Tropical Grassland Society of Australia Inc.

TGS news & views

about pasture development in the tropics and subtropics

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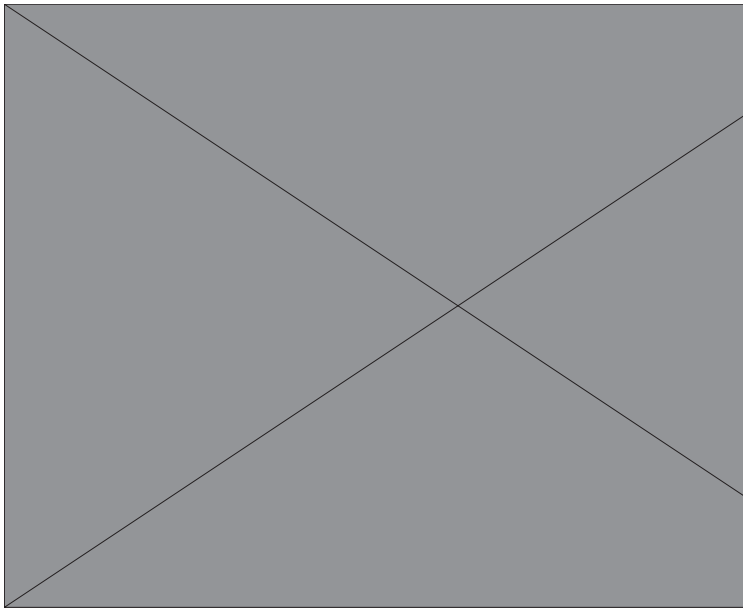
Turfgrasses for salty soils

In 2003, we held our AGM at Redlands and were introduced to the turfgrass work being carried out there by Dr Don Loch. In 2003, the program was only a couple of years old but there was an impressive array of turfgrasses of different attributes covering surface texture, shade tolerance and salt-tolerance. The report in News and Views was headed 'Mighty turf at Redlands'.

Our visit three years later shows that things at Redlands are no longer 'mighty tough' but mighty impressive.

On the infrastructure side, the research station has undergone a $ 3 million expansion and upgrade with a subtitle of 'Australian Centre for Lifestyle Horticulture'. Whether or not lifestyle horticulture involved in the production of non-food horticulture products, such as ornamental plants, cut flowers and turf can be termed a primary industry ignores the reality that most urban dwellers take food production for granted and would rather spend their money and time on life's luxuries. And why not? Even graziers and their families like to have attractive gardens as a barrier against the heat, dust and flies beyond the garden fence.

As we have mentioned in previous newsletters, the turf industry for amenity and sports fields is expanding exponentially and the Queensland Department of Primary Industries is right in there with some impressive work and some impressive clients.



Attendees at the AGM inspect the ornamental Korean lawngrass (Zoysia tenuifolia) at Redlands.

Those of you interested in more information can ask the Redlands Research Station for a copy of their little booklet 'Overview of turf research at Queensland's Redlands Research Station' (phone (07) 32861488). The full range of work of this new program includes genetic improvement, breeding, DNA profiling, the turfgrass collection and commercial services.

This newsletter carries an article on the search into salt-tolerant turf grasses and shows how salt-scalded foreshore parkland—such as visitors to the AGM in 2003 saw at Rabi Bay—can be transformed into verdant turf.

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Society News

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Making the Journal archive

We have now completed archiving past issues of Tropical Grasslands for the Internet. Under this AusAID project, we have put issues back to 1980 as searchable pdfs available to the world at no charge. This is because Aus AID recognised that our journal is the major resource for forages in the developing countries, and while the richer universities can subscribe to abstracting services like CABI, many others cannot afford it.

These archives are in a variety of forms. More recent issues will be totally searchable pdf files but earlier issues will have searchable titles and abstracts as pdfs but the main paper have to be as images. Basically the key words are usually in the title or abstract while the text images can be read on the screen or printed.

Issues 1 to13 (1967 - 1969) are available as titles only so that the titles are searchable. If the paper content is wanted, it will have to be ordered from a library service.

Issues for the previous year are available only to journal subscribers.

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The Tropical Grassland Society of Australia Inc.
Income and expenditure statement
For the year ended 30th September 2005

2004		2005
Income		
6265.50	Book sales	1802.00
11510.16	ILRI	
80.00	Field day	
310.12	Interest	314.54
1576.04	Interest – CMA	962.94
	AusAID	11000.00
16454.11	Journals	19044.80
14952.34	Membership	14948.73
	Sundry income	15.00
2332.99	Reprints	468.56
53481.26	**Total income**	**48556.57**
Expenditure		
495.00	Audit	420.00
35375.24	Journals	37905.66
91.60	Books	261.65
826.76	Bank charges	812.46
	Insurance	563.20
	Internet	269.70
6201.00	Movement in book stock	648.00
4650.80	Newsletter	7750.00
411.81	Petty cash	400.00
37.45	Postage – books	128.12
1199.40	Postage – newsletters	1093.66
4175.37	Postage – journals	3890.25
1470.93	Postage – general	33.20
	Reprints	932.80
7660.00	Wages	7920.00
34.20	Dept Fair Trading	35.10
451.50	Sundries	310.40
63081.06	**Total expenditure**	**63374.20**
($9599.80)	**Excess over income**	**($14817.63)**
Current Assets		
17913.22	Commonwealth Cheque Ac	12660.06
44297.18	CBA Cash Management Ac	4210.12
7937.58	CBA Term Deposit	38198.33
608.00	Petty cash	621.00
7588.00	Books Stock	6940.00
78343.98		**62629.51**

The sad financial state of the Society can be seen from the statement above. Our reserves are going backwards at a rate that gives us only another 3 or 4 years of existence. This is a story that we have had to tell for a number of years Part of this is due to a decline in the number of pasture scientists in Australia, but this also seems to be feature of some other agricultural societies. Another factor is the explosion in the number of new and specialised journals that seem to get published each year.

The Executive will be considering our amalgamation with another society in similar straits but we need to remain relevant to the tropics and subtropics and also to developing countries which are now some of our keenest supporters. We will report on this

New TGS Fellows

David McKittrick Orr

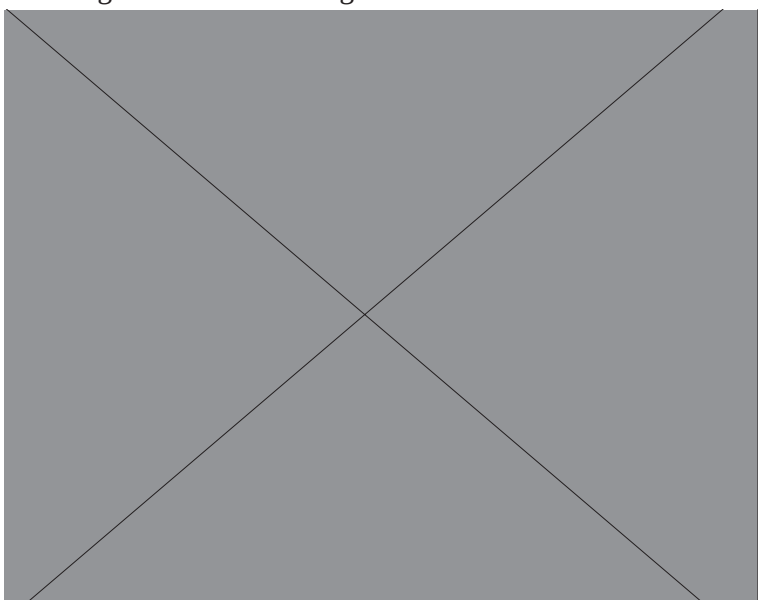
David Orr has made a major contribution to research in the sustainable grazing management of Queensland's extensive native pasture communities. He has developed and refined a novel approach to the study of pasture communities by understanding the ecology of individual plants and plant species within the pasture community. This research highlights the importance of maintaining palatable perennial grasses in the face of highly variable rainfall and grazing pressure as the cornerstone to sustainable grazing management.

Mitchell grass management

David graduated from the University of Queensland in 1971 with a major in pasture agronomy. In 1972, he joined the Queensland Department of Primary Industries as an agrostologist based in Blackall where he was responsible for the development of sustainable grazing management of *Astrebla* (Mitchell grass) pastures. He also conducted pasture extension throughout central western Queensland.

Mulga grassland

David transferred to Charleville in 1977 where he joined the highly respected research team at the Charleville Pastoral Laboratory. He further developed his *Astrebla* grassland research and expanded this into the management of perennial grasses in *Acacia aneura* (mulga) communities of south-west Queensland. David was awarded both Masters and Ph.D. degrees from the University of Queensland for his innovative research into the grazing management of *Astrebla* grasslands in Australia.



Dr David Orr receives his Fellowship plaque from out-going President Peter Larsen.

Burning black speargrass

In 1986, David transferred to Brian Pastures Research Station at Gayndah where he started his work in the grazing ecology of *Heteropogon contortus* (black speargrass) pastures. This research highlighted the role of fire in maintaining desirable pastures and how fire can be used to restore pasture composition. Because of his expertise in perennial grass dynamics, in 1988, David was invited to join two teams –with DPI and with CSIRO – researching the dynamics of *Heteropogon contortus* under grazing in native pastures and those oversown with legumes in southern and central Queensland.

Perennial grass dynamics

David is currently based in Rockhampton where he continues his perennial grass dynamics in a range of pasture communities in Queensland. He has developed a particular interest in the dynamics of introduced legumes which have been oversown into native pastures. In 1996, David conducted a review of the role of *Stylosanthes* in the stability and management in pastures in northern Australia.

David has an outstanding publication record with over 70 scientific papers presented both in refereed journal and contributions to international and national conferences. His earliest publication (1975) in Tropical Grasslands, "A review of Astrebla (Mitchell grass) pastures in Australia" remains the definitive, introductory source of information for this valuable pasture community. David has been an active member of the Tropical Grassland Society of Australia for over three decades, serving on the Society's Executive Committee for four years and as President in 2002 and again in 2003.

David is also active in other scientific organisations including the Australian Rangeland Society and the Australian Institute of Agricultural Science (CQ Sub-branch Treasurer, 2001-02), and is an Honorary Fellow of the Plant Sciences Group at Central Queensland University.

David's significant contribution has been to the understanding of management practices in preserving the integrity, and optimising the productivity, of the vast resource of the natural grasslands in northern Australia. Nominated by Ian Partridge, DPI&F Toowoomba

Dr. Albrecht Glatzle

Albrecht Glatzle, born 1951 in Göppingen, Germany, studied Agricultural Biology at the University of Hohenheim, Stuttgart, Germany from 1970-1974.

Botswana

Since developing countries were one of the University's foci both in research and teaching, Albrecht then went to Botswana, work from 1975-1976 in a DED (German Development Service)-FAO-UNDP project as an Assistant Range Ecologist. This was his first contact with tropical and subtropical pastures, an interest and passion that persisted for the next 30 years.

Morocco

In 1977, Albrecht returned to the University of Hohenheim as a Scientific Assistant, while also researching biological nitrogen fixation in the rhizosphere of grasses for his doctoral thseis. As soon as he got his Ph.D. in 1981, he went back to Africa and worked in Morocco as Expert for Forage and Pasture Improvement in a GTZ (German Agency for Technical Cooperation) project until 1985.

Paraguay

During the next four years (1986-1989), Albrecht was again at the University of Hohenheim as a research scientist and lecturer in tropical pasture science at the Institute of Animal Production in the Tropics and Subtropics. In early 1990, he moved to Filadelfia in the Paraguayan Chaco, and has lived there since that time (with an interruption in Germany): From 1990-1997, he was Pasture and Forage Expert in a GTZ R&D project and since 2000 on he has been Technical Director of the private non-profit foundation INTTAS (Iniciativa para la Investigación y Transferencia de Tecnología Agraria Sostenible), in charge of pasture development in the Chaco.

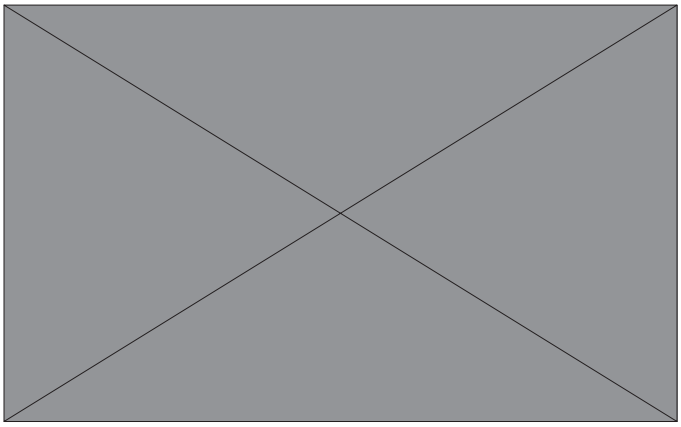
Sustainable production in the Chaco

The common denominator in all of Albrecht's phases of professional life is the development of sustainable pasture and forage production. In this, legumes always played a important role and, as his publication record shows, his interest and engagement in legumes dates back to the early 1980s when he worked in Morroco with medics and subterranean clover for ley-farming.

But it is Albrecht's work in Paraguay during the past 15 years that has been particularly productive in terms of impact on both research and development, addressing sustainable land use by improved, legume-based pastures in the semi-arid, subtropical Chaco region. His impact is not restricted to the Paraguayan Chaco but to the whole Gran Chaco region which also extends over significant portions of Bolivia and Argentina. His work consisted mainly of introduction (in the case of legumes, even including collection of native Chaco species) and systematic evaluation of forage germplasm, forage seed production, and subsequent on-farm grazing experiments. Although grasses played an important role, particular emphasis was on legumes and their introduction on improved pastures. Albrecht did also research on the understanding of native pastures and their vegetation in both the dry and wet portions of the Chaco, and on salinization problems.

Suitable grasses and legumes

As a result of his work in the Chaco, a range of grass species has been identified as suitable for the Chaco, and the use of species such as Gatton panic, *Urochloa mosambicensis*, Callide Rhodes and Bambatsi Makarikari grass is vigorously spreading. Current grass research concentrates on *Digitaria* species. In spite of the success of improved grasses in the region, as a consequence of Albrecht's work it has become common knowledge among graziers that legumes are required for higher livestock productivity and sustainable pasture yields. A number of suitable, persistent and even spreading legumes have been identified in grazing experiments, including Oxley fine-stem stylo, Miles lotononis and an *Alysicarpus vaginalis* accession (CIAT 17360), and, particularly, *Leucaena leucocephala* (cvv. Cunningham and Tarramba). Although there are no statistics available on areas of pasture with these legumes, for the Paraguayan Chaco alone it is estimated that more than 3000 hectaresa of pangola pastures have been improved by herbaceous legume introduction, and that from 2001-2004 leucaena hedgerows were planted on about 5000 hectares of improved pastures.



Albretch Glatzle (left) with his collection of Digitaria species, which must be the largest in the world.

Author and organiser

Albrecht Glatzle has written two text-books on (sub-) tropical pastures, one in German (*Weidewirtschaft in den Tropen und Subtropen*, Stuttgart, Germany, 1990) and one in Spanish (*Compendio para el Manejo de Pasturas en el Chaco*, Asunción, Paraguay, 1999) and that he is author or co-author of about 100 publications such as research papers in scientific journals, contributions in proceedings of national, regional and international congresses and symposia, extension documents, technical reports.

A significant recent event organized by Albrecht and his INTTAS colleagues in March 2005 in Loma Plata, Paraguay, was the *Congreso Internacional de Leucaena y Otras Leguminosas con Potencial para el Gran Chaco*. This presented impressive evidence of the success of legumes, mainly leucaena, in improved Chaco pastures. During the congress, a video on DVD on leucaena (*Leucaena – Forraje potente para el Gran Chaco*) addressing both graziers and extension agents in the Gran Chaco region, was launched.

In summary, Dr. Albrecht Glatzle has rendered outstanding services to subtrop-ical pasture science and development, and is still contributing significantly to the 'legume philosophy' for an eminently important subtropical pasture area, the Gran Chaco.

Rainer Schultze-Kraft
University of Hohenheim
Stuttgart, Germany

Keeping tropical grasses through the cold winters of southern China

Shilin Wen
CAAS Red Soils Research Station, Hunan Province, China

Dwarf elephant grass and an elephant grass hybrid are showing considerable promise as forages for smallholder beef producers in southern China. Although there are large differences in the survival of elephant grass plants over winter due to site, soil fertility or local climate, they can be killed by the cold.

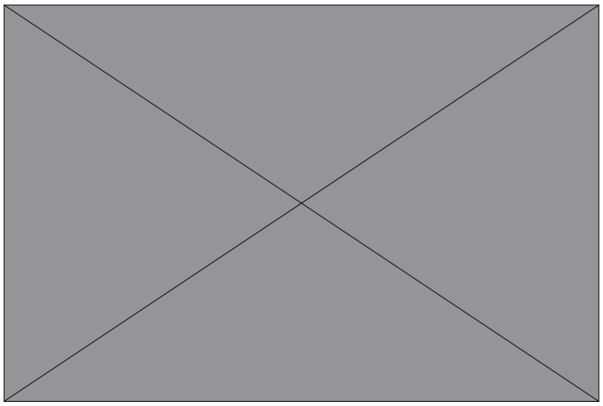
Can covering elephant grass tussocks improve survival?

In a small trial, dwarf elephant grass was cut back to 20 cm before the first frost; some rows were covered with a strip of rice straw 30cm wide and 25 cm high, some covered with soil in the same way, the rest left uncovered.

The winter was colder than normal with three falls of snow, one 20 cm deep. In January, maximum and minimum temperatures were 6.8 and 1.2°C.

When the plants regrew in April, only 10% of the uncovered plants survived compared with 85% of those covered with straw and 95% of those covered with soil.

I have used these treatments in many plantings of elephant grass and survival has been consistently good.



Elephant grass tussocks covered by soil (background) or rice straw (foreground)

Fixing salty scalds on the seashore

Rachel Poulter and Don Loch, DPI&F Cleveland

Tourists visiting coastal towns don't want to look at or sit on patches of bare scalded soil interspersed by tufts of unthrifty grass in the shore-side parks—they and the locals demand attractive soft green lawns.

Urban salinity

Urban salinity is an increasingly serious problem. It is increasing in both the inland towns, such as those in southern New South Wales and in the wheat belt of Western Australia, and in the coastal cities where 85% of the Australian population live, work and spend a major part of their leisure time.

Artificial land fills created by canal development and dredging add another dimension to the normal coastal salinity problems; the usual turfgrasses cannot tolerate the high levels of salt or the low pH of acid-sulphate soils.

We have been investigating these problems in a project supported by Horticulture Australia Ltd and the Redland Sire Council.

Screening all turf species

Finding a salt-tolerant grass is no 'silver bullet' or easy solution to salinity problems, but it does buy time to implement sustainable long-term management practices. We have been investigating best practices for establishment and management of tolerant grasses on saline sites:

Salinity tolerance. We have screened more than 40 cultivars or accessions from 9 species for salt-tolerance in flood-and-drain hydroponic trays and followed this up with field trials.

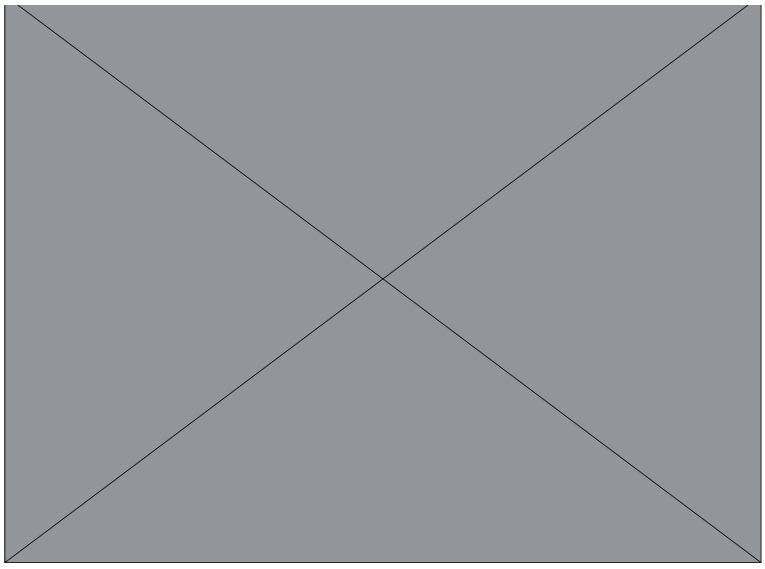
New lines have been tested against our standards of *Paspalum vaginatum* 'Sea Isle 2000', *Cynodon dactylon* FloraTeX™, *Digitaria didactyla* 'Aussieblue' and *Eremochloa ophiuroides* "TifBlair'. The first run focussed on species considered the most salt-tolerant, namely *Distichlis spicata, Paspalum vaginatum, Sporobolus virginicus* and *Zoysia matrella* using salt levels from nil to 75% of sea water. The next run tested *Pennisetum clandestinum* and *Stenotaphrum secundatum*.

Acid soil tolerance. Six cultivars from 5 species have been screened with different liming rates.

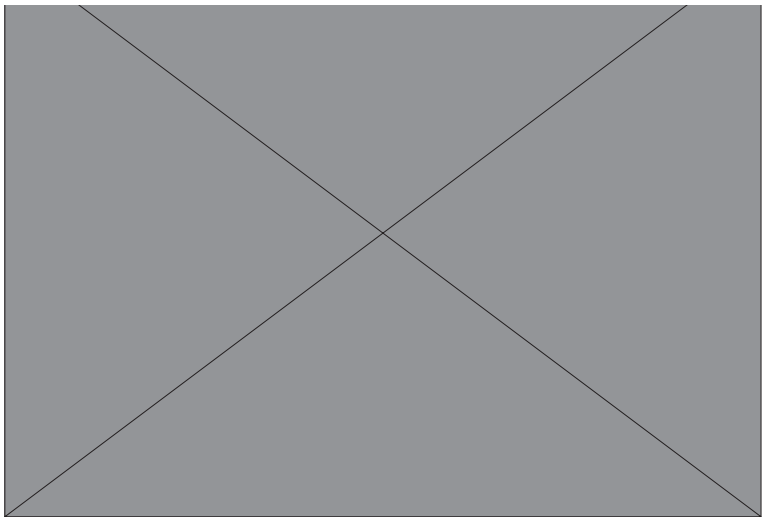
Establishment. We have looked at the effect of adding up to 15 cm of topsoil on the establishment and persistence of 11 cultivars from 8 species, and are looking at how different cultivation machines de-compact the subsoil.

Soil fertility. Field experiments with 6 cultivars from 5 species receiving up to 400 kg N/ha/year to see how much nitrogen is needed for both high profile and lower use park turfs.

We have short-listed four turfgrass species, each adapted to different environments, management regimes and uses, for larger-scale planting.



Wintergreen couch (above) is widely used by councils and homeowners, but was killed at salinity levels >18 dS/m electrical conductivity (one-third seawater level salt), whereas seashore paspalum (below) was stunted but still alive and functioning at 40 dS/m (80% seawater salt).



From moonscape to magic carpet

Visitors to the 2003 AGM may remember visiting the harsh conditions of the Rabi Bay seafront with its scalded patches. These conditions were not unique to Rabi Bay but exist in towns all along the coast of Queensland.

In February 2004, Redland Shire Council established a 0.2 ha demonstration park area of seashore paspalum (*Paspalum vaginatum*) at Birkdale.

Strongly acid and salty

The site was on a compacted marine mud, and was both strongly acid (pH 3.3–4.7 on the surface with the subsoil pH 2.9–4.4) and saline (EC_e 2.8–41.1 dS/m surface, 4.2–46.7 dS/m subsoil).

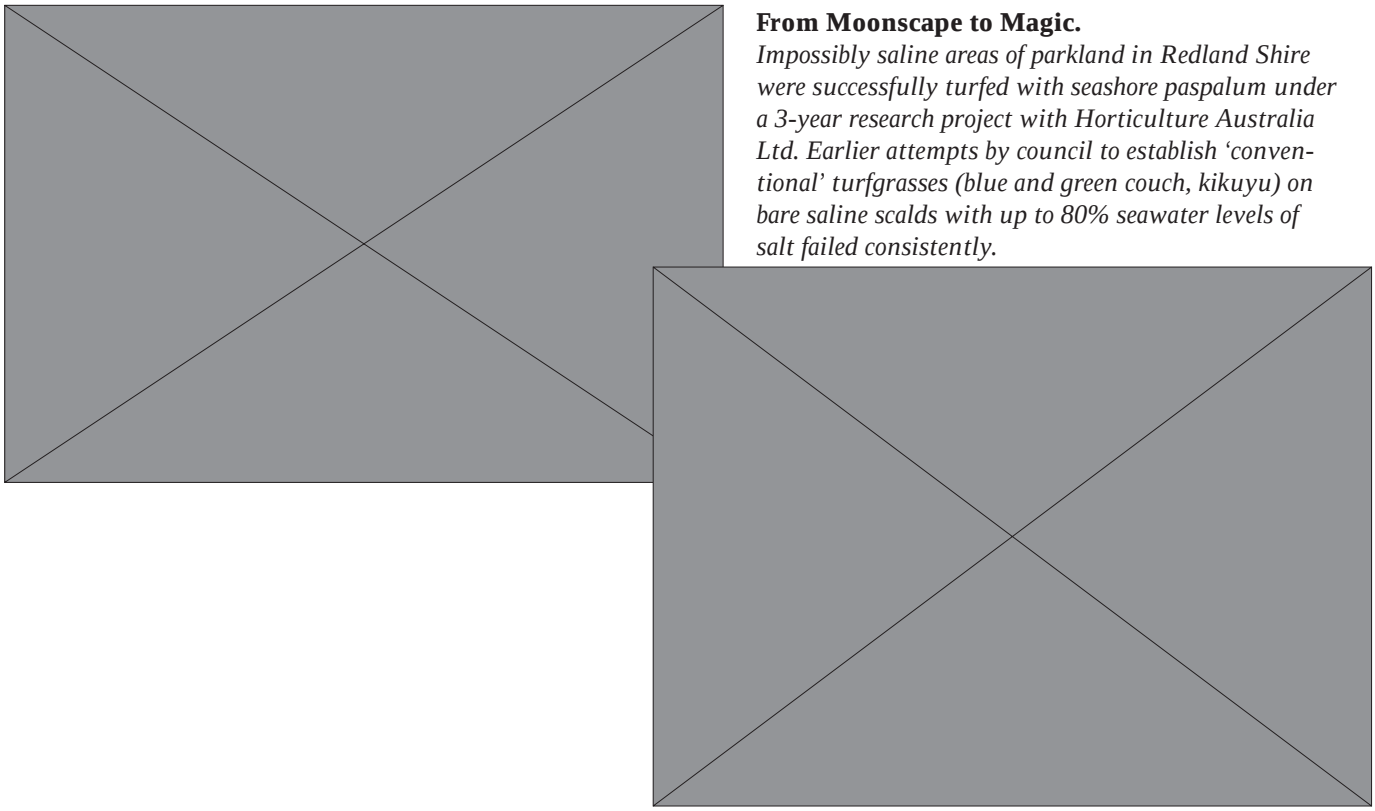
Reconditioned

The ground was sliced to reduce compaction, gypsum applied to improve soil structure and calcium status, 5 cm of sandy loam spread before full-sod turf was laid. The site was then irrigated regularly to flush the salt to below the root zone.

The result is a stable, complete grass cover.

$$ in turf

There's money in grass. The Redland Shire Council has since spent around half a million dollars in successfully turfing other similarly 'impossible' park areas with seashore paspalum.



From Moonscape to Magic.
Impossibly saline areas of parkland in Redland Shire were successfully turfed with seashore paspalum under a 3-year research project with Horticulture Australia Ltd. Earlier attempts by council to establish 'conventional' turfgrasses (blue and green couch, kikuyu) on bare saline scalds with up to 80% seawater levels of salt failed consistently.

Continued from page 9

few well adapted species. Two cultivars, Seca shrubby stylo and Verano Caribbean stylo, have dominated commercial sowings.

Six experiments evaluated, under grazing, 26 legumes in sub-coastal environments and 92 legumes in the harsher inland over 5 generally below average rainfall.

New legumes had some adaptation to a range of soils types. Some cultivars could be further tested under commercial grazing, others may have a future in high quality pastures or used for special purposes, such as for making hay for weaners or the live export trade. Drought conditions can destroy legumes that might be useful under better rainfall conditions. Management considerations for some adapted legumes are suggested. Seca stylo was the most consistently successful plant on light-textured soils, with Milgarra butterfly pea and *Desmanthus* species most persistent on heavy clay soils. None survived under drought conditions on fertile loams soils of the arid zone near Cloncurry.

Practical Abstracts
Tropical Grasslands, Vol. 39, 3 September 2005

Influence of storage conditions on survival and sowing value of seed of tropical pasture grasses. 1. Longevity—by John Hopkinson and Bernie English, on pages 129–139.

The way grass seed is stored commercially will affects its life and sowing value. Seed stored in woven bags in open storage in tropical northern Queensland lost all its viability within three years while that kept in a cool store was little affected. The rates of loss in air-tight packages increased with moisture content at ambient temperatures but were much lower than seed in woven bags. Cool storage temperatures and low seed moisture content appeared to prolong dormancy while freezer storage retained and even intensified it.

2. Sowing value and storage strategies—on pages 140–151.

Seed kept in a cool store at 10ºC and 50%RH mostly had much better sowing value than that stored in the open because its better viability and vigour tended to outweigh its retained dormancy except when dormancy did persist. Lower moisture content in sealed bags helped to preserve viability except when very low moisture content prolonged dormancy. Cold storage intensified dormancy of Gatton panic delaying germination in the greenhouse until the second and third season after sowing.

Forest management innovations, forage development practices and livestock in the hills of Nepal—by N.R. Devkota and Fabrizio Felloni, on pages 152–159.

Deforestation is a serious problem in Nepal. 'Leasehold forestry' is a new approach that promotes the re-growth of degraded forest. Under this scheme, poor families are given a lease over a plot of degraded forest land, which they must protect, in return for using the products derived from the land. Forestry can re-grow quite rapidly (1–2 years) and provide farmers with fodder, firewood and fruits. The leaseholders have also been provided with goats, buffalo and seeds of forage species. Unexpectedly, few farmers are interested in buffalo and most preferred goats which are easier to look after and feed and easier to sell as meat. As a result, numbers of the larger animals have changed little whereas goat numbers have increased dramatically. Traditionally, extension staff have advocated planting a limited number of introduced forages rather than native species, without regarding the local farmers' practical experience. If extension staff discussed issues with poor farmers, they could develop technical solutions that are better adapted to local conditions and at lower costs.

Flood tolerance of *Panicum decompositum*: Effects on seedling biomass—by C.J. Geurts, John Fox, T.M. Luong and Christina Fox, on pages 160–170.

Panicum decompositum is a perennial tussock grass found in the Fortescue Valley floodplain in the Pilbara region of Western Australia, where it is grazed by cattle. Flood tolerance of seedlings of this species was investigated in pot trials with water to soil level for periods of up to 4 weeks at different seedling ages. No seedlings died during the 63 days of the experiment showing the seedlings can stand flooding for up to 4 weeks. However, it reduced growth by as much as 85% especially when flooded at an early age. Ratios of shoot to root were reduced. Flooded plants developed elongated aerenchyma cells in the root cortex; these transport oxygen from the shoots to the roots, and indicate some intrinsic flood tolerance. It is not known yet how well the plants withstand submergence. (Note the journal has two excellent colour photographs of these elongated root cells. Ed.)

Selective herbicide strategies for use in Australian desmanthus seed crops—by Kendrick Cox and K.C. Harrington, on pages 171–181.

Desmanthus is regaining favour as a pasture forage in Queensland, and new varieties have recently been released to complement cv. Marc. Adoption depends on the availability of good and affordable seed. A large number of selective herbicides have been assessed for controlling the wide range of weeds in desmanthus seed crops. Desmanthus can tolerate a number of herbicides which collectively control most weeds encountered in Queensland; these should be used with cultural weed control practices.

Pasture legume adaptation to six environments of the seasonally dry tropics on north Queensland—by Trevor Hall and Bob Walker, on pages 182–196.

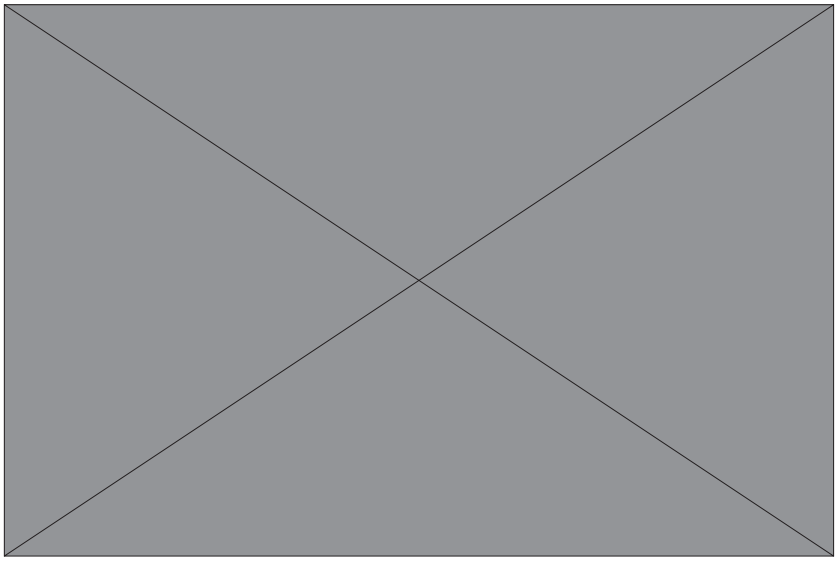
Sown legumes have increased cattle production across northern Queensland but there are

Continued on opposite page ...

Pastures on the Darling Downs

There is an enormous resurgence in planting pastures on the Darling Downs driven by the realisation that there is no fun or profit in repeatedly planting forage crops on old marginal cropping land.

For decades, farmers, especially dairy farmers of the past, have been planting forage sorghums in summer or oats in winter on the sloping foothills. The soils are now thin, the nitrogen levels negligible and the weeds magnificent. Green fields reflect liverseed grass (*Urochloa panicoides*), purple fields represent Mayne's pest (*Verbena tenuisecta*).



The foothills around the Darling Downs. Good soils, some rainfall? and overcultivated for forage crops for decades

Mayne's pretty pest

Mayne's pest also covers the large areas of run-down old pasture land. *Pasture Plants of Southern Inland Queensland* describes Mayne's Pest as 'unpalatable and undesirable… a vigorous coloniser of bare areas …it can dominate overgrazed pastures and choke out more desirable pasture plants…'

Pasture for water quality

The organisation behind this resurgence for permanent pastures is the Condamine Alliance with its Regional Investment Strategy and Natural Resource Strategy. Funded by both federal and state governments, the strategy is to convert the old cropping land to permanent pasture to improve water quality by reducing run-off and sedimentation and by lowering the water tables that bring up salinity.

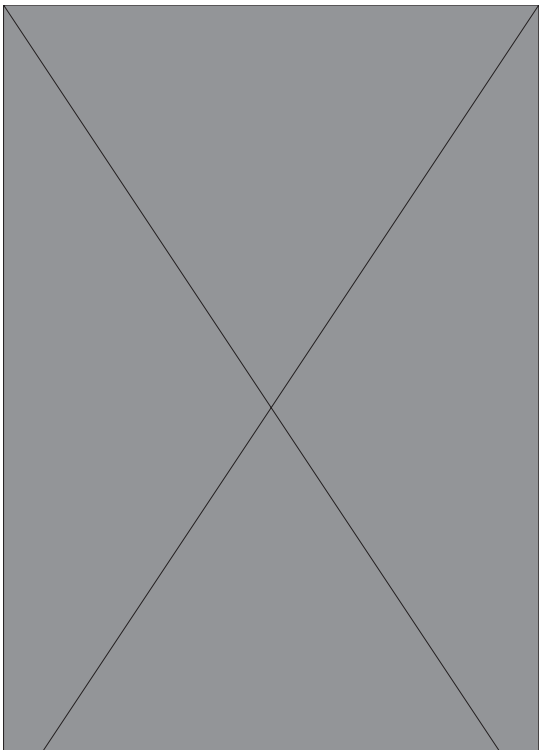
50% off cost of pasture seed

Through five Landcare offices covering the North-east Downs, Brigalow Jimbour Flood Plains, Central Downs, Chinchilla and Millmerran, the strategy is pushed along by funding grants for 50% of the cost of new pasture seed. The response has been enormous and encouraging with the North-east Downs office, for example, receiving more than 60 applications.

Applicants have to submit farm plans on where they will plant and what they do with the new pastures. More importantly, all applicants have to attend a training workshop on grazing land management. George Lambert (ex-DPI Mackay) is now looking after this 'Landscape Change' program for the Condamine Alliance and has produced a training package on Grazing Land Management for the region.

Pasture condition or stock condition

Too many farmers still assess their pastures on the condition of their stock and, in view



George Lambert of Condamine Alliance and Nevin Olm look at Floren bluegrass on the heavy clay soils

of the generally high fertility of the regional soils, most cattle are in good condition. But the pastures are pathetically overgrazed.

Besides the green of liverseed and the purple of Mayne's pest, there are paddocks of white which are probably of hayed off slender chloris—a sure sign of overgrazing. A comparison of these thin weedy pastures with the dark colour of vigorous green panic over the fence in the road reserve shows the potential forgone by poor grazing management.

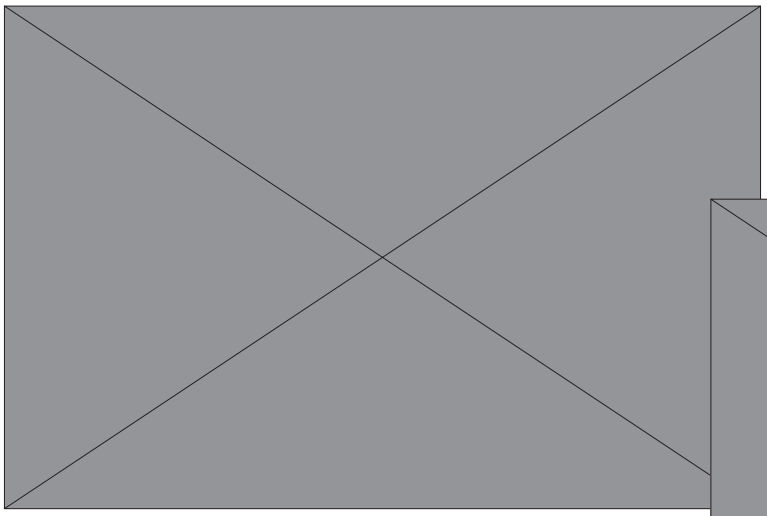
Improved grasses

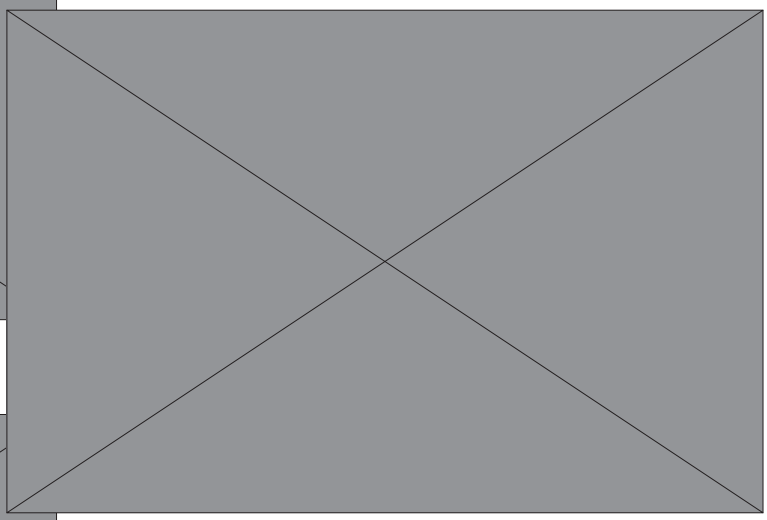
The main grasses being planted are Finecut Rhodes grass, creeping bluegrass (Bisset and sometimes Hatch), Premier Digitaria for the lighter soils with Bambatsi and Floren for the heavier clays—the 'Illing mix' and all seem to be working well.

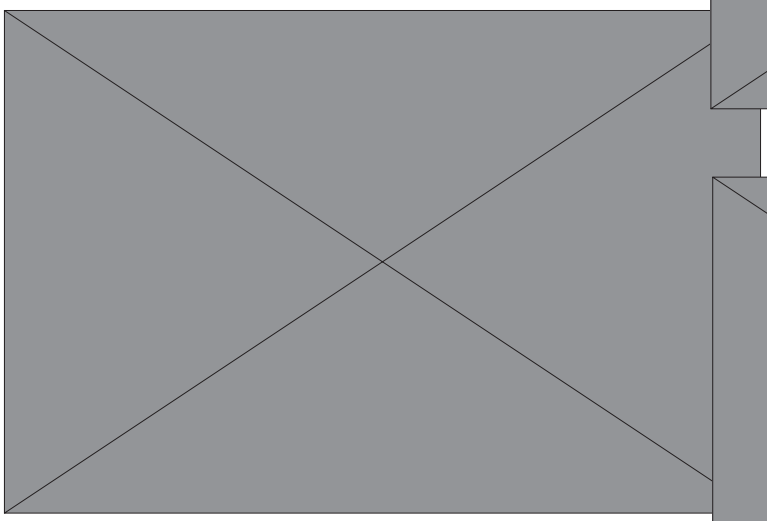
Suitable legumes are a problem with few summer-growing species. Seed of medics and lucerne is cheap but they have to be sown in autumn—often too late for good establishment of the summer grasses. Desmanthus doesn't seem to be have been very productive, lucerne and the ley legumes fail to persist. Leucaena is very productive and long-lived but is too susceptible to frost for much of the lower lying Downs country.

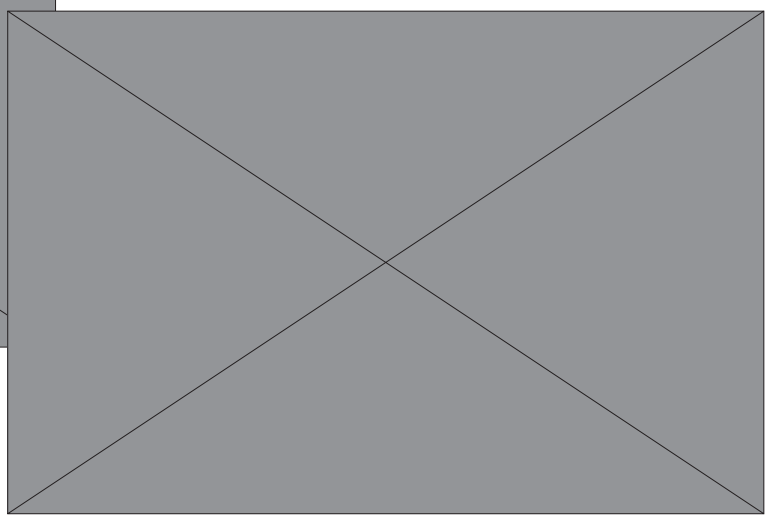
Improved management

I saw several magnificent pasture paddocks that had been recovered from almost bare ground by better grazing management. Resting the paddocks over early summer has given the grasses a chance to strengthen and to set seed, resulting vigorous growth that is smothering many of the broad-leaf weeds.









(Clockwise from left)Paddocks of Bambatsi and purple pigeon grass at Clifton, steers in Bambatsi at Warra, Fine cut Rhodes grass smothering weeds like Mayne's pest.

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