhino. The plan allows for the monitoring and review of actions taken to preserve the species and forms part of government's continued efforts to ensure the survival of South Africa's rhino population. "It will contribute significantly to the management and conservation of black rhino, presently under threat from poachers," a statement from the Minister said.

The Conservation Plan for the Black Rhino, which forms the basis of the Biodiversity Management Plan for this species in South Africa, was jointly developed by South African members of the Southern African Development Community (SADC) Rhino Management Group to promote the development and long-term maintenance of viable populations of the various sub-species of African rhino in the wild. It was published for public comment in 2011. The South African Rhino Management Group, which functions under the auspices of the International Union for the Conservation of Nature's Rhino Specialist Group, is to manage the implementation of the plan, including the legally required approval of management plans submitted by rhino conservation bodies for adoption by the government.

The 10-year conservation goal is to achieve an average South African meta-population growth rate for the two indigenous subspecies of black rhino of at least 5% per annum. The aim was also to achieve meta-population sizes for the two subspecies of 3 060. In addition to the achievement of a minimum 5% growth rate in the meta-population as part of biological management, the plan states that protection remains a key activity to minimise rhino losses from illegal activities. Protection measures include effective law enforcement, improved neighbour relations, effective criminal investigations and prosecuting, and securing and monitoring rhino horn stockpiles. Human resources will also be developed to ensure there are sufficient skills available to protect and manage black rhinos. Strict rhino hunting guidelines have also been included to ensure proper control over the removal of animals from breeding populations, and to combat any incidence of illegal hunting

Outeniqua Research Farm Information Day

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Sustainable Milk Production from Planted Pastures

The Western Cape Department of Agriculture's scientists from the Outeniqua Research Farm communicated their latest research findings, of the highest quality, during their Information Day, which was held on the 30th of October 2012. The day was themed 'Sustainable milk production from planted pastures' and was attended by more than 230 agriculturalists. Research is one of the key priorities of the Western Cape Department of Agriculture and it is important for critical research, relating to the sciences of soil, pastures and animal production, to be translated into practice, for the benefit of farmers. Research findings of the past two years were therefore presented in a popular and farmer orientated manner.

Western Cape Minister of Agriculture and Rural Development, Gerrit van Rensburg, opened the day by encouraging agricultural scientists to anticipate the needs of agriculturalists in the coming years. Research conducted on Outeniqua Research Farm complies with this message from the minister and scientists of the Western Cape Department of Agriculture were commended for being crowned the best research department in South Africa.

The research findings shared encompassed topics ranging from soil quality and cultivar evaluations to animal production from pastures, all affecting sustainability of dairy-pasture systems. Pieter Swanepoel shared initial findings of his PhD study on soil quality of pastures in the southern Cape. The most important soil quality indicators from the chemical, physical and biological components of soil were discussed and he summarized that proper soil functioning necessitates sound management of all three components to sustain soil as a living entity.

Dalena Lombard discussed subtropical grasses and summer forage crops as alternative pasture. Janke van der Colf provided valuable information regarding phase 1 cultivar evaluations of tall and meadow fescue, festulolium hybrids, annual and perennial ryegrass cultivars and hybrids, perennial legume cultivars, cocksfoot and *Bromus* spp. Lombard and Van der Colf stressed that the choice of which species or cultivar to use should be based on the specific purpose of the pasture to be established, seasonal production potential and the persistence over years.

They provided information to assist farmers when selecting a species or cultivar based on specific seasonal feed shortages and fodder flow requirements within their pasture systems. Dr Philip Botha discussed the influence of planting date on the production potential of annual ryegrass. He concluded that Italian ryegrass, if not strategically over-sown into perennial pasture, is a better option than Westerwolds ryegrass based on growth rate and total production. This information is indispensable to pastoralists for the management of sustainable pastures and successful fodder flow programs.

From a dairy production point of view, two MSc students, Lobke Steyn and Josef van Wyngaard, discussed the feeding of a high fibre concentrate to overcome pasture shortages during winter and the use of palm kernel expeller as an alternative to maize in dairy supplements, respectively.

Prof Robin Meeske debated strategies of rearing less replacement heifers to increase profitability. He showed that breeding heifers only from the top half of cows and inseminating the bottom half of cows in the herd with beef semen, can be profitable. After the proceedings, recognition of participation for the Peter Edwards Award for the best conservation farmer in the Western Cape was given to the following small-holder farmers:

- Freddie Persensie of Baviaanshoek in the Hessequa District
- Ernest Joubert of Toekomslaagte in the Mosselbay District
- John Johannes Nicolaas Swart of Sleeping Beauty in the Riversdale District

Figure 1: Presenters at the Outeniqua Research Farm Information Day 2012: *Front row, from left to right*: Annelene Swanepoel (Scientific Manager: Institute for Plant Science), Lobke Steyn (MSc Student), Dalena Lombard (Research Technician), Janke van der Colf (Scientist), Prof Robin Meeske (Specialist Scientist). *Back row from left to right*: Josef van Wyngaard (MSc Student), Minister Gerrit van Rensburg (Minister of Agriculture and Rural Development), Dr Philip Botha (Specialist Scientist), Pieter Swanepoel (Scientist).

Figure 2: Small holder farmers who received recognition for participation for the Peter Edwards Award. *Left to right:* Mr Ernest Joubert, Mr Freddie Persensie,Minister Gerrit van Rensburg (Minister of Agriculture and Rural Development, Mr John Johannes Nicolaas Swart and Nelmarié Saayman (Grassland Society of Southern Africa representative and Scientist at Western Cape Department of Agriculture).

Garden Route Initiative Information Sharing Session

Pieter Swanepoel

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The Garden Route is a place of true natural beauty having verdant and ecologically diverse vegetation, numerous lagoons and lakes dotted along the coast, lush natural forests and mountain and coastal fynbos. The series of lake havens host a variety of aquatic species and have been proclaimed as a Ramsar site (wetlands of international importance). No wonder the Garden Route has been placed 42nd on the National Geographic Magazine's 100 Journeys of a Lifetime special edition, finally receiving the prime international destination status it so well deserves.

However, since it is a very popular and sought-after area, there are enormous challenges to meet. Urban expansion, invasive alien species and the exhaustion of natural resources, including water and ocean stocks, are difficulties that need to be faced. The Garden Route Initiative, governed by a Steering Committee of qualified professionals and volunteers supports the different activities of its cohorts in the areas of climate change, biodiversity, social upliftment, environmental education, rivers and wetlands, water resources and sustainable energy. Their efforts in conservation and environmental sustainability are vitally important for the critically sensitive area of the Garden Route.

On 26 October 2012, an information sharing session was held in the George Municipality Conference Theatre where a multitude of organisations shared information on projects which have been undertaken, conservation successes, internship programmes and many more.

A disconcerting talk was given by the Landmark Foundation, which shared research relating to top trophic level conservation. They also spoke out against killing of predators and government departments issuing more permits for extermination of predators than the population of predators in the area. Other conservation related addresses included that of Roland Scholtz, who gave a talk on a potential model for active private conservation in the Fransmanshoek Conservancy, the Oyster Bay Reserve, which provided information on their involvement in conservation, preservation and educational projects, SANParks, which presented information of projects on environmental education, socio-economic development and cultural heritage resource management, WESSA provided information on their EcoSchools and the Mossel Bay Environmental Partnership on their community upliftment projects.

The Custodians of Rare and Endangered Wild Flowers (CREW), a division of the South African National Botanical Institute (SANBI), shared their successes on the monitoring of more than 200 sites, 300 special plants and 40 threatened plants. They reported on their discovery of three previously undescribed plant species

Penny Price of the Department of Environmental Affairs conveyed interesting information about the Eden districts' Climate Change Adaptation Programme which focuses on mitigation and adaptation to climate change at a local level.

It was finally announced that the Eden District Municipality Coastal Management Programme can now be downloaded from www.edendm.co.za. It is a robust document which aids in decision making processes relating to the management of environmentally sustainable, functioning natural systems in the Eden District.

Southern African Butterfly Atlas

Silvia Kirkman
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Finally, the Southern African Butterfly Atlas and Red List book is available for order, via the pre-publication offer! It's really a beautiful book - all 794 of our butterfly species and subspecies are illustrated to aid identification, there are distribution maps for all of them, as well as their conservation assessments. This book presents all the work done during the butterfly atlas project (SABCA), which I managed from 2007-2011. (A4, about 600 pages, full colour, hard cover)

If you'd like to see more details and place an order (or more) for the book, please visit this link:
http://adu.org.za/sabca_book.php

Please note: The prepublication offer ends 31 March and thereafter you will no longer be able to order the book. We will only be printing the number of books that are ordered so it will be extremely difficult if not impossible for you to obtain a copy later on.

ASSAf elects New President and Council

The Academy of Science of South Africa (ASSAf) has inaugurated its new President and new Council of the Academy for the 2012 – 2016 cycle. The names of the elected candidates have been forwarded to the Minister of Science and Technology for appointment as prescribed by the ASSAf Act (*Act 67 of 2001*).The Academy of Science of South Africa (ASSAf) is the official national academy of science and represents the country in the international community of science academies. ASSAf is governed by a Council comprising 13 members, of whom 12 are elected from the membership and one is appointed by the Minister as representative of the National Advisory Council on Innovation (NACI). The Academy has five office-bearers: the President, two Vice-Presidents, General-Secretary and Treasurer.

The Council members are:

President and Chairperson of ASSAf Council

Prof Dayanand (Daya) Reddy holds the South African Research Chair in Computational Mechanics in the Department of Mathematics and Applied Mathematics at the University of Cape Town. He is also Director of the Centre for Research in Computational and Applied Mechanics, and served as Dean of the Faculty of Science at the University of Cape Town over the period 1999 – 2005. He is a recipient of the Order of Mapungubwe (Bronze), awarded by the President of South Africa for distinguished contributions to science.

Vice-Presidents

Prof Patricia Berjak is a Professor Emeritus and Senior Research Associate at the University of KwaZulu-Natal. She is a Fellow of the university and the Academy of Sciences for the Developing World (TWAS). In 2006, she was awarded the National Order of Mapungubwe (Silver).

Prof Iqbal Parker is the Director of the International Centre for Genetic Engineering and Biotechnology, Cape Town. He was the Head of the Division of Medical Biochemistry and Director of Research in the Health Science Faculty at the University of Cape Town.

General Secretary

Prof Hester (Este) Vorster, previous Director of the Centre of Excellence for Nutrition at the North-West University, is a Research Professor in Nutrition at the university, and General Secretary of the Academy of Science of South Africa.

Treasurer

Prof Sunil Maharaj holds the South African Research Chair in Gravitating Systems. He is a Senior Professor of Applied Mathematics at the University of KwaZulu-Natal and serves as Director of the Astrophysics and Cosmology Research Unit.

Climate Change Could Devastate Agriculture

Christopher Doering

USA Today

Climate change could have a drastic and harmful effect on U.S. agriculture, forcing farmers and ranchers to alter where they grow crops and costing them millions of dollars in additional costs to tackle weeds, pests and diseases that threaten their operations, a sweeping government report said Tuesday.

An analysis released by the Agriculture Department said that although U.S. crops and livestock have been able to adapt to changes in their surroundings for close to 150 years, the accelerating pace and intensity of global warming during the next few decades may soon be too much for the once-resilient sector to overcome. "We're going to end up in a situation where we have a multitude of things happening that are going to negatively impact crop production," said Jerry Hatfield, a laboratory director and plant physiologist with USDA's Agricultural Research Service and lead author of the study. "In fact, we saw this in 2012 with the drought."

The National Oceanic and Atmospheric Administration said 2012 was the hottest year ever in the USA since record-keeping began in 1895, surpassing the previous high by a full degree Fahrenheit. The country was battered by the worst drought in more than 50 years, and crops withered away in bone-dry fields across the Midwest.

In the report, researchers said U.S. cropland agriculture will be fairly resistant to climate change during the next quarter-century.

Farmers will be able to minimize the impact of global warming on their crops by changing the timing of farming practices and utilizing specialized crop varieties more resilient to drought, disease and heat, among other practices, the report found. Crops also may benefit by increasing the use of irrigation when possible and shifting production areas to regions where the temperature is more conducive for better output. Depending on where they live, some farmers could benefit financially at the expense of others.

By the middle of the century and beyond, adaptation becomes more difficult and costly as plants and animals that have adapted to warming climate conditions will have to do so even more — making the productivity of crops and livestock increasingly more unpredictable. Temperature increases and more extreme swings in precipitation could lead to a drop in yield for major U.S. crops and reduce the profitability of many agriculture operations. The reason is that higher temperatures cause crops to mature more quickly, reducing the growing season and yields as a result. Faster growth could reduce grain, forage, fiber and fruit production if the plants can't get the proper level of nutrients or water.

Among the biggest threat to crops from rising temperatures and accelerated levels of carbon dioxide is an increase in the cost for the agricultural industry to control weeds, a challenge that tops more than $11 billion annually, according to the study. Warmer weather provides an ideal atmosphere for weeds to thrive, but at the same time, it can stunt the growth of traditional plants like grain and soybeans.

The entire USA is likely to warm substantially during the next 40 years, increasing 1-2 degrees Celsius over much of the country, according to the study. The warmth is likely to be more significant in much of the interior USA where temperatures are likely to increase 2-3 degrees Celsius. The USDA review said climate change will affect livestock by throwing off an animal's optimal core body temperature, which could hurt productivity and limit the production of meat, milk or eggs. A warmer and more humid weather pattern is likely to increase the prevalence of insect and diseases, further diminishing an animal's health and output.

The 146-page report, written by a team of 56 authors from the federal government, universities, the private sector and other groups, stopped short of providing answers on how to stop or curtail global warming. The analysis was done by reviewing more than 1,400 publications that looked at the effect of climate change on U.S. agriculture.

In a separate report, the USDA looked at literature reviewing the impact of climate change on the country's forests. The data indicated the most visible and significant short-term effects on forests will be caused by fire, insects, invasive species or a mix of these occurring together.

Wildfires are likely to increase throughout the USA, causing at least a doubling of area burned by the mid-21st century. "That's the conservative end," said Dave Cleaves, a climate change adviser with the USDA's Forest Service. "We can't just stand back and let these natural conditions occur.".

Meet the Members

Andrew Cauldwell
Natural Scientific Services cc
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Andrew Cauldwell works with Environmental Resource Management, southern Africa and is a member of their Impact Assessment Team. He is qualified in the field of Wildlife Management and with a strong interest in the natural world. Andrew has over 20 years of professional experience as a biodiversity consultant and as a wildlife management advisor / project manager within an EU-funded project to rehabilitate vast protected areas in Tanzania. His biodiversity consulting experiences cover a wide range of habitats from rainforest to extreme desert in projects in South Africa, Tanzania, Mozambique, Botswana, Zambia, Ethiopia, Sierra Leone and Liberia. His experience has involved baseline and impact assessments for numerous ESIA studies for mining, oil and gas and infrastructure sectors.

Dr. Joseph Baloyi
University of Venda
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Dr. Joseph Baloyi joined University of Venda on 1st of June 2009 and currently teaches environmental physiology, animal production systems and management, ruminant nutrition, advanced small stock production and advanced large stock production. He worked for more than 12 years in different Zimbabwean government departments as an agricultural extension officer, lecturer at an Agricultural College and Zimbabwe Open University, and a research officer. Later he worked as a senior lecturer in Animal Science and Total Quality Assurance Manager at Fort Cox College of Agriculture and Forestry, Eastern Cape, North-West University and University of South Africa (UNISA)

Dr Alan Wheeler
CapeNature
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Dr Alan Wheeler was born and raised in the Eastern Cape, Queenstown district. He worked for Nature Conservation for 20 years and is currently the Ecological Coordinator for the Karoo Area of the Western Cape Nature Conservation Board, based in Oudtshoorn. He is responsible for the Karoo Protected Areas, Biodiversity Corridors and off reserve conservation. His qualifications include a PhD majoring in Conservation Biology (University of the Western Cape) and his research interests are mainly around determining thresholds of potential concern in Succulent Karoo vegetation condition; game and livestock impacts on vegetation in the Nama Karoo; biodiversity corridor development and conservation farming.

Yolanda Pretorius
Elephant Specialist Advisory Group for South Africa
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Yolanda is an ecologist by training and a conservationist by heart. During the last 15 years she has gained experience in the South African wildlife industry by doing research and working at game reserves and parks in Zululand, the bushveld, the Waterberg and the Greater Kruger National Park. Her main interests and fields of expertise are large herbivore ecology, elephant management, soil-plant-animal relationships and human-wildlife interactions, including tourist impact, rehabilitation and conflict resolution. In 2009 she completed a PhD on large African herbivore foraging ecology at the University of Wageningen in the Netherlands and in 2011 she founded an ecological training, research and consulting organization called Eco-Sustain Africa (ESUSTA). ESUSTA's main aim is to assist owners and managers of protected areas and game reserves with the wildlife management challenges they face whilst providing volunteers, researchers and students the opportunity to contribute to conservation and gain hands-on experience with management of wildlife.

Thozamile Yapi
CSIR - Natural Resources and the Environment
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Thozamile Yapi holds a BSc in Agriculture (Livestock and Pasture) from the University of FortHare. He is currently in a studentship programme at the Council for Scientific and Industrial Research (CSIR) within the Biodiversity and Ecosystem Services Research Group. He is an MSc student at Stellenbosch University, Conservation and Entomology Department, focusing on the impacts of invasive alien plants on grazing provision and livestock production. His interests include understanding the impacts of invasive alien plants on ecosystem services.

Niels Dreber
North-West University
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Niels hold a diploma degree in biology (focus botany and soil science) and a doctor's degree in vegetation ecology from the University of Hamburg, Germany. Currently, he is a postdoctoral fellow at the North-West University (Potchefstroom campus), South Africa, and an associated researcher at the Biocentre Klein Flottbek and Botanical Garden of the University of Hamburg, Germany. During his scientific career, he developed a distinct interest and passion for the semi-arid to arid south-western zone of Africa, where he has about 9 years of field-work experience across biomes, and undertook extensive research in the Nama Karoo Biome, Succulent Karoo Biome, and Savanna Biome. His research interests span a broad range of topics in the fields of rangeland ecology, plant community ecology, and seed ecology (with special emphasis on soil seed banks). Most of his work has taken place in rangelands under different land tenure ranging from commercial farming systems to open-access communal land-use systems. He has a strong theoretical and practical background in the assessment of land-use impacts, analysis of vegetation dynamics, habitat mapping, evaluation of land management strategies, as well as biodiversity monitoring. His ecological research is largely user-oriented, and as such he has a keen interest in participatory approaches addressing the interface between humans and their environment, i.e. coupling science and local (traditional) knowledge. Most recently, I have been working together with local stakeholders on identifying best management and restoration practices in different Kalahari ecosystems of South Africa for the purpose of combating and/or mitigating desertification.

Brain Zulu
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Lethukuthula Brian Zulu matriculated at Zwelibanzi High school in year 2000, then in 2001 enrolled at Port Elizabeth Technikon for a National Diploma in Agricultural Management, where he obtained two outstanding academic achievement awards (Animal Production I and Best Student) during three years he spent there. He is currently working for the Western Cape Department of Agriculture, in the Plant Science Directorate, where he holds a position of a Scientific Technician since 2007 at Outeniqua Research Farm, focusing on performing technical scientific functions regarding pasture science research projects which include cultivar evaluation trials and system trials. He strives to have a major impact in findings of sustainable production of planted pastures.

David Joubert
Polytechnic of Namibia
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David is the Head of the Nature Conservation Department, School of Natural Resources and Tourism, Polytechnic of Namibia. He lectures Ecology and Conservation Biology courses mostly. His research interests are mainly in the field of savanna dynamics, particularly bush thickening. He is also involved with invasive alien research and awareness.

Mota Lesoli
Fort Cox College of Agriculture and Forestry
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Mota Lesoli was born in Tsikoane Lesotho. He holds a Diploma in Agricultural Education at Lesotho Agricultural College/National University of Lesotho. He was employed as a teacher at Leribe English Medium High School teaching Science and Agriculture. He obtained BSc Agriculture (Animal Science), MSc Agriculture (Pasture Science) and PhD in Rangeland Science from the University of Fort Hare. He has served as a tutor for Pasture and Animal Science modules at the Department of Livestock and Pasture Science, University of Fort Hare. At present he is a senior Lecturer (Animal, Range and Forage Sciences) at Fort Cox College of Agriculture and Forestry. He is supervising MSc Pasture Science students at the University of Fort Hare. His PhD, focused on social and biophysical factors and indicators of rangeland degradation, and evaluated vegetation restoration techniques. He found that social factors such as lack of skills, lack of individual/community obligation and lack of effective policy for rangeland management, and biophysical factors such as uneven grazing distribution pattern could be attributed to rangeland degradation in communal areas of Eastern Cape. He found that rangeland degradation was characterised generally by poor forage productivity and vegetation cover, high soil unconfined compressive strength (UCS) with low hydraulic conductivity. He further found that the effectiveness of restoration techniques generally depends on the ability of "microsite" to collect and store water. His research interests include rangeland water dynamics, interaction of rangelands with biotic and abiotic environment, vegetation species identification, wetlands management and management of invasive species on rangelands. Mota published 29 peer-reviewed papers in Journals and conference proceedings, and three book chapters and five manuscripts are at different stages of review in peer-reviewed journals. Mota is the member and Public Relations Officer of the Executive Council for the Grassland Society of Southern Africa (GSSA).

Suzette Bezuidenhout
KwaZulu-Natal Dep. of Agriculture and Environmental Affairs
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Suzette was born and raised in Johannesburg and completed her M.Sc.(Agric) in Weed Science at the University of Pretoria in 2001. In the beginning of this year she received her Ph.D from the same university, specialising in the suppression of weeds with cover crops. She started to work as a weed scientist in 2000 at the KZN Department of Agriculture and Environmental Affairs and still enjoys it tremendously. Her main focus is on alternative weed control methods such as the use of cover crops and crop rotations. She is also looking into the biology of weeds and their influence on crop growth. One of her favourite weeds is *Cyperus esculentus.*

New and Resigned Members

Resigned Members

Miss Danne Joubert, SAEON
Ms Glenn Ramke, Endangered Wildlife Trust
Prof Lincoln Raitt, University of the Western Cape
Mrs Natasha van de Haar, Scientific Aquatic Services
Dr Anthony Mills, C4 EcoSolutions cc
Mr Lutendo Desmond, Malatleng Mining cc
Ms Mamathung Phahlanohlaka, DAFF - Grootfontein ADI
Mr Manie Grobler, Western Cape Department of Agriculture
Mr Wim Landman, Pongola Game Reserve

New Members

Ms Antonia Bezuidenhout, Gauteng Department Agriculture and Rural Development
Mr Brian Zulu, Western Cape Department of Agriculture
Mr David Joubert, Polytechnic of Namibia
Mr Gabriel Lekalakala, Limpopo Department of Agriculture
Dr Niels Dreber, North-West University
Dr Suzette Bezuidenhout, KwaZulu-Natal Agriculture and Environmental Affairs
Mr Thozamile Yapi, CSIR - Natural Resources and the Environment
Mr Zamukulunga Ndovela, The Eastern Cape Department of Agriculture
Mr Christiaan Harmse, North-West University
Mr Clement Adjorlolo, KwaZulu-Natal Agriculture and Environmental Affairs
Mr Dalton Masia, CSIR - Natural Resources and the Environment
Mr Jacques Brits, Timbavati Private Nature Reserve
Ms Jenifer Gouza, CapeNature
Prof Johann du Preez, University of the Free State
Ms Linda Luvuno, WESSA
Ms Mabora Thupana, SANBI
Mr Peter Oosthuizen, KwaZulu-Natal Departement AEA
Mr Rakesh Naik, Plazaboard
Mr Support Chavalala, City of Johannesburg Metropolitan Municipality
Dr Tunde Amole, University of Agriculture

Council News

Yolandi Els, Honorary Secretary of the GSSA Council
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Two Council meetings have taken place since the Annual Congress at Club Mykonos in Langebaan last year. Both meetings were very productive with Council members diligently completing their tasks and enthusiastically contributing to their respective portfolios.

One of the meetings was combined with a visit to Weesgerus, Modimolle, where the 48th Annual Congress will take place later this year. The venue is well-suited for an intimate congress atmosphere and delegates can look forward to a stimulating and packed programme. Of particular interest is a workshop on Fire Policy and Management, including demonstrations, scheduled for the Monday preceding the Congress. Delegates will be able to choose from a number of mid-congress tours and a visit to the much researched Nylsvlei Nature Reserve will also take place.

The 49th Annual Congress will take place at the Black Mountain Hotel in the Free State, and Congress 50 in St Lucia. Plans are already in place for a very special 50th Anniversary Congress, some of which will be the publication of a special 50-year Anniversary Yearbook and the handing over of a number of special awards.

This year will see the 4th GSSA Research Skills Workshop taking place, this time at the campus of the University of Pretoria. More than 40 delegates have already registered and they will be receiving information on all matters related to research, from proposal writing to reviewing scientific papers, presented by South Africa's top grassland scientists. This is definitely an event not to miss out on!

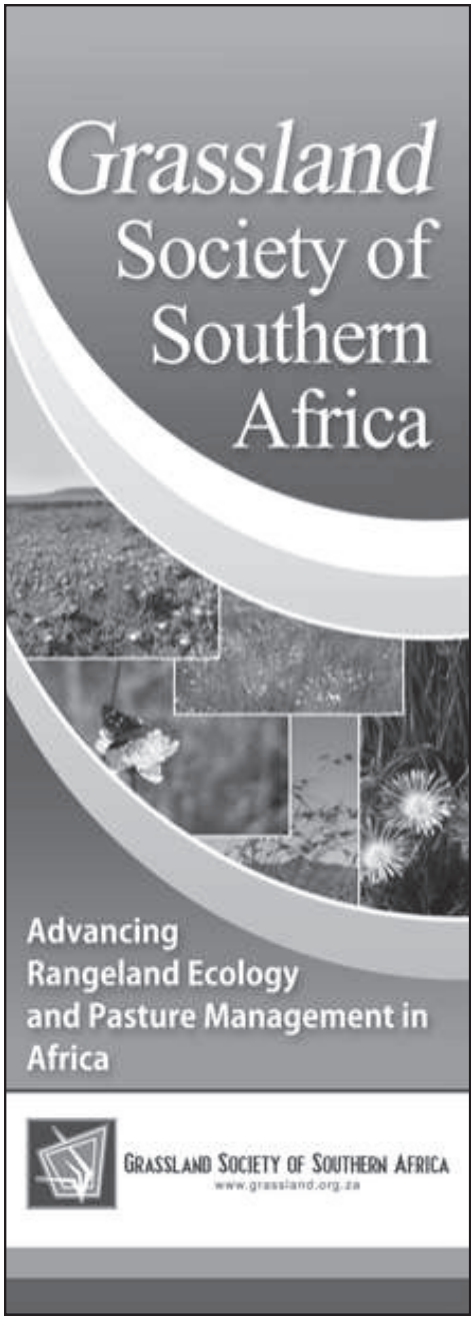
Members can look forward to a special issue of the African Journal of Range and Forage Science (AJRFS) on "Aligning policy with the socio-ecological dynamics or rangeland commons" published as Issue 30(1). Plans for a special issue on bush encroachment are also under way.

The AJRFS has and will be seeing some changes in the Editorial Board – Prof Charlie Shackleton has joined as Associate Editor and Dr Susi Vetter will be handing over her position as Editor-in-Chief to Dr James Bennett in July 2013.

The Grassroots newsletter will also be undergoing editorial changes, with Publication Editor Julius Tjelele handing over to current Assistant-Editor, Pieter Swanepoel, also in July 2013. Authors can now submit articles to Grassroots online via the GSSA website where information such as *Instructions to Authors* is also available.

The Fortnight Forum has been launched since members met at the last Congress. This is a newsletter sent out to Society members every fortnight containing information on upcoming events, job- and bursary opportunities and recent publications. The objective of this newsletter is to reduce excessive daily e-mails and very positive feedback has been received since its release in August 2012. Members are also reminded to visit and "like" the GSSA's Facebook page and follow us on Twitter.

The content of this edition of Council News attest to the GSSA being a well-administered, thriving and up-to-date Society. Council would like to thank each member for their contributions and support, and may 2013 be a productive and rewarding year!



Recent Publications

The African Journal of Range and Forage Science now has iFirst which enables rapid online publication of manuscripts accepted for publication in the journal. Rapid online publication of articles dramatically reduces the time that the target audience must wait to see the results of current research. The rapid online publication system further eliminates the problem of the "backlog": accepted but unpublished papers. This is a great asset in many fields, where publishing an article can assure priority of discovery.

AJRFS articles published in this manner lack page spans and can be cited using their DOIs, or Digital Object Identifiers, in addition to the article and journal title, see below. The DOI is a unique number assigned to an article that stays with that article throughout its digital life, allowing researchers to find and reference these articles and to hyperlink to the articles. DOIs are persistent - they will always direct readers back to the definitive version of an article, either the version first published online or the subsequent paginated version in the online journal issue. Once the fully paginated version of the article appears in a volume of the journal, all future citations should be made to the fully paginated version.

All subscribers with online access to the AJRFS can access articles published online (see the 'Latest Articles' tab on the journal home page).

These "Latest Articles" are later assigned to a particular issue of the journal, given page numbers, and published in final form. The first two articles to be published using this system by the African Journal of Range and Forage Science are:

The influence of *Pechuel-Loeschea leubnitziae* (wild sage) on grass sward and soil seed bank composition, MJ Tedder*, KP Kirkman, CD Morris, WSW Trollope and MC Bonyongo, doi: 10.2989/10220119.2012.720280, http://www.tandfonline.com/doi/abs/10.2989/10220119.2012.720280

A novel method for estimating tree dimensions and calculating canopy volume using digital photography, AS Barrett* and LR Brown, doi: 10.2989/10220119.2012.727471, http://www.tandfonline.com/doi/abs/10.2989/10220119.2012.727471

Remote Sensing, 4(1), 303-326, 2012, Exploring Simple Algorithms for Estimating Gross Primary Production in Forested Areas from Satellite Data, Hashimoto, Hirofumi, http://www.mdpi.com/2072-4292/4/1/303/htm

Conservation Biology, Volume 26, Issue 6, pages 1156–1158, Toward a More Balanced View of Non-Native Species, Martin A. Schlaepfer, Dov F. Sax, Julian D. Olden, http://onlinelibrary.wiley.com/doi/10.1111/j.1523-1739.2012.01948.x/abstract

Grass and Forage Science, Volume 67, Issue 4, page 606, December 2012, Practical handbook for seed harvest and ecological restoration of species-rich grasslands, Richard G. Jefferson, http: onlinelibrary.wiley.com/doi/10.1111/j.1365-2494.2012.00875.x/abstract

Grass and Forage Science, Volume 67, Issue 4, page 607, December 2012, Grassland productivity and ecosystem services, Alan Hopkins, http://onlinelibrary.wiley.com/doi/10.1111/gfs.12015/full

South African Journal of Science; Vol 108, No 11/12 (2012), 3 pages, Challenges in invasive alien plant control in South Africa, Brian W. van Wilgen, Richard M. Cowling, Christo Marais, Karen J. Esler, Matthew McConnachie, Debbie Sharp, http://onlinelibrary.wiley.com/doi/10.1111/j.1365-2435.2012.02053.x/abstract

Plant Ecology, Spatio-temporal patterns of tree establishment are indicative of biotic interactions during early invasion of a montane meadow, Janine M. Rice, Charles B. Halpern, Joseph A. Antos, Julia A. Jones, http://andrewsforest.oregonstate.edu/pubs/pdf/pub4710.pdf

African Journal of Range & Forage Science 2012, 29 (2) : 97–99, Zimbabwe's Land Reform: Myths and Realities, MJ Roodt, http://www.nisc.co.za/oneAbstract.php?absId=4546

Upcoming Events

Fynbos Identification Course: Identifying Fynbos Plant: an introduction, 2 April 2013 to 5 May 2013, Gold Fields Centre, Kirstenbosch, www.ecoactivities.co.za, contact: Wendy Hitchcock, email: hitchcock@mweb.co.za

2013 International Conference on Indigenous Knowledge Systems (IKS), 17 to 20 April 2013, Birchwood Hotel, Gauteng, www.nstf.org.za, email: enquiries@nstf.co.za

35th International Symposium on Remote Sensing of Environment (ISRSE), Earth Observation and Global Environmental Change- 50 years of Remote Sensing: Progress and Prospects, 22 to 26 April 2013, Beijing, China, www.isrse35.org/

43rd St. Gallen Symposium, Leaders of Tomorrow, 2 to 3 May 2013, University of St. Gallen, Switzerland, www.fundsforngos.org/conferences/opportunity-participate-leaders-tomorrow-st-gallen-symposium-switzerland/

ISF World Seed Congress 2013, 27 to 29 May 2013, Intercontinental Athenaeum Hotel in Athens, www.worldseed2013.com, contact: Nathalie Huguenin, email: register@worldseed.org

Exhibit at Wastex Africa 2013, 29 to 31 May 2013, Gallagher Convention Centre, www.wastexafrica.co.za, contact: Estelle Hunt

48th Annual Congress of the Grassland Society of Southern Africa, Advancing rangeland ecology and pasture management in Africa, 15 to 19 July 2013, Weesgerus, Modimolle, Limpopo, South Africa, www.grassland.org.za, contact: Freyni du Toit, email: admin@grassland.org.za

The Young Water Professionals Programme, 16 to 18 July 2013, Conservatorium of Music at the University of Stellenbosch, South Africa, www.sa-ywp.org.za, contact: Glaudin Kruger, email: kruger@kruger-associates.com

The 6th International Symposium, The biology and ecology of galling arthropods and related endophytes, 4 to 8 August 2013, O'Reillys Rainforest Retreat, Queensland, Australia, http://6isbegia.org/

International Fertilizer Development Center Announces an International Training and Study Tour, 19 to 30 August 2013, Alabama, Arkansas, Georgia, Illinois, Missouri, Tennessee and Washington,D.C, www.ifdc.org/getdoc/bd34bef9-ce00-4b0f-aaba-ae4c2fc8a5aa/Technology_Advances_in_Agricultural_Production_andemail: training@ifdc.org

Symposium on Science and Stewardship to Protect and Sustain Wilderness Values, Make the World a Wilder Place, 4 to 10 October 2013, Salamanca, Spain, www.WILD10.org, email: symposium@wild10.org

The Modimolle Junior Land Care Project: Controlling Invader Plants in the Waterberg

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The Klein Nyl river flows through Modimolle, situated in the Sour Bushveld in the Waterberg. Over time, invasion by a variety of alien plants (*Meliaazedarach, Lantana camara*, and different reed species) and pollution has resulted in the severe deterioration of riverine areas in town. A local request by various stakeholders to clear the Klein Nyl river of alien invasive plants resulted in the launching of the Modimolle Junior Land Care Project during 2010. Initially, the two co-authors started treating alien plants along the banks of the Klein Nyl river with arboricides. During August 2011, funds were allocated (under EPWP) to employ 25 workers for three months, with the aim of removing alien plants and trees, and cleaning polluted areas of waste. The success of the project, which had a major impact on natural vegetation and water flow in cleared areas, led to a further allocation of R1.3 million during October 2011. The project was then extended to 2014 to incorporate surrounding municipal camps, totalling 1 740ha, that are leased to emerging farmers and livestock owners.

These camps are severely encroached by various invaders, especially lantana, but also syringa, bugweed (*Solanum mauritanum*) and mulberry (*Morus alba).*

The primary objective was to control listed alien invaders, the secondary objective was to create part time work for previously disadvantaged people and to provide training in identifying alien plants, applying arboricides, operating and maintaining brush cutters and chain saws. During May 2012, 53 more people were recruited from the local township of Phagameng and accommodated as workers in the project. The focus was on the youth, and the labour force currently reflects the principle of gender equality, with women representing 50% of the group. As the project progressed, other activities developed which had wider impacts than previously imagined, for example:

- Firewood production for feeding schemes at schools
- Firewood sales for buying fuel and supplies for project
- The erection of erosion structures and brush packing to prevent soil erosion
- Recycling of glass, plastic and metal collected in the area
- Identifying and marking of trees for a future walking trail

- The training of school groups on Land Care issues
- A supply of fodder (syringa, mulberry, etc.) to developing goat farmers in the vicinity of the project
- A significant drop in crime on the outskirts of town; the project has assisted the South African Police Service (SAPS) with access to areas that were previously inaccessible.

Since May 2012, approximately 200 ha have been cleared of alien invaders and in conjunction with researchers stationed at the Towoomba Agricultural Development Centre, rehabilitation of natural vegetation is monitored annually.

The project has already illustrated its positive influence on various sectors of the community. Over the next few years, it will hopefully inspire other land owners in the area to follow its example.

Figure 1: Riverbed after spraying, cutting and burning of reeds

Figure 2: Dense areas to be cleared

Figure 3: Land Care EPWP at work with the effect in the foreground

Forage Sorghum (*Sorghum* hybrids) and Hybrid Pearl Millet (*Pennisetum glaucum*) as Strategic Annual Summer Fodder Crops

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Introduction

Annual fodder cops are sometimes classified as expensive, because of the annual seedbed preparation and establishment. The higher production and palatability of newer forage sorghum and pearl millet cultivars might oppose this statement. Gerber et al. (2006) and Robertson et al. (2009) reported that the production, palatability and quality of newer annual, summer cultivars make it popular crops for dairy production.

Forage Sorghum – General

The following characteristics of newer fodder sorghum cultivars are important:

- It produces palatable and nutritious stems, with an abundance of lush leafs.
- Very good re-growth potential (multiple shoots)
- Excellent spring and summer grazing.
- Carrying capacity of up 5 LSU/ha or 8 young heifers/ha.
- Higher plant populations result in thinner and more palatable.
- Maximum re-growth could be obtained when cutting or grazed start at a height of 600 mm to 800 mm, but not utilized lower than100 mm – 150 mm.
- Newer cultivars also contain less prussic acid.

The following different hybrids (cultivars), with different characteristics are available:

- Sorghum x sweet sorghum and sweet sorghum x sweet sorghum hybrids:
- These hybrids mature late in the growing season, with high yields and limited re-growth potential. They are best suited for silage or standing hay (sweet sorghum hybrids) to be grazed in winter and early spring.
- Sudan grass hybrids:
  These hybrids produce less, but their thin stems, extensive tillering and rapid re-growth make them ideal for grazing and hay making.

- Sorghum x Sudan hybrids:
  These hybrids normally produce high yields, with more stems than Sudan grass. They are suited for grazing and silage operations.

Trials on several forage sorghum cultivars were conducted on the Hygrotech Seed Company experimental farm (Dewageningsdrift (DWD)) near Moloto, in Gauteng province. The long term average rainfall of the area is 627 mm/year, but the rainfall was only 356.8 mm in the 2006/07 season, when the research was done.

This relative low rainfall was supplemented by strategic irrigation of approximately 25 mm/week during December 2006 to May 2007, when necessary.

Production of Forage Sorghum in Gauteng

Table 1 shows different forage sorghum cultivars that were tested during the 2006/07 growing season on Dewageningsdrift, Gauteng province. The material was cut every six weeks, to mimic a grazing situation, and a second treatment was cut once at the soft dough (silage) stage.

Under frequent defoliation Jumbo and Kow Kandy produced the highest (15.5 and 12.5 t/ha respectively) followed by Revolusion BMR (11.0 t/ha) and Sweet Kandy BMR (9.3 t/ha). These cultivars can be classified as grazing cultivars. The lower producers, under frequent defoliation, were Sugargraze, Kow Kandy BMR, Everlush BMR and Silo 700.

Cultivar	Hybrid	Cut every 6 weeks	Cut at silage stage
Kow Kandy	Sorghum x Sudan	12.5 ^{ab}	21.1 ^{bc}
Jumbo	Sorghum x Sudan	15.5 ^{ab}	26.9 ^{a}
Kow Kandy BMR	BMR Sorghum x Sudan	6.5 ^{de}	21.2 ^{bc}
Revolusion BMR	BMR Sorghum x Sudan	11.0 ^{bc}	19.5 ^{bc}
Sweet Kandy BMR	BMR Sorghum x Sudan	9.3 ^{bcd}	14.3 ^{d}
Everlush BMR	BMR Sorghum x Sweet Sorghum	4.9 ^{de}	19.5 ^{b}
Sugargraze	Sweet Sorghum x Sweet Sorghum	6.6 ^{cd}	21.9 ^{bc}
Silo 700		4.4 ^{e}	17.2 ^{cd}

Table 1: Production values (t/ha) of a few forage sorghum cultivars with strategic irrigation, Dewageningsdrift, Gauteng province.

The highest producer in the silage stage was Jumbo (26.9 t/ha) followed by Sugargraze (21.9 t/ha), Kow Kandy BMR (21.2 t/ha) and Kow Kandy (21.1 t/ha). The cultivars that produced less than 20 t/ha, in the silage stage, were Revolution BMR, Everlush BMR, Silo 700 and Sweet Kandy BMR. In the same season, on the same locality, four of the cultivars mentioned in Table 1 were planted under rain fed conditions (without irrigation) and these results are shown in Table 2. Under this drier condition, the production of Kow Kandy and Sweet Kandy BMR, cut six-weekly, were approximately 40% lower as shown in Table 1. Kow Kandy BMR and Sugargraze were not influenced much by the drier conditions.

In the silage stage Kow Kandy and Kow Kandy BMR benefitted from additional irrigation (compare results in Tables 1 and 2). Sweet Kandy BMR produced 14.3 t/ha with additional irrigation, compared to the 12.1 t/ha under dry land. Irrigation was not influence to the production of Sugargraze.

Palatability/Acceptability of Forage Sorghum

A further factor that plays an important role in these crops is the introduction of the brown midrib (BMR) gene. This gene is associated with a lower lignin content in crops, which contributes to higher palatability. An experiment was done where Sweet Kandy BMR and Kow Kandy were grown adjacent to each other in one camp. This material was grazed by cattle and they were allowed to make their own choice. Digital photos of the two crops were taken when grazing started (Day 1), on Day 7 and Day 14. The photos were classified by a program called BrivTM, which measure the percentage green material. The decrease in green material on the photos taken on the three days was an indication of material utilized by the cattle (Table 3).

	Grazing stage	Silage stage
Kow Kandy	7.4	15.8
Sweet Kandy BMR	5.0	12.1
Kow Kandy BMR	5.7	12.3
Sugargraze	7.6	22.1

Table 2: Production values (t/ha) of a few forage sorghum cultivars under rain fed conditions, Dewageningsdrift, Gauteng.

Photos taken on:	% Green Material	
	Sweet Kandy BMR	Kow Kandy
Day 1	59	57
Day 7	13	27
Day 14	4	22

Table 3: Disappearance of green material (%) over time due to grazing

The percentage of green material present on Day 1 was 59 % and 57 % for the two Sweet Kandy and Kow Kandy respectively. The lower percentage of green material in the case of Sweet Kandy BMR, on day 7 and 14, was an indication that animals utilized it more than Kow Kandy. The fact that the cattle selected Sweet Kandy BMR above Kow Kandy is an indication that the BMR cultivar was more acceptable.

Planting date of forage sorghum also influences DM production as indicted in Figure 1. These results represent the average production of all the cultivars mentioned in Table 1, planted on three different planting dates. According to Figure 1 the December planting date resulted in a higher DM production than of January and February planting dates. With early planting the growing season is longer, thus more plant material.

Forage Sorghum Silage

Maize, forage sorghum and pearl millet were compared as silage crops on small scale. The material was ensiled in small plastic containers (10ℓ buckets, with lids) and not done on the traditional way. The quality of this silage is shown in Table 4.

The ammonia content of silage of the three crops varied between 0.15 and 0.38 %, while the ideal level should not be higher than 0.05%. The acid detergent fiber (ADF) varied between 39.6 and 46.2%, which was not much higher than the preferred 31%. The neutral detergent fiber (NDF) varied between 56 and 72%, while the ideal should be lower than 55%. The Crude protein content was higher than 10.9 % which can be described as average and higher than the excepted for ruminants. The quality of the silage did not differ much between maize and forage sorghum, and it compared well with the expected values for good silage. Although pearl millet had lower crude protein content it can also be described as a good silage crop, especially in this unconventional ensiling technique.

Pearl Millet - General

Important characteristics of newer fodder sorghum cultivars are:

- Hybrid pearl millet contains no prussic acid, implying it can be grazed heavily under various environmental and soil conditions without problems. The ideal sheep, cattle and horse pasture.

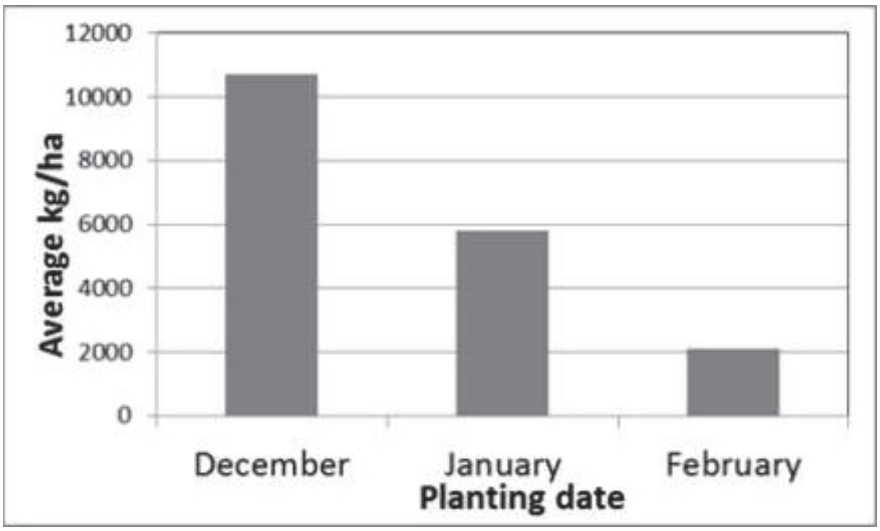

Figure 1: The average production (kg/ha) of different forage sorghum cultivars as influenced by planting date

Crop	Lactic acid (%)	Ammonia (%)	ADF (%)	NDF (%)	Protein (%)
Maize	2.5	0.38	39.6	58	14.2
Kow Kandy	2.5	0.41	46.2	72	13.8
Pearl millet	3.0	0.15	35.6	56	10.9

Table 4: The quality of maize and Kow Kandy forage sorghum silage.

- Its rapid re-growth and high forage quality makes this an ideal pasture crop for direct grazing and for finishing lambs and weaners or as dairy pasture.
- It should be utilized when 300 mm to 500 mm tall for optimum quality and energy content
- Rotational grazing ensure good production, should not be grazed lower than 150 mm to 200 mm to ensure rapid regrowth.
- Due to its high leaf content, good hay can be made.

Trails with several pearl millet cultivars were conducted at the Hygrotech Seed Company's experimental farm [(Dewageningsdrift (DWD)) near Moloto, in Gauteng province, South Africa. The long term average rainfall of the area is 627 mm/year.

Pearl Millet in 2007/08

The total rainfall for the 2007/08 season was 1217.9 mm, which is reflected in the high production values. Three different planting dates were applied during the 2007/08 season (Table 5).

Monthly defoliation:

The results in Table 5 represent a monthly defoliation treatment of material established on the three planting dates (imitating a grazing system). The first cut was done four weeks after each establishment (post-planting).

The highest DM production was measured from material planted in November. These values varied between 12.9 t/ha (Milkstar) and 7.9 t/ha (Nutrifeed).The DM production during the December establishment varied between 10.5 t/ha (Milkstar) and 3.46 t/ha (Nutrifeed). For both these planting dates the DM production of Milkstar, Speedfeed, Hypearl millet and Common babala did not differ significantly from each other. The DM production of Milkstar was significantly higher than that of Nutrifeed.

The relative short growing period followed by the January establishment, is reflected in the relative low DM production values, which varied between 5.5 t/ha and 7.9 t/ha.

From the results in Table 5 it is clear that the most ideal time to establish pearl millet is in November. The re-growth (t/ha) of each cultivar established in November, and defoliated four weekly (to imitate rotational grazing), is shown in Figure 2.

The initial production (4 weeks post-planting) of Common babala and Milkstar was relatively high (4.3 and 4.5 t/ha respectively). After that the production of these two cultivars increased to a potential 5.1 and 6.8 t/ha in January respectively, after which it declined and ended below 1 t/ha in March. Hypearl millet started with a relatively low production (between 2 and 3 t/ha) in December and January, but production increased in February to 4.4 t/ha and ended with 0.47 t/ha in March. The production of Speedfeed and Nutrifeed started with approximately 3.7 t/ha in December. Speedfeed showed a gradual decline in re-growth, which ended with 2.3 t/ha in March. The total DM production of this cultivar was the second highest (Table 5), and proved to withstand regular defoliation. Nutrifeed showed the same re-growth pattern; however, the decline was faster and ended with less than 1 t/ha in March.

At four weeks post-planting Speedfeed and Milkstar produced 1.6 and 3.2 t/ha respectively (Figure 3). The re-growth of these two cultivars increased to 6.7 and 6.5 t/ha in mid-February respectively and after that it declined to less than 1 t/ha in mid-April. Hypearl millet and Common babala produced both 1.5 t/ha (four weeks post-planting), but increased in mid-February to 3.0 and 3.5 t/ha respectively. After that production declined to lower than 1.0 t/ha in mid-April.

Cultivar	Planting date		
	21/11/2007	27/12/2009	30/1/2008
Milkstar	12.91 a	10.52 a	7.94 a
Speedfeed	11.80 ab	8.71 ab	7.48 a
HPM	10.73 abc	6.00 abc	7.52 a
Common babala	10.47 abc	7.89 abc	7.03 ab
Nutrifeed	7.92 c	3.46 c	5.53 b
LSD	3.57	5.02	1.58

Table 5: The effect of planting date on the total DM production (t/ha) of different pearl millet cultivars which were defoliated every four weeks in 2007/08

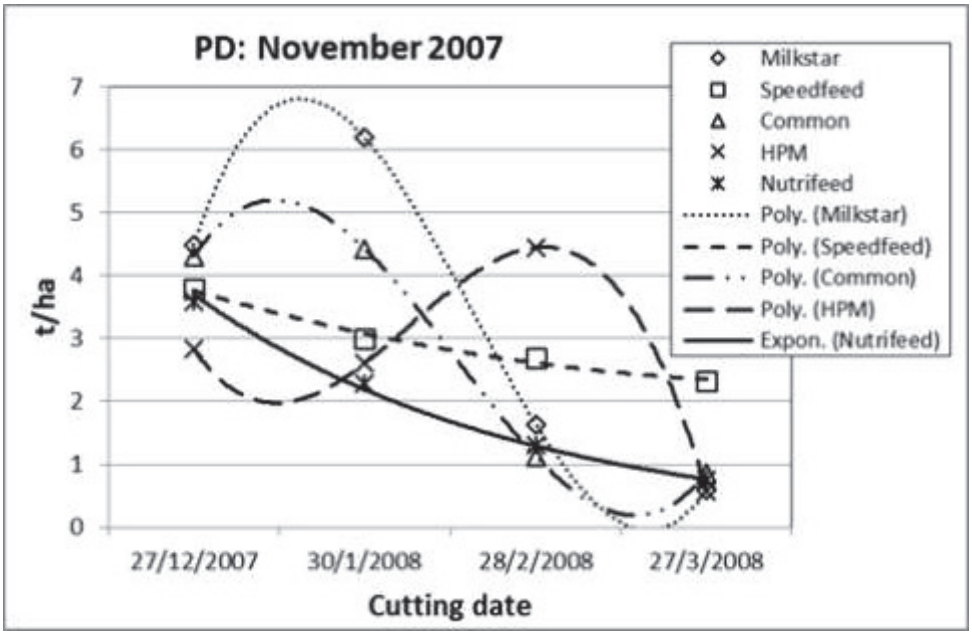

Figure 2: Dry material (DM) production of pearl millet cultivars, planted November 2007 and defoliated every four weeks.

Silage

All cultivars under discussion were also allowed to grow out for longer periods before they were defoliated. Figure 4 shows the DM production of all cultivars at the soft dough stage (typical silage stage). This stage was reached on 27 March 2008 for the November and December planting dates (PD 1 and 2) and on 23 April 2008 for the January planting (PD 3).

Planted in November 2007 Hypearl millet and Nutrifeed showed the highest DM production potential to be ensiled (more than 30 t/ha), followed by Speedfeed and Common babala (more than 17 t/ha), Nutifeed and Speedfeed showed the best DM potential for silage (more than 14 t/ha), when planted in December. Planting as late as January Speedfeed and Milkstar can produce more than 13 t/ha for ensiling. Under these conditions the same cultivars can be used as foggage.

Pearl Millet in 2008/09

Three different planting dates in the 2008/09 season are shown in Table 6. The total rainfall for this season was 732 mm, which was much lower than the previous season.

Monthly defoliation:

The results in Table 6 represent a monthly (four weekly) defoliation treatment of material established on the three planting dates. The first cut, for each planting date, was done four weeks after establishment (post-planting). The impact of the lower rainfall is clearly visible in Table 6, compared to the results in Table 5.

.From the results in Table 6 it is clear that establishment date did not influence DM production of material defoliated four weekly. Different cultivars did not differ significantly from each other also.

The initial production (4 weeks post-planting) of Hypearl millet and Milkstar were just above 500 kg/ha. The re-growth of these two cultivars increased to a potential 2.1 t/ha and 2.1 t/ha respectively, in January. After which it declined and ended below 1 t/ha in March. Common babala and Nutrifeed started with 0.4 t/ha and 0.9 t/ha respectively in December and re-growth increased to 1.8 t/ha and 2.1 t/ha respectively in February, but ended both with 0.84 t/ha in March. The production of Speedfeed was 0.53 t/ha in December, with a gradual increase to 1.75 t/ha to the end of January, after which it declined to 0.5 t/ha in March.

Establishment in December 2008 resulted in a low initial production, of less than 500 kg/ha, for all five cultivars (Fig. 6). After that a high re-growth rate was measured towards the middle of February, when it peaked at 3.4 t/ha for Hypearl millet; 2.75 t/ha for Nutrifeed; 2.45 t/ha for Common babala; 2.4 t/ha for Milkstar and 2.25 t/ha for Speedfeed. After February the re-growth of all cultivars declined. Milkstar showed the highest regrowth in March with 1.4 t/ha, while the rest were at 1.0 t/ha and lower The re-growth of Nutrifeed and Speedfeed improved again towards April and ended with 1.5 t/ha and 1.3 t/ha respectively.

Figure 7 shows the DM production of all cultivars at the soft dough stage (typical silage stage). This stage was reached on 10 March 2009 for the November and December planting dates (PD 1 and 2) and on 7 April 2009 for the January planting (PD 3).

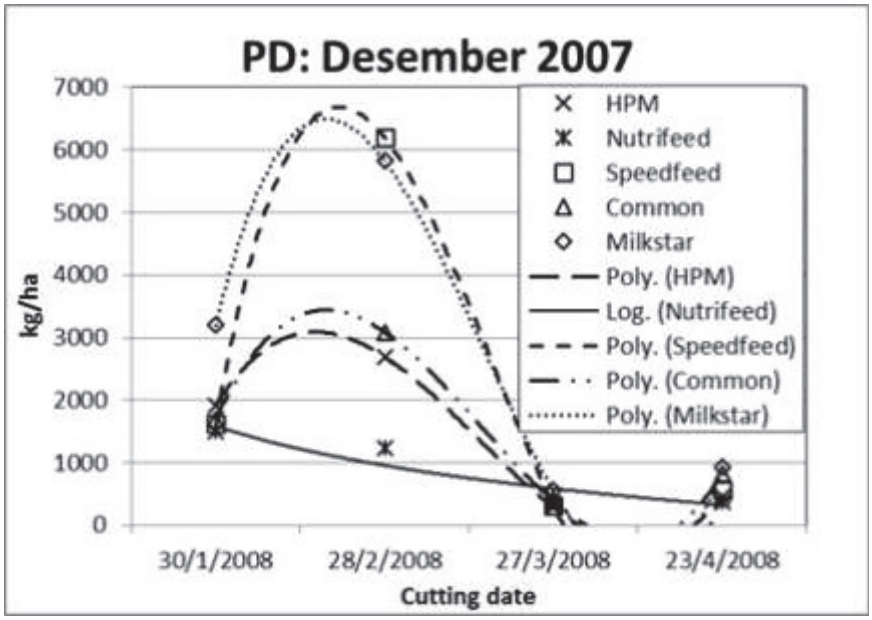

Figure 3: Dry material (DM) production of pearl millet cultivars, planted December 2007 and defoliated every four weeks.

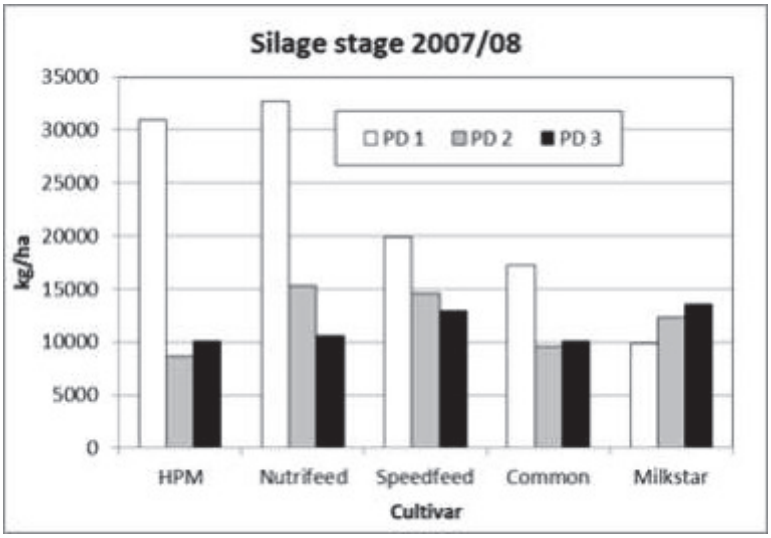

Figure 4: Dry material (DM) production of pearl millet cultivars planted on three different dates (2007/08) and cut at the silage stage.

Cultivar	Planting date		
	19/11/2008	19/12/2008	14/1/2009
Nutrifeed	5.54a	5.16a	5.56a
HPM	5.02a	5.28a	5.56a
Milkstar	4.81a	4.91a	4.37a
Speedfeed	4.21a	4.72a	4.41a
Common babala	4.33a	4.54a	4.32a
LSD	1.93	1.64	1.68

Table 6: The effect of planting date on the total DM production (t/ha) of different pearl millet cultivars which were defoliated every four weeks in 2008/09

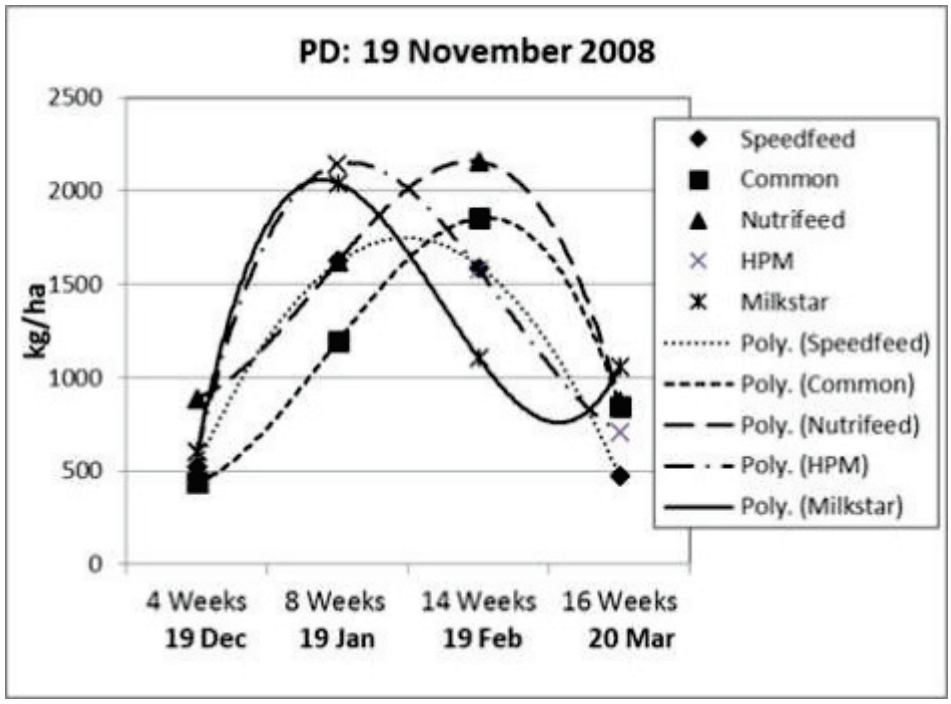

Figure 5: Dry material (DM) production of pearl millet cultivars, planted November 2008 and defoliated every four weeks.

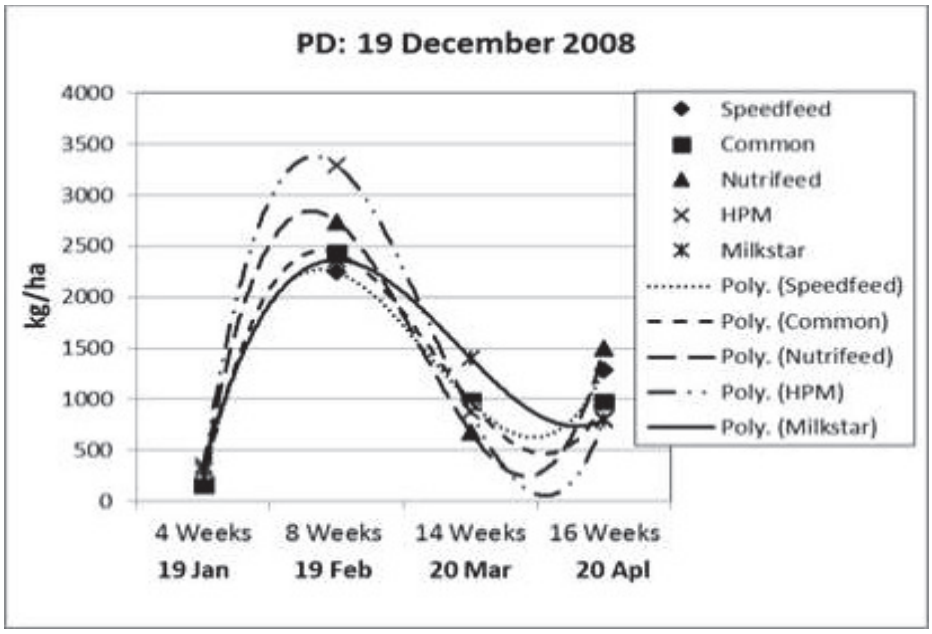

Figure 6: Dry material (DM) production of pearl millet cultivars, planted December 2008 and defoliated every four weeks.

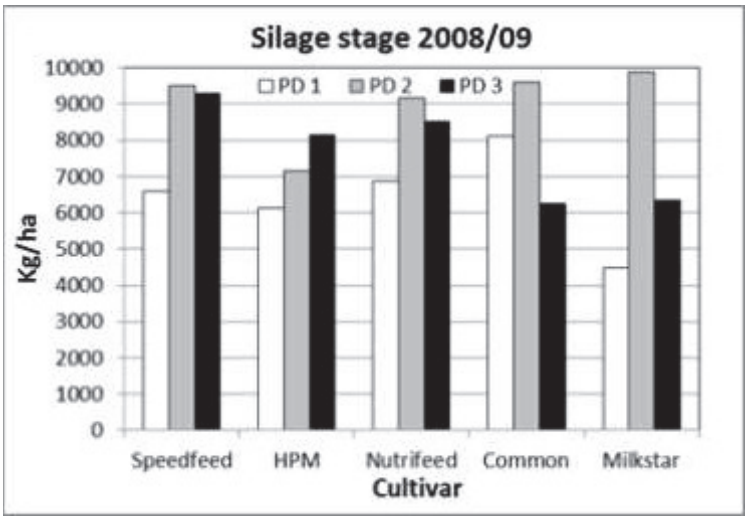

Figure 7: Dry material (DM) production of pearl millet cultivars planted on three different dates (2008/09) and cut at the silage stage

Planted in November 2008 (PD 1) Common babala and Nutrifeed showed the highest DM production potential to be ensiled (more than 6.9 t/ha), followed by Speedfeed and Hypearl millet (more than 6.0 t/ha). Speedfeed, Nutifeed Common babala and Milkstar all produced more than 9 t/ha, when planted in December, and are all good candidates for ensiling. Planting as late as January Speedfeed, Hypearl millet and Nutrifeed can produce more than 8 t/ha for ensiling. Under these conditions the same cultivars can also be used as foggage.

Conclusions

Forage Sorghum

Of all the cultivars tested in this study Jumbo and Kow Kandy (both sorghum x sudan hybrids) produced the highest, followed by Revolution BMR and Sweet Kandy BMR, if defoliated monthly. These values varied between 10.00 and 15.5 t/ha, in a season with 356.8 mm with strategic supplementary irrigation in dry periods. During the same season, without irrigation, the following production values were measured: Sugargraze (7.6 t/ha); Kow Kandy (7.4 t/ha); Kow Kandy BMR (5.7 t/ha) and Sweet Kandy BMR with 5.0 t/ha. There was a tendency that the BMR cultivars produced less than the other cultivars. Gerber et al. (2006) reported production values of 4.9 to 7.6 t/ha for forage sorghum tested on the Outeniqua Experimental farm (Western Cape), with a LTA rainfall of 728 mm/year. The higher production at Dewageningsdrift (Gauteng), with a lower rainfall for the specific season, can be explained by the well distributed rainfall, which was 104 mm, 80 mm and 61 mm for December, January and February respectively.

The average production of forage sorghum cultivars planted in December was 10.7 t/ha. It dropped to 5.8 t/ha when established in January and to 2.0 t/ha when established in February.

Recent qualitative results of silage, made in small plastic containers, showed that forage sorghum and pearl millet compared well with maize as silage crops. Forage sorghum cultivars which showed high production potential as silage crops were Jumbo, Sugargraze, Kow Kandy BMR and Kow Kandy (21.1 to 26.9 t/ha).

Pearl Millet

In a high rainfall season (1218 mmyear) pearl millet can produce as high as 12.9 t/ha when it is defoliated frequently (4 weekly). The highest producers under these conditions were Milkstar, Speedfeed Hypearl millet and even Common babala.

The re-growth distribution during a wet growing season differed between cultivars. Milkstar and Common babala produced higher in December and January than in February and March (early season cultivars). Speedfeed and Nutrifeed did not show a specific production peak, but showed a gradual decline in production over time (full season cultivars). Hypearl millet started slow, but production peaked late February and March (late season cultivar).
Pearl millet grown out to the soft dough stage can be cut for hay, can be ensiled or can be grown out for foggage. Planted in November, Nutrifeed produced the highest at this stage, followed by Hypearl millet. If planted in December Nutrifeed and Speedfeed produced the highest, at this stage, while Milkstar and Speedfeed did the best when planted in January.

In a lower rainfall (732 mm) season the pearl millet production values varied between 4.3 and 5.56 t/ha, if defoliated monthly. There was no significant difference in production between different cultivars and planting dates. During this season Milkstar and Hypearl millet were the early production cultivars, while Nurtifeed and Common babala started slower, with a production peak in February/March. Speedfeed peaked in the middle of the growing season (end January). Robertson, Botha & Gerber (2009) reported a production of 8387 kg/ha for Hypearl millet tested on the Outeniqua Experimental farm (Western Cape), with a LTA rainfall of 728 mm/year.

If grown out to the soft dough stage (for ensiling or hay or foggage), in the low rainfall season, establishment in December (PD 2) seemed to be the best for maximum production of higher than 9000 kg/ha.

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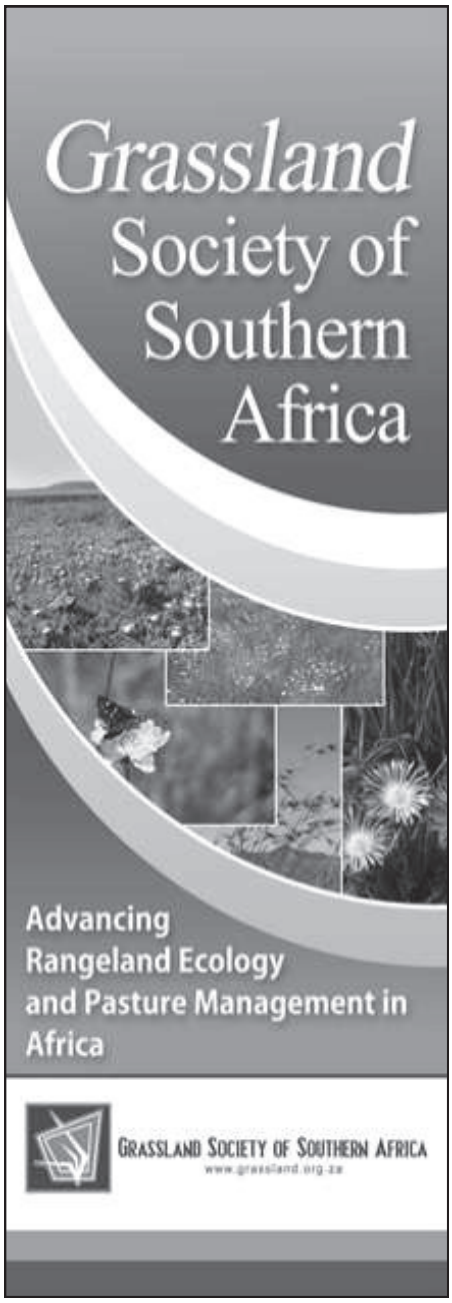

Washing Roots does not Necessarily Remove Sand Implications for Pot Experiments

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In biological research it is often necessary to estimate the root mass of plants. When roots are grown in some sort of soil, it is necessary to removed clay, silt, and sand particles from roots once they are uprooted. This is often done by washing, carefully massaging out the earth from between the roots, while taking care to minimize the loss of root material. This approach works on the basic assumptions that a) any soil particles are on the outside of the roots, and b) these particles can be removed by washing.

An experiment on the response of the grass *Themeda triandra* to nitrogen, phosphorous, and potassium fertilization provided a useful opportunity to address the hypothesis that washing does not remove all sand attached to roots. *T. triandra* plants were grown in 500 ml pots for 6 months in washed river sand. This medium was chosen because it was relatively nutrient-free, and because sand is presumably easy to wash from plant roots. Plants were then removed from the pots, and separated into root and shoot fractions. A tussock grass plant consists of a number of tillers tightly to loosely joined at their bases, above whorls of seminal and adventitious roots (Briske 1991).

Structurally, owing to the way the bases of the tillers are joined, it might appear that a grass plant has three sections: the leaves, a hard, almost woody base (or crown), and the roots, possibly leaving one with the dilemma of whether to cut the leaves off the root + base or the roots off the leaves + base.

The latter is the correct option if true roots are to be separated, and was the procedure used here. The roots, which were often pot-bound and filled the entire volume of the pot, were carefully and thoroughly washed, and the shoot and root fractions were dried at 60°C for 48 hours and weighed. The roots were then incinerated (ashed) at 600°C in a kiln, and the residue was weighed.

Amount of Sand in the Root Samples

The average proportion of residue in the root samples was 40.3% ± 16.0 SD, with a range from 6.70 to 74.8%. There was a significant postitive relation between root mass and residue mass ($_{F1,83}$ = 44.9, $P < 0.0001$, $R^2dj = 34.3\%$), indicating that the larger the root mass, the more residue it holds.

The relation between root mass and the proportion of residue was not significant ($F_{1,83}$ = 1.40, P = 0.23, R^2dj = 0.47%), indicating that the proportion of residue that is attached to the roots is constant from small to large roots. The residue was not chemically analysed, but certainly had the appearance of the sand in which the plants were grown, along with a small amount of grey ash. Samples were washed to remove soluble salts and re-weighed, revealing that on average 93.8% of the residue was insoluble, presumably comprising sand and silica.

Sand and Silica in and on Plants

The presence of silica in plants, especially grasses, has been well documented (see O'Reagain and Mentis 1989), and its role as an anti-herbivore defense mechanism has been suggested. McNaughton et al (1985) argued that grasses accrue silica as a defense to large mammalian herbivores in the Serengeti. In their study the silica contents of leaf blades and sheaths of laboratory-grown grasses were 2.7 and 3.7% respectively, while roots, which had been washed in water to remove soil, had silica contents of 11.3%. Curiously, above-ground leaf litter had the highest silica content – 12.8% - which is higher than for any other part of the plant. This seems impossible (how does a plant accrue silica once it is dead?), but a possible explanation is that exogenous dust and grit accumulate on fallen material, thereby increasing its silica content. McNaughton et al (1985) did use electron microscopy to determine that the insoluble ashed material was indeed silica, but did not explicitly test whether it was plant- or soil-derived. Sanson et al (2007), while indicating that silica is not, in fact, harder than tooth enamel, noted also that dust and grit are a likely source of silica in the forage of animals.

Implications

The results from this single study indicate that conventional root-washing methods may not be a satisfactory way of removing sand from roots (e.g. Ghebrehiwot et al (2006) used a hose and a bucket of water to wash sand from *T. triandra* roots). One way around the problem was given by Badgery et al (2005), where the problem of recalcitrant soil in root samples was addressed by ashing a subsample of the population of roots with which they were dealing, and using a linear regression between root + soil weight vs. residual soil to correct root weights of the remaining values. They found that the amount of sand was directly related to plant size, but did not give the results of the regression, or whether they felt that it was suitably accurate for use as a correction factor.

While this is certainly a move toward addressing the problem, the results from the current study suggest that it is not good enough. Although there was a significant relation between sand mass and root mass, the predictive capacity of the model is relatively low (34%). The recommendation, therefore, is to always ash root samples after they have been dried and weighed to account for trapped sand particles.

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African Environments: What is Social-Ecological Resilience and how might we achieve it?

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Thirty-two people met for a small but lively workshop in Oxford on Friday 14 December 2012 to explore the usefulness of the concept of 'Social-Ecological Resilience' (SER) especially as applied to African Environments. The workshop was organised by Andrew Ainslie and Kate Hill, of the Department of Social Sciences at OBU, with sponsorship from Oxford Brookes University (OBU) and the BioSocial Society. Invited speakers and discussants came from the UK, the Netherlands, Denmark and Zimbabwe, while the workshop attracted participants from a number of other UK universities, including University College London, Oxford University, Coventry University, as well as the Universities of Leeds, Kent, and Southampton.

Drawing on a Concept Note that was circulated to presenters prior to the workshop (Ainslie n.d.), Andrew Ainslie introduced the rationale for the workshop and outlined the main themes for the day's discussions. He pointed out that over the past decade, the concept of 'resilience' has moved centre-stage, becoming a buzzword and across a wide range of disciplines, sectors and institutional stakeholders. Holling's original definition of resilience as the "measure of the persistence of systems and of their ability to absorb change and disturbance and still maintain the same relationships between populations or state variables" (Holling 1973:14, cited in Folke 2006), has since been applied to a bewildering range of contexts, including those at the intersection of ecological and social systems, hence the term 'Social-Ecological Resilience'.

The first of many points of criticism raised was that 'resilience' is not always or self-evidently a desirable condition, as a system that is, for example, severely degraded can also be a resilient system. Moreover, although Social-Ecological Systems are said to exhibit 'emergent' properties through the interactions of the natural and social components, there is still no shared understanding of the dynamic and complex nature of social and ecological system linkages or interactions. Béné et al (2012: 21) suggest a 'resilience framework' that incorporates what for them are the three different facets of resilience, i.e. 'absorptive coping capacity', 'adaptive capacity' and 'transformative capacity'.

Furthermore, in his 2011 address to the Resilience Alliance conference in Tempe, Arizona, Brian Walker suggests that social-ecological systems are complex at a range of scales and levels and that increasing resilience at one scale can lead to a reduction of resilience at another scale.

When applied to African environments that exhibit high levels of social, economic, political and ecological variability over time and space, the analytical value and indeed practical usefulness of the concept of Social-Ecological Resilience is seen as, at best contentious. Nevertheless, the six presenters valiantly attempted to apply (critically, it must be said) the concepts to their individual case-studies. Most of these case-studies are sites in which the presenters and their research colleagues have engaged in long-term social and ecological research, sometimes over several decades. Thus it was hoped that their fine-grained understandings of change in these systems over the long-term would enable them to grapple with the conceptual tools provided by Social Ecological Resilience and further developed in the burgeoning academic literature in this broad area. Dr. Malcolm Hudson (University of Southampton, UK) delivered a paper on the conservation of Northern Kenyan Rangelands in which he argued that methods matter when measuring the effectiveness of resource management practices. With quasi-experimental design and controls, it is possible to reliably measure effectiveness of interventions or different governance situations, but such approaches should sit alongside detailed case studies to capture spatial variation, and broader meaning and context.

Prof. Bram Büscher (Institute of Social Studies at Erasmus University, the Netherlands) presented a paper on the politics of neoliberal conservation paradigms in southern Africa. Given that the construction of Social-Ecological Systems (SES) happens within particular political economic contexts, he asked, who defines which system with what objectives in mind? Büscher went on to point out that the actors within an SES have different ideas about the SES (contested boundaries, meanings and modes of operationalisation). The concept of resilience assumes that something (a 'system') is resilient in relation to something else, rather than thinking about social processes as dynamic interactions that continuously produce new constellations, balances and imbalances, structures and agencies.

Dr. Clifford Mabhena (National University of Science and Technology in Bulawayo, Zimbabwe) delivered a paper that considered the impact of the Fast Track Land Reform and Resettlement programme on livestock production in Southern Matabeleland. The redistribution of land as an end in itself rather than a focus on the creation of viable rural livelihood options for rural people has led to a collapse in the rural sector, especially in relation to the pastoral economy. Mabhena concluded that a resettlement model focussing on decongesting communal areas in respect of livestock has the potential of creating a more vibrant livestock economy in this region than the redistribution of land, ostensibly for the purposes of arable production.

Prof. Melissa Leach (University of Sussex, UK) presented a paper on the land investments and land grabs in the search for resilient pathways in rural Sierra Leone. In relation to resilience, she urged the posing of three key questions, (i) resilience of what, for whom? (ii) resilience of structures or functions? (iii) whose framing of system, change, goals? She suggested that a 'pathways' approach to understanding social and ecological change may be more instructive, so that the following crucial questions could be posed: What pathways of change are underway? What are the consequences for resilience/ transformation of which aspects of the system? Who does this matter to and why? What alternative pathways are possible?

Prof. Anette Reenberg (University of Copenhagen, Denmark) delivered a paper on land use and natural resource management in the Sahel, in which she considered the usefulness of a resilience framework in understanding this dynamic system. She argued that as a concept 'resilience' sounds compelling but often lacks specificity and accuracy, not least in terms of what constitutes an appropriate time-step for assessing both social and ecological changes. Among many other telling observations, she noted that it may be that the problem is not to increase resilience, but to increase transformability in order to enable a transformation from the current type of system to some other kind of system. This may entail changing the ways people make a living, developing new 'goods and services' and operating at different scales.

Prof. Katherine Homewood (University College London, UK) drew on her long-standing research in Maasailand, the vast region that straddles the border between Tanzania and Kenya, to contrast the production system resilience with pastoralist system vulnerability. She started by considering why one would bother to assess resilience, i.e. what new perspectives did the concept offer? She then asked how would one measure resilience in pastoralist systems. She considered the implications of scale and noted that pastoralism remains amazingly resilient at the local, regional and the historical scales, but it is in 'zooming out' that the vulnerability of the system to changes at the global, political and economic scales is revealed.

Before Kate Hill offered her concluding remarks and thanks, two discussants, Dr. Alex Arnall (University of Reading), and Dr. Deborah Bryceson (University of Glasgow), skillfully drew together and contrasted some of key themes from the background paper and the six presentations. They also highlighted several of the more significant points of discussion that had emerged during the day. Arnall pointed out that prioritising resilience can entrench social and economic inequalities. Brcyeson questioned whether the resilience literature really anything new in these debates beyond the new terminology and whether enough attention was being paid to cultural contexts and to economics, particularly at the level of livelihoods, and with regard to the displacement of labour and more recently the displacement of land.

The plan now is to draw together several of the presentations/papers and other cognate papers for publication in a special issue of an appropriate journal and/or edited collection.

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Grass Cutting

This has been the most used alternative usage for cleaning up farm roads, keeping the weeds down between crops, around sensitive areas like orchads and for the edge of roads on highways and roads where conventional brushcutters are normally used.

The cutting speed is usually done in top gear which is 2km/hr.

Grass Road Cutting

This is usually done with the 1.7m bar since the grass is generally not as thick or tough and is done regularly. The 1.7m bar is not advised for very dense material or where a high maneuverability is required.

Road Maintenance on the Verge

The cleaning up on the side of the roads is traditionally done with a gyro-mower behind a tractor, by brushcutters similar to the STIHL or manually using a slasher. These all have limitations that include a high horse power requirement, dangerous due to high speeds and throwing stones into traffic, and is a manual intensive job if doing it by hand.

The CaneThumper® fitted with the 1.35m grass bar is perfectly suited for this. It is resistant to bottles, rocks or other foreign matter, is safe and uses only 0.5 litres of diesel an hour.