

TGGS news & views

about pasture development in the tropics and subtropics

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International Grasslands Congress

More than 1000 delegates from 80 countries attended the XX International Grasslands Congress (Grasslands — a Global Resource) in Ireland and the UK at the end of June to early July.

The three main themes were:

Efficient production from grassland

– covering forage plant improvement, forage quality for animal nutrition, overcoming seasonality of production, animal-plant relations, grass and forage agronomy and animal production.

Grassland and the environment

– covering climate change, greenhouse gases and carbon sequestration, biodiversity, water resources, soil quality and nutrients, and the multifunctional use of grasslands.

Delivering the benefits from grassland

– covering grassland management, decision support systems for grassland, adoption of new technology, participatory and on-farm research, improved livelihoods from grasslands.

The tropical forage angle

A landmark session was held on advances in sown tropical legumes, in which many success stories from different regions were outlined. These stories were summarised in an excellent presentation by Max Shelton (see some of Max's case studies in this issue starting on page 6).

The new *Tropical Forages* database presented by Bruce Pengelly also got a great reception. Delates from universities in developed and developing countries

who saw it as a resource which would completely change the way forage science is taught. (For a fuller description, check out page 3).

Overheard

“Good to see a change in emphasis towards matters of sustainability, ecosystems and people.”

“—but still an awful lot about nitrogen and rye grass production in the temperate regions.”

Paper weight for air travellers. The 1000-page printed volume of 'Offered papers' is not the easiest system for tracking a reference. Will there be a CD with a search engine attached?

Some raised eyebrows when FAO decided to give away free CDs of their old forage database in spite of contributing to the latest information and technology of the *Tropical Forages* package about to be released at the Congress.

Newsletter editor:
Ian Partridge

Tel: (07) 4688 1375

Fax:(07) 4688 1477

ian.partridge@dpi.qld.gov.au

Society News

Our Internet address — www.tropicalgrasslands.asn.au

Our Society e-mail address is tgs@csiro.au

Making the Journal archive

We are making good progress with archiving past issues of Tropical Grasslands for the Internet. Under this AusAID project, we are putting issues back to 1983 as searchable pdfs available to the world at no charge. This is because Aus AID recognises 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 will be 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. This work is being done under contract with our typesetters, Sun Photoset.

At present, pre-1983 issues will not be archived unless we can persuade AusAID that we have been successful and it is worthwhile. However, I have typed up the titles of the earlier issues so that the titles are searchable. If the paper content is wanted, it will have to be ordered from a library service. These titles are on our web site now.

Your Executive for 2005

President

Peter Larsen
'Cedars Park'
Banana, Qld 4702
Phone and fax: 07 4995 7228
e-mail: leucseeds@dcnet.net.au

Vice President

Kevin Lowe
DPI&F Mutdapilly Research Station
MS 825, Peak Crossing
Ipswich, Qld 4306
Phone: 07 5464 8713
Fax: 07 5467 2124
e-mail: Kevin.Lowe@dpi.qld.gov.au

Past President

Dr Max Shelton
School of Land & Food Science
University of Qld, St Lucia Qld 4072
Phone: 07 3365 3474; Fax: 07 3365 1188
e-mail: m.shelton@mailbox.uq.edu.au

Secretary

Cristine Hall (nee Cox)
CSIRO Sustainable Ecosystems
PO Box 102, Toowoomba Qld 4350
Phone: 07 4688 1569
e-mail: Cristine.Hall@csiro.au

Treasurer

Mark Callow
DPI&F Mutdapilly Research Station
MS 825, Peak Crossing
Qld 4306
Phone: 07 5464 8714
Fax: 07 5467 2124
e-mail: Mark.Callow@dpi.qld.gov.au

Journal Editor

Lyle Winks
44, McNeills Rd
MS 825, Peak Crossing
Qld 4306
Phone: 07 5467 2314
Fax: 07 5467 2314
e-mail: lwinks@jil.com.au

Newsletter Editor

Ian Partridge
DPI&F, PO Box 102
Toowoomba Qld 4350
Phone: 07 4688 1375
Fax: 07 4688 1199
e-mail: Ian.Partridge@dpi.qld.gov.au

Which forage?

— for anywhere, any use in the tropics

Which forages would be best for the local conditions? This is the sort of question that is posed by many advisers in agricultural development. And from where do they get some good suggestions? Experienced pasture researchers and advisers are disappearing fast as they age and retire from active service, and are not being replaced. This is occurring in many countries. Northern Australia was once the home to teams of the most advanced forage researchers. After fantastic early gains in knowledge and productivity and as many of the basic problems were solved, the returns on costs of research have diminished. Funds are devoted to new spheres of agricultural and environmental research. But the same reductions have occurred in other countries, and many experienced pasture agronomists have retired.

So what's a good solution to the problem? Get together those with the most experience and gather their accumulated knowledge in a form that can be used anywhere.

Tropical Forages

The result can be found bound together on one CD, or on the Internet as *Tropical Forages: an interactive selection tool*.

Tropical Forages brings together in one package much of the accumulated information on the adaptation, use and management of tropical and subtropical forage

species. An excellent front, by Lucid, allows the user to check off the local conditions of use, climate, soil and other environmental and management factors to whittle away a big list of species until one is left with a short list of 'best bet' species.

180 fact sheets

From this short list, the user can bring up very comprehensive fact sheets which provide details of all aspects of management while listing the registered cultivars and their strengths. Also listed, where available, are promising accessions of each species—those that were not necessarily selected as the best in the country of evaluation but that might be valuable under different conditions.

Hundreds of pictures

What do the species look like? *Tropical Forages* has hundreds of good quality photographs of close-ups of the plants, seed heads

and seeds, and of the forages being used for their relevant purposes. Each thumbnail image can be zoomed up by clicking on it.

Thousands of references

But there's more! Hundreds of links to other sources of information and further reading, topped up by 7000 references with many abstracts.

Aus plus international partners

This Tropical Forages project has been funded mainly by the Australian Centre for International Agricultural Research but with financial contributions from other countries including Germany and the United Kingdom. It has been a large collaborative effort between many scientific institutions including the Commonwealth Scientific and Industrial Research Organisation, the Queensland Department of Primary Industries and Fisheries in Australia, Centro Internacional de Agricultura Tropical (CIAT) in Columbia, International Livestock Research Institute (ILRI) in Ethiopia and the United Nations Food and Agriculture Organization (FAO), while the Centre for Biological Information Technology at the University of Queensland had developed the Lucid data base.

The examples of screen grabs illustrate how the selection system works.

Making a selection

The system behind the *Tropical Forages* selection is the Lucid database. The front is a really friendly screen that has four frames. The top left frame shows the many features or characteristics that can be selected. Each of the topics can be

opened up to show the options available.

The first and longest list is 'Intended use'.

Here you can nominate how the forage will be used. Is it for a permanent pasture or a ground cover or a hedge row?

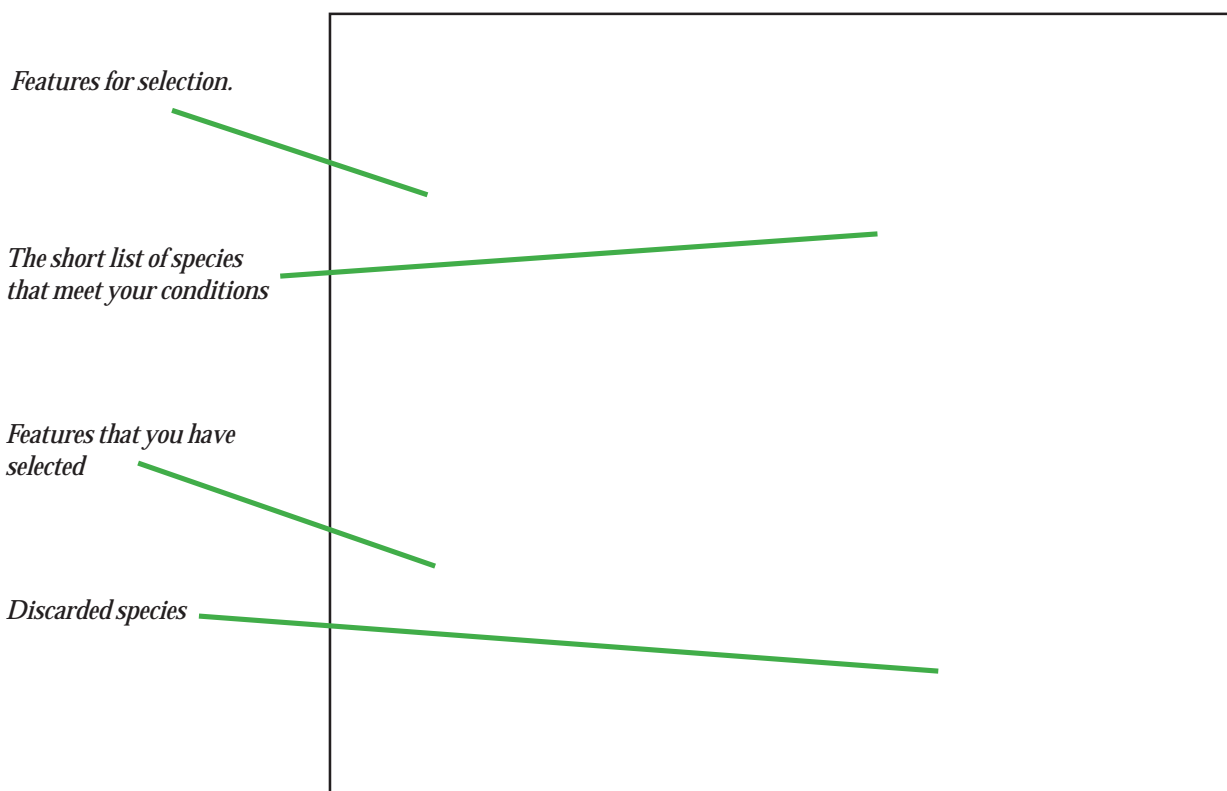
The top right frame lists all the species that meet this criterion. Then as you continue to select more detail about the relevant climate, soil type, tolerance of soil or management conditions, grass or legume, the list on the right gets whittled down

By the end of the selection process, there is a short list of potentially suitable species.

At this stage, you can click on an icon next to the name to bring up a fact sheet about that species.

Tropical Forages holds fact sheets on about 180 forage species. The sheets are often extremely comprehensive, often with almost a review of all that is known about the species, its preferences, tolerances, pest and diseases and productivity, right down to registered cultivars and selections or accessions that have showed or are showing promise somewhere in the world but haven't been released yet.

There are also photographs, and some-

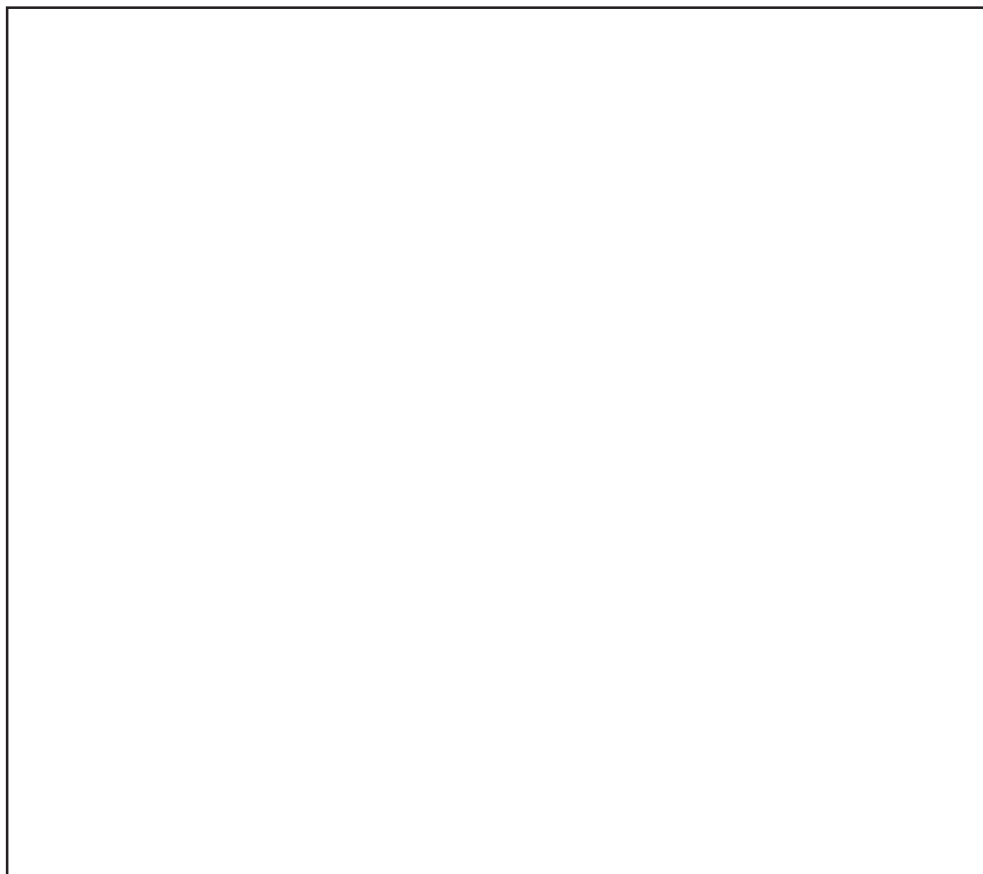
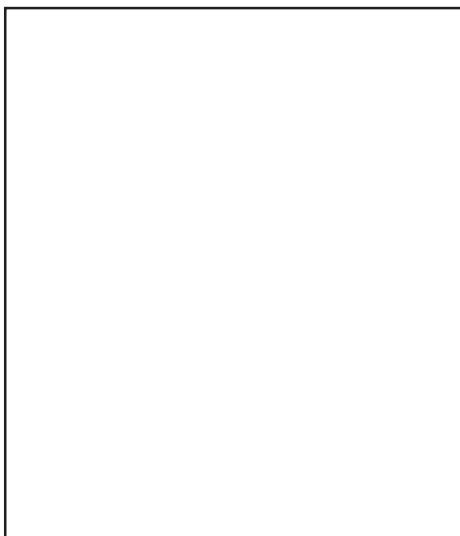


times drawings, of the plant, its seed head and seed, and of it being used in the field. Small maps show broad homoclimes that suit the species around the tropical world.

Then, if you still more background information, you can search through some 7000 references and abstracts using the BiblioExpress tool on the CD or the search engines such as Procite if you have access to it.

Tropical Forages is available on a CD and also on the Internet. The CD is probably the preferable first choice because of its speed of operation but as time progresses, the Internet version will be easier to be updated with new information. The Internet version would give you immediate access for testing but the Lucid database does need a new version of Java to be downloaded to run. Unfortunately, this Java file is large (well over 10 MB) and this could create problems for those with slow Internet access. Without Java, you can still access the individual fact sheets but not the great selection tool.

Features for selection.



Above: Part of a fact sheet showing text, image thumbnails and maps of homoclimes

Below: Click on an image thumbnail to zoom in for detail



Copies of *Tropical Forages* on CD are available (free) through:
Kristy.Wilson@csiro.au
Tel: (07) 3214 2397

The Web version can be found at:
www.tropicalforages.info

Using forages in PNG and SE Asia

Max Shelton

The University of Queensland, Brisbane

I have returned from a visit to Papua New Guinea, the Philippines, Vietnam and Thailand. My main task was to assess adoption of new varieties of leucaena following an ACIAR-supported project that our team completed in 2000—but I also wanted to see how new forage technology was being taken up.

I found many farmers to be innovative, regardless of farm size and resources, with leading farmers always looking for better ways to raise their livestock.

In Papua New Guinea

Several large expatriate-owned company ranches in the Markham Valley are beginning to use leucaena-based grazing systems. The success of cultivar Tarramba, originally released in 1997, has dramati-

abandoned and allowed to grow tall. Although he was advised to bulldoze the area, Scott has cut it back and he is now feeding 600 cattle on the 40 ha for much of the year. He finds that he needs to use this very high stocking rate just to control the amazing rate of regrowth of leucaena in this very favourable environment (plenty of water, heat and fertile soil). He feeds 1 kg per day of copra meal, but leucaena plus some inter-row grass is the main pasture feed supply. The main problem is finding a grass that can survive these high stocking rates.

Scott said that the leucaena has given him the confidence to expand the operation. It is their best asset and is the basis of the profitability of their operation.

He plans to increase his leucaena area by 100 hectares per year for next 5 years. He would like to plant at a faster rate but is concerned about keeping the very vigorous PNG weeds under control. His strategy is to plough strips and plant double rows of leucaena at 10 m centres, arguing that the wide rows will give grass a better chance of survival at the high stocking rates, and it will give him a better chance to control leucaena.

*Cattle grazing
leucaena pastures in
the Markham Valley*

cally lifted the potential for ruminant production in the Markham, and this has led to almost 1000 hectares being planted. The new live cattle export to the Philippines and Indonesia has buoyed the market.

Scott Young at Markham Farms has 400 ha of existing leucaena and has just planted a further 50 ha. When he arrived to take up his new job of manager of the property, he found that 40 hectares of leucaena planted in the late 90s had been

Expanding the area of leucaena in the Markham

In the Philippines

In the Philippines, leucaena (local name ipil-ipil) has long been an important feed source for cattle and goat production by more than 50,000 smallholder farmers. Since the 80s, leucaena growth has been limited by the psyllid insect which greatly reduces leaf production in the dry season when it is most needed.

In the late 1990s, with our Bureau of Animal Industry collaborators, we introduced our new hybrid KX2 leucaena for testing by the villagers at Mabini in Batangas Province. On this trip, I met Mariano Bautista, President of Farmers Association in Mabini and his friend Gaudencio Manebo. They have successfully grafted KX2 scions onto existing leucaena trees in their fields. Mariano now has more than 300 KX2 trees, while Gaudencio has more than 500 trees. They use them to feed goats. Bautista has 5 breeding does and a total of about 15 goats. Triplets are common which he attributes to the high quality leucaena in diets. Both farmers reckoned KX2 was better than the existing ipil ipil because of its better psyllid resistance and better growth. They said that it can be cut at least twice for every one cut for local ipil ipil and the wood yield was also higher; this is very important due

to the need for a year-round supply of fuelwood for cooking. They saw no difference in quality of the KX2 and ipil ipil for their goats; the animals preferred the local type initially but soon accepted KX2. They also remarked that when ipil ipil was badly affected by psyllids, with a black sticky exudate, it gave their goats scours; KX2 did not.

Cebu is an island largely composed of limestone soils and with about three and a half million people. Cattle and goats are major livestock industries with very good prices for livestock due to high demand from the middle classes in the big cities. Livestock fattening is a very important income for the farmers. Leucaena was first introduced in 1977 as part of Philippine-wide program to upgrade rural communities. Incentives were introduced to promote multi-purpose tree planting. For instance, no one was allowed to marry, or graduate, unless they planted trees, often leucaena trees.

In this way more than 1000 smallholders in the village of Dabayaag adopted ipil ipil. The village is located 400-1000m asl in Argao Municipality, and almost all of the 200 households raise a few cattle or goats. Because of the psyllid problem, *Leucaena diversifolia* was introduced to the village by Larry Fischer, working for World Vision, in the mid to late 80s. Farmers now collect seed of *Leucaena diversifolia* to sell to other farmers. As the new species was psyllid-resistant, it solved the feed gap created in the existing system and was immediately adopted. *L. diversifolia* has proven to be both a good timber and good fuelwood.

Leucaena — good for producing triplets – and a stack of firewood.

Leucaena's important role as a forage in the Philippines was set back by the psyllid.

*Buy a young bull,
feed leucaena to put
on 1 kg/day, sell it for
a good profit.*

We spoke with 54-year old farmer Benigno Alcarzaren, who had just produced 9 kg of *L. diversifolia* seed for sale. He feeds *L. diversifolia* with a mixture of corn bran, plus some coconut meal to fatten cattle. He buys cattle at 200kg, and keeps them for just 4 months lifting their liveweight to about 300k. He currently has 2 cattle and 3 goats. He thought there was little difference between *L. leucocephala* and *L. diversifolia* but traditional leucaena was more palatable. Benigno also reckons that psyllid damaged leaf causes scours.

In another village on Cebu (Balaygtika), over 80% of 800 households fatten cattle on traditional ipil ipil leucaena. Victoria Casipona and her family feed a mixture of chopped ipil ipil, melina (*Gmelina arborea*) leaves and corn bran every day

to fatten bulls purchased at the local market. The bulls are bought at around 300 kg live weight and fattened for 2-4 months and then sold. The bulls do extremely well on the concentrate diet.

In the same village, Marlene Zulueta was fattening a bull bought for 23,000 P. She was feeding it a mixture of 8 kg of fresh chopped ipil ipil, some pig concentrate, leaves of a native hardwood, and corn bran every day to get a weight gain of about 1 kg a day. She plans to sell after 60 days for 30,000 P.

In Vietnam

KX2 was also successful in Vietnam where there is less of a history of leucaena utilisation in ruminant feeding systems. However, smallholders are similarly dependent on sale of livestock products for income, and were immediately interested in our technology as the KX2 leucaena offered a cost-effective supply of protein.

The Moc Chau Plateau (1000 metres asl) in Son La Province is about 200 km west of Hanoi and has a thriving dairy industry supplying fresh milk to the Hanoi market. The smallholder dairy farmers at the Moc Chau Milk Company said that cattle find KX2 leucaena very palatable. There is no problem with the taste or smell of the milk, and when they feed 5 kg of fresh KX2 per day per cow (= 10-12% of diet), there is an increase in yield of milk (1-3 L/d), butterfat % and density of the milk. They said that KX2 produces forage

KX2 hybrid on the cool Moc Chau plateau in northern Vietnam boosts milk production.

year round and does not frost in winter like the grasses. It was easy to cut and feed, and cows like it.

Mr Hoang Minh Duc in Moc Chau District has 15 Holstein Friesian cows, and he feeds elephant grass, 4-6 kg concentrate (minerals, maize bran, rice bran, soybean, promix) per day, and KX2. At the moment he has 400 square metres of KX2 but he wants to expand this area to 2000 when KX2 cuttings become available. He can increase milk yield by about 2 L/d to 18 L/d in winter and 20 L/d in summer by feeding KX2 leucaena.

In north-east Thailand

Livestock raising for beef and milk has also become popular in northeast Thailand. In the past, cattle were mainly used as draft animals and were poorly fed, mainly with rice straw. Now, with a strong economy and strong demand for beef and milk, cattle are worth a lot of money. Prices for sale of fat cattle are high, up to A\$1200 for a slaughter animal of about 400kg. There is insufficient feed for these intensively raised cattle so some farmers with irrigation have grasped the opportunity to become specialist grass growers.

It is common for a range of home-grown products to be sold along the roads of Thailand. However, a new sight in northeast Thailand is roadside grass sellers. Neatly wrapped bundles of freshly cut grass are being offered for sale at relatively high prices (A\$0.30 per bundle).

Mrs Orathai Buaprasert of Yasothon Province in northeast Thailand, has planted 0.6 ha of purple guinea grass with some elephant grass, but she prefers guinea as it is more palatable for cattle.

Charmingly, some Thai farmers have named guinea grass by a similar sounding Thai word – ginaree, which is a mythical creature half-woman half-bird. Verano stylo (*S. hamata*) is often called *armata* — which means ‘eternity’.

Orathai has irrigation available from a nearby bore and is able to sell cut fresh grass in the dry season when it is most in demand. She first planted the guinea in early February 2004. She both sells grass

Purple guinea grass makes better quality feed than the ubiquitous elephant grass

and feeds it to fatten her own cattle, which gives her a regular income from sale of grass, and larger but less frequent profit for special occasions when she makes an animal sale. She originally purchased seed of the guinea at the local cattle auction from a middle man at A\$3.30/kg who had himself purchased the seed from the Department of Livestock Development for A\$3/kg.

Milk and beef raisers in the region are apparently happy to buy this highly priced grass. They add concentrate, often feed pig grower pellets, to improve the protein content of the diet.

For sale. Roadside forage for your backyard livestock

Practical Abstracts

Tropical Grasslands, Vol. 39, 1 March 2005

Growth and survival of a range of *Leucaena* species in southern Brazil—Paulo E. Kaminski, Maria Teresa Schifino-Wittmann and Nilton R. Paim, on pages 1–8.

The growth and survival of 21 species and 2 hybrids of *Leucaena* varied considerably before and after the 1997 winter in Rio Grande do Sul. Mean growth was over 2.6 cm/week before winter and 5.5 cm/week after. Survival of the 77 accessions ranged from 6% to 100%. The better lines were *L. trichandra*, *L. pallida*, *L. diversifolia*, *L. pulverulenta* and *L. leucocephala* but they need to be evaluated as a forage under specific local conditions.

An evaluation of three tropical ley legumes for use in mixed farming systems on clay soils in southern inland Queensland, Australia—Anthony Whitbread, Bruce Pengelly and B. R. Smith, on pages 9–21.

When Endurance lablab, Juanita burgundy bean and Milgarra butterfly pea were compared on three farms, lablab produced most in the first and second years but dropped in the next year as its old plants died and few seedlings reestablished. Butterfly started poorly but strengthened to become best in the third year as old plants survived and many seedlings established. Burgundy bean was relatively stable in the second and third years. On one farm, soil nitrate to 1.5 m depth reached about 180 kg/ha following the legume leys compared with only 75 kg/ha in a continuous wheat treatment. Management strategies to capitalize on this added soil N are discussed.

Estimation of herbage mass in a bahia grass (*Paspalum notatum*) and a centipede grass (*Eremochloa ophiuroides*) pasture using a capacitance probe, a sward stick and a rising plate—by S. Ogura, Y. Nagatomo and M. Hirata, on pages 22–30.

These 3 techniques for estimating herbage yield without cutting were tested on the two types of pasture using 2 methods — stratified across the range of pasture yields and at set intervals across the paddock over 2 grazing systems. All techniques were reasonably accurate in bahia pastures in spring and summer but overestimated yield in autumn because of a lot of stem and dead material. All were quite accurate across the seasons in centipede grass. Overall, the rising plate was the most accurate for estimating yield whereas the capacitance probe was

poorest in bahia grass and the sward stick the worst for centipede grass. None of these techniques seems to be as useful for estimating pasture as the visual estimation technique developed by CSIRO.

Effects of severity of threshing damage on seed quality of Gatton panic (*Panicum maximum*)—by John Hopkinson and Bernie English, on pages 31–41.

Threshing damage can break dormancy in commercial direct-headed green panic but will also shorten its life expectancy. Using numerous combinations of drum speed and concave clearance showed that increasing severity of damage reduced dormancy but shortened life expectancy with the two effects cancelling each other on the ability of seed to germinate, especially when measured in terms of seedling emergence from soil. No particular combination of drum speed and concave clearance was superior on seed performance or yield of pure seed. Hand threshing merely increased the bulk of material harvest without improving yield of pure seed.

Growth, forage yield and light interception and use by stands of five *Brachiaria* species in a tropical environment—by O. Guenni, J.L. Gil and Y. Guedez, on pages 42–53.

Light interception and use were studied in fertilized stands of brizantha, signal grass, humidicola, para grass and *B. dictyoneura* in Venezuela. Final dry matter yields were similar between species at 280–350 g/m² despite wide variation in leaf area index. The pattern of biomass partitioning in some favoured leaf resulting in higher leaf:tiller ratios, in others, higher tiller production.

Effects of rock phosphate, sulphur with and without *Acidithiobacillus* and organic by-products on mimosa (*Mimosa caesalpiniiifolia*) grown in a Brazilian tableland soil—by N.P. Stamford, C.E.R. Santos, P.R. Santos, K.S. Santos and A. Montenegro, on pages 54–61.

A cheaper source of phosphorus than superphosphate may be obtained by the acidifying action of sulphur on rock phosphate in the soil. The effect of rock phosphate and sulphur inoculated with *Acidithiobacillus* on the available P and plant growth was greater when applied with organic matter with high pH. Mimosa tree legume responded well but was greater when effective rhizobia were applied. Care should be taken with sulphur and thiobacillus as it may lower soil pH excessively in acid soils.

Supplements thru the water

Most graziers are aware of the need to feed supplements to their cattle to overcome seasonal or regional nutrient deficiencies. The major mineral supplements provided to cattle are phosphorus in P-deficient country and nitrogen during the dry season.

NPN as urea

Much work has been done to find the best ways of supplementing beef cattle with nitrogen. Cattle needing a production ration must have a source of real protein such as cotton seed or copra meal but for preventing weight loss during the dry season, non-protein nitrogen is much cheaper. The cheapest form of NPN is urea, but if cattle eat too much urea, it becomes toxic (and hence very expensive).

Various techniques have been developed over the years to control the intake of NPN by cattle. There have been the drums rolling in a urea-molasses mixture so that cattle could take in only what they could lick off the drum. Another method was to make the molasses unpalatable by dissolving more concentrated urea in the M8U system.

Bossy cows get most

No one system had all the answers, with addition problems arising from cow behaviour. Not every animal received the right dose at the trough—the bossy ones eat too much, those more timid don't get enough.

Through the water trough

One way of overcoming this is by supplying the mineral through the drinking water.

Early pioneers with this system often had problems, and these could be expensive when they resulted in deaths from urea toxicity. But new technology and better understanding of the problems of water quality is showing that water medication could have a new place on cattle properties.

Is it for you?

Water medication is not for every one and every where. Top level management and attention to detail are prerequisites for success as are total control of the water sources available. Rectifying problems of water quality—usually caused by too high a pH—is also critical to success. But if it works, water medication is the cheapest system for supplying urea to cattle.

MLA has produced a small book on water medication. This is the start for anyone considering using the technology.

Topics covered include the benefits of water medication, types of supplement, water consumption by stock, problems with water quality, medicator technology and the experiences of four commercial users. Appendices provide details on water sampling and analysis and sources of equipment



Copies of *Water medication: a guide for beef producers* are available from MLA and through the DPI Book Sales for \$25.

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Tropical Grassland Society Inc.
306 Carmody Road
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