

# TGAS news & views

about pasture development in the tropics and subtropics

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## Leucaena and enthusiasm

Some readers ask, “Why do we have so much about leucaena in the newsletter?”

Farmers and graziers have been planting pastures for decades—when rainfall permits. Farmers plant grasses in old cultivation land in southern Queensland, forage legumes in central Queensland and graziers oversow stylos into native pastures in the north. But ask someone for an article on their pastures and the answer comes back that nothing is new; ask about leucaena and someone is always willing to send me a story.

### Planting pastures

In the south, it is now common to plant a mixture of grasses. DPI used to recommend planting a single well-adapted grass; they reckoned that mixtures tend to sort themselves out into the best adapted species under grazing, so why waste money on species that will not survive. But a mixture has advantages where supplies of seed of some species are limited and where soils are not uniform; a mixture may increase the chance of a successful early establishment with marginal and unreliable rainfall. Popular newer species include creeping bluegrass, Finecut Rhodes and Premier digit grass; legumes for the farming country are still limited to temperate types such as medics and lucerne.

### Restoring fertility

Butterfly pea has been major success as a fertility restoration break in the Central Highlands, with thousands of hectares being sown.

### Fewer tractors and less fuel

Many farmers are tired of paying for large and expensive tractors and machinery and for fuel to grow crops that have unreliable yields and markets. They are looking for a system of producing good beef year after year without frequent replanting or renovating run-down pastures.

More and more farmers are realising that at last there is a system that can allow them to do this, and the topic that excites enthusiasm in the pasture world is leucaena.

In a world in which pastures have become just a routine part of life, it is exciting to see enthusiasm again.

Two other topics that seem to excite enthusiasm in growers and farmers are tropical forages in the developing countries and cell grazing, and this is why we tend run articles about them in the newsletter.

AGM  
on  
1st December

Details  
on  
page 3

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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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# 42<sup>nd</sup> Annual General Meeting

The 42<sup>st</sup> Annual General Meeting will be held on Thursday 1st December 2005

at

DPI&F Redlands Research Station

Cleveland

10.00 a.m. Arrival and smoko

Tropical Grassland Society of Australia Inc.

11.00 a.m. Annual General Meeting

Agenda

1. Apologies
2. Minutes of the 41<sup>st</sup> AGM held near Gympie
3. Executive Committee Report
4. Treasurer's Report
5. Journal Editor's Report
6. Newsletter Editor's Report
7. Harry Stobbs Memorial Fund report
8. General Business
9. Fellowship Awards
10. Election of Office Bearers
11. Presidential Address

The AGM will start at 11 am and will be followed by a BBQ or snack lunch.

12.30 p.m. BBQ or snack lunch at Redlands Research Station (price to be determined but morning smoko and lunch should be around \$10-12)

After lunch, we will have a demonstration of the Tropical Forages database and then see some of the new leucaena breeding and selection results at Redlands and maybe also at the old UQ Redlands Bay Research Station.

## How to get there:

Firstly note that the Redlands Research Station is in Cleveland, NOT Redland Bay!

From Brisbane, the easiest route is the Mount Cotton road, then down Finucane Rd. The Research Station turnoff is on the right side on a (nasty) corner just past the newly developed Redland Heritage Garden. (Both are signboarded).

Please let Ian Partridge (see front page for contact details) or Cristine Hall or know if you are going to the AGM, to the lunch or to the afternoon field walk. This is for numbers for seating at the AGM and for catering purposes. (By 20th November, please.)

# THE LEUCAENA NETWORK

The Leucaena Network held their AGM and field day at Jambin, north of Biloela on 23<sup>rd</sup> and 24<sup>th</sup> September.

The morning session had some interesting information that comes from the work of students of the University of Queensland under Max Shelton.

Not all producers who grow leucaena are members of the Network unfortunately but the latest figures suggest that there are about 400 graziers using leucaena producing about 100,000 head off 100,000 ha of leucaena.

## Mimosine toxicity

Max gave us an update on mimosine toxicity. The young tips of leucaena can contain up to 10% of the alkaloid mimosine which depresses animal appetites and growth. It's been known for many years that cattle can be inoculated with rumen bacteria (*Synergisti jonesii*) that can overcome the problems of mimosine toxicity, but part of the pathway is new to me.

The old story was that in the rumen, mimosine was broken down to the real villain known as DHP (3, 4 di hydro pyridoxine), and it is this that the special bacteria render harmless. What was new to me was that the 3,4 DHP was broken down first to 2,3 DHP and then to harmless compounds.

The UQ work looked at 44 herds in six districts in Queensland to see what proportion of stock eating leucaena were protected by inoculated bacteria. They took urine and dung samples to test for the presence of DHP and for how much leucaena the stock were eating.

On average, leucaena was providing 40% of the steer's diet, nearly half the 44 herds were protected but the DHP story was unusual. Some herds with poor protection had high levels of 3,4 DHP and 2,3 DHP as expected, others had low 3,4 DHP showing some bacterial degradation but high 2,3 DHP suggesting something was missing. These animals had been inoculated with the bacteria bred in vitro by the

DPI's Animal Research Institute. Did the unusual results mean that the strain of bacteria that can degrade 2,3 DHP has changed over the years.

Since effective inoculation can improve an animal's performance by between 30 and 100%, graziers need a simple on-farm test to know how well covered they are by inoculation.

## Are you wasting your leucaena?

This was another study from UQ by Sarah Streeter. Leucaena is a very palatable and high protein feed. But the high protein must be balanced by adequate energy in the diet or the animals gets its energy by wastefully degrading the protein.

Because leucaena is so palatable, cattle eat off all its leaf in summer. Then there is insufficient available in autumn when it is needed to complement the maturing grasses. Sarah found that the amount of leucaena in the diet was closely related to the amount available in the paddock. The average in the diet in the herds tested ranged around 50-75% with some eating up to 98% leucaena. But the animal needs only about 30% leucaena to make a productive diet, so 65% of time there were wasteful levels of the legume for optimum weight gain. This wasted balance is not available later in the year when needed.

She recorded weight gains of 0.8 to 1.7 kg/head/day over 150 days but the gains could drop to 0.2 kg/day when the leucaena runs out.

On good quality grass with 8% crude protein, steers need to eat only 20-30% leucaena, but they need 50-90% leucaena when the grass drops to 2% CP.

What's the best way to preserve the leucaena leaf for when its needed? Restrict the days on leucaena, use a short-duration cell grazing approach or provide a high energy supplement.

## Inoculating with Rhizobia

Leucaena plants need to be inoculated with Rhizobia bacteria to fix the nitrogen that makes the leaf so high in protein.

The current recommendation has been to inoculate leucaena seed with the CB3060 Rhizobia, but this is no longer available commercially. Fortunately, it has been found that strain CB 3162 is just as good. Since CB 3162 is recommended for Desmanthus, it is still commercially available.

### Cutting back leucaena

Leucaena has many forms in the wild of central America. Some lines are multi-branching shrubs – from which have come the cultivars Peru and Cunningham, others are more erect and tree-like. Tarramba, selected for its high production, faster establishment and degree of cool tolerance, is an arboreal line. Without good management, all cultivars can grow out of reach of stock and Tarramba is even more vigorous in this regard. So there may come a time when the leucaena stems need to be cut back or knocked down. Some growers put in a herd of lactating cows to pull down the tall stems, some have pushed the tall stems down with grader type blades, others use slashers. In the recent issue of this newsletter, there was a picture of a giant circular saw as used for citrus and other orchards being used on Tagasaste, and earlier issue



Rod and Kevin Linke of Biloela have designed this leucaena trimmer.

showed Peter Larsen's flail mower based on the heavy duty Critter. Rod and Kevin Linke of Biloela showed their trimmer based on multiple horizontal circular saws. It's still in the developmental stage with Rod reckoning that 20 hp is insufficient with 40 hp being preferable for heavier growth. That is still much less than the big machines use. The unit is mounted on the deck of a LandCruiser and can be driven between properties as Rod and Kevin offer contract trimming as Leucaena Maintenance Pty Ltd out of Biloela.

### Planting leucaena

Planting leucaena is an expensive business but the legume becomes cheap if a stand lasts for 20 or more years. Poor establishment is doubly expensive and may have to be ploughed out for another go. As a result many growers use precision planters. The Norseman Techni-Plant unit was on display at Jambin and has given excellent and even strikes. Another issue of TGS News and Views showed the Gyral planter. I took this photo of Peter Larsen's planter set up based on old Chamberlain precision planter units to show what can be done without buying the latest. This unit has planted thousands of hectares.



(Above) The Norseman Techni-Plant is a precision seeder for leucaena.

(below) Peter Larsen's home-modified seeder has planted thousands of hectares.



# Wynn cassia – eaten or rejected?

## OK in the drier subtropics

Wynn cassia can be a useful legume when sown into native pasture. It has been shown to improve steers weight gains in south-east Queensland, but it's not very palatable.

While it seems to form a reasonable balance with the native grass in districts with rainfall under 1000 mm, it can start to take over in higher rainfall areas and the Queensland DPI&F doesn't recommend it for those wetter places and good soils.

Wynn cassia flowers with a couple of months of being planted and then sets masses of seed.

Very palatable legumes soon get grazed out and do not persist; Wynn is at the opposite end of the spectrum—cattle don't like eating it while there is good green grass around. In drier regions such as around Gayndah, cattle do seem to eat it at any time of the year, but closer to the coast they leave it alone until around mid-autumn when the grass starts to go off.

## Problem in monsoonal NT

This becomes even more of a problem in areas with a monsoonal rainfall pattern—where it rains heavily

in summer and then stops raining abruptly—because tall ungrazed Wynn cassia plants don't like drought. The leaves turn red, then brown, then drop off, leaving a hard inedible stalk.

This is a problem that has been besetting farmers in the Northern Territory around Douglas Daly. The cattle won't eat fresh green cassia over summer and won't eat the hay stalks either so that it can

*“Wynn cassia is an easy-to-establish, highly persistent legume of low palatability and low grazing value on fertile soils in the Douglas Daly area.”*

become totally dominant. Fergal O'Gara with the NT DBIRD has run a number of trials to try to sort out the grazer's problems with Wynn cassia. He grazed steers on pure cassia, fertilised it, made hay and pellets from it, fed horses on it, looked for grasses for it and tried to kill it.

He confirmed that cattle don't like eating Wynn cassia and, when forced to, they put on less weight than from other improved pasture species. The problem seemed to lie in low energy intake by the cattle which craved for grass. If the companion grass is very palatable it gets eaten out although more aggressive and less palatable species such as humudicola and 'Arnhem' digit grass might form a better grass-legume balance. If there are still grass plants in the cassia stand, they can be encouraged back by fertilising with super and resting at the start of the wet season. Fertilising can also make the cassia more palatable.

Stock did not like cassia hay as it is very stinky but would eat pellets made from cassia with sorghum, cooking oil and molasses as binding agents.

## Spray to kill or to eat?

Want to get rid of it? It's not easy because there are such large reserves of seed in the soil. While a range of herbicides will suppress Wynn cassia, Brushhoff™ (metsulfuron-methyl) was most effective.



Dense Wynn cassia dominating a northern pasture

Some graziers found that spraying with low rates of 2,4-D made the legume more palatable so the cattle would eat it a week after spraying.

### Never again on good soils!

The conclusion of the graziers in the Douglas Daly area was, 'Wynn cassia is an easy-to-establish, highly persistent legume of low palatability and low grazing value on fertile soils (in the Douglas Daly area). It may have a role in soil conservation and may also have potential for hay and pellet production.', and most would never plant it again.



Cattle prefer the grass. Note the absence of grass outside the enclosure or where cattle can reach over the fence.

(Illustrations scanned from the printed technical bulletin)

More detailed information is in Fergal's latest 66-page report 'Evaluation of Wynn cassia as a pasture and hay crop for the Douglas Daly area of the

Northern Territory' Technical Bulletin No. 316 from the NT DBIRD, GPO Box 3000, Darwin NT 0801 (\$8.80)

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## A SOFT approach to Tropical Forages?

The last issue of News & Views carried a long article about the *Tropical Forages* interactive database. A good number of you have looked at the web site but many more have not yet done so.

We will be giving a demonstration of the program after the AGM because it really is something about which you can be proud.

This is to encourage you to get hold of a *Tropical Forages* CD or visit the Web site at [www.tropicalforages.info](http://www.tropicalforages.info).

Use it for selecting a short list of species for your conditions to see whether it is accurate and print out some fact sheets for species or cultivars about which you are familiar. Although each fact sheet has been researched and reviewed, you might well have some extra experience or information that could be included. Obviously the Web site can be quickly updated but new CDs will also be released periodically.

The whole aim of the project has been to document and encapsulate the

great amount of experience of pasture agronomists from around the world before that information is lost.

Another valuable part of the package for researchers is the bibliography of some 7000 references. The free search engine (BiblioExpress) is less friendly initially than some of the expensive engines but it does work when you persevere and learn your way around.

*Tropical Forages* is a generic title and hence not totally prescriptive for this unique package. In the development phase, we always referred to the project as 'SOFT' — Selection Of Forages for the Tropics. A unique identifying 'trade name' like SOFT is always more recognisable than a bland all-encompassing name like 'Tropical Forages'. So don't be surprised when you start to hear it being called 'SOFT' in the future.



# How many cattle to carry?

All agree that stocking rates are the key to keeping native pastures productive. It is generally uneconomic or just not feasible to replant native pastures if they are grazed out, so management is the key to sustainability.

## Carrying capacity

But how does one decide what is a suitable stocking rate? Many methods have been proposed, some more digestible than others. We've looked at Rainfall Use Efficiency and long-term average rainfall and 'utilising' 20-30 % of the theoretical growth but that can run into problems in higher rainfall regions where soil nitrogen runs out before soil moisture, at 'utilising' 30% of what's in the paddock at the end of the growing season as the stocking rate for the next 12 months, at setting dry season stocking rates on what's available until the next wet season, and at asking good graziers in the district what they consider to be the carrying capacity (even if they acknowledged that they were grazing more heavily than this 'because of the circumstances'). I've seen calculations based on the 30% theory that have been fudged with figures for 'inedible species' or trampling, etc until the calculations agreed with local knowledge.

But enter *Stocktake* the DPI&F's new aid to rationality.

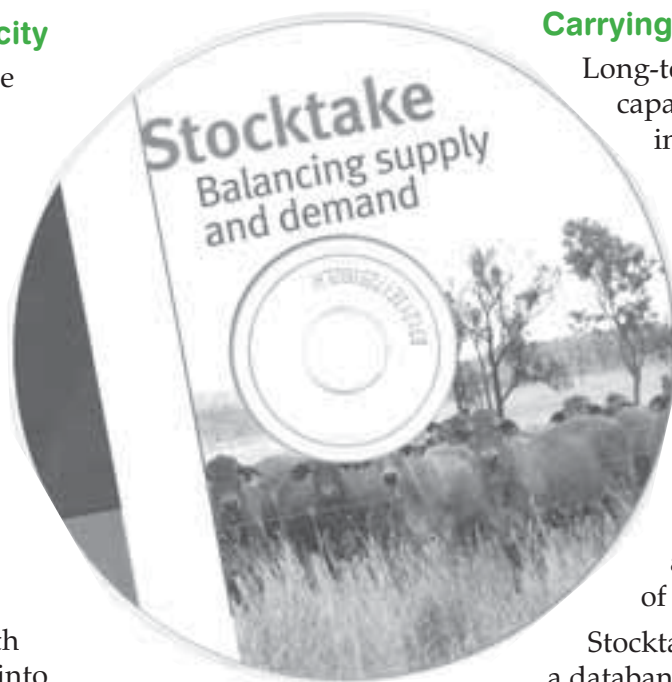
## Stocktake: Balancing supply and demand

Stocktake is a 'monitoring package that takes stock of your grazing resources and points to improved

management decisions. It has two components. One is to calculate the present carrying capacity of a paddock based on its present condition, the second a feed budgeting tool for setting the dry season stocking rate.

## Carrying capacity

Long-term carrying capacity takes into account the present condition of the land and the pasture. This is based on the soil types, the species composition, presence of erosion, weeds and the density of shrubs or trees.



Stocktake contains a databank of typical pasture growth for a whole

range of districts and vegetation types and for increasing density of trees. These pasture growth figures show average yields based on the plant growth model GRASP using a hundred years or so of daily climate data—rainfall, temperatures, radiation, humidity.

The grazier knows that his paddock contains a proportion of 2 or 3 different soils types, works out a carrying capacity for each and then an overall carrying capacity.

The present condition of the land and pasture are factored in, a percentage utilisation is recommended and the program can work out how many head of any animal type should be carried in a typical year.

## Feed budgeting

The dry season feed budgeting is based on how much grass is present at the end of the wet season, how much is needed for ground cover or a useful fire at the beginning of the next wet season, how



much will be trampled (detached), and how much of this dry feed stock might eat with or without a supplement. Again the program does the calculations for you.



So the package contains some useful features for the concerned grazer and especially for students so that the next generation of managers are more aware of their grazing resource.

### Climate variability

I guess that if there is a deficiency in the program, it would be in how a grazer manages proactively for climate variability but I don't think the program's developer can be blamed for this. Carrying capacity is just that—an average of how many stock the land can carry year to year while the pasture is in its present condition. The stocking rate can be adjusted—more beasts in wet years, and fewer in dry years.

The feed budgeting program does take into account reactively how much pasture is in a paddock after an exceptionally dry or wet year and allows adjustment on that.

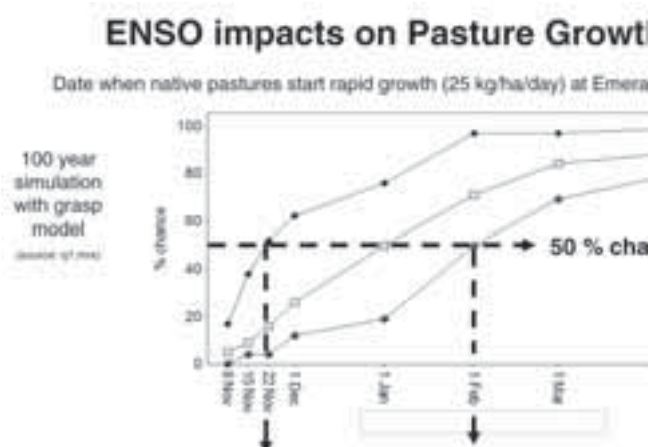
### Can seasonal forecasting help?

Seasonal forecasting is generally not very useful for setting stocking rates for the next year at mustering/weaning time in autumn when the decisions have to be made. Autumn is the period of unreliability for seasonal forecasting based on the SOI; the world climate system tends not to settle down until at least the end

of June for a forecast of the next wet season. However, in much of north-east Australia, there can be a reasonably reliable signal by mid-dry season and stock numbers can be adjusted then.

An example of how much a El Niño or a La Niña affects the start of wet season growth can be seen in the figure below—25 kg/ha/day is the first flush of decent pasture growth.

The average date of first growth is January 1<sup>st</sup>, but it's one month later in an El Niño, and almost 6 weeks earlier in an La Niña year. The problem is that you cannot forecast this in time when doing the forage budget.



Date when pasture growth starts in different types of ENSO year.

### Take home message

The valuable message from Stocktake would be to stock lightly based on the carrying capacity. Then there should be enough latitude in the system to handle any one-year drought. Stock on the limit for the 'average' year and you'll be in trouble at least 50% of the time.

Stocktake comes as a CD for the database and calculations, with a booklet describing the grazing ecosystem, monitoring and instructions for the database and a field notebook for assessing and recording soil and pasture condition in each paddock.

Contact Jill Aisthorpe, DPI&F Emerald (07 4983 7421) or Col Paton. DPI&F Brian Pastures (07 4161 3709) for more information.

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# Practical Abstracts

## Tropical Grasslands, Vol. 39, 2 June 2005

**The impact of fire on population density and canopy area of currant bush (*Carissa ovata*) in central Queensland and its implications for grazed woodland management**—by Paul Back, on pages 65–74.

Currant bush has been thickening up in grazed eucalypt woodlands in central Queensland. It is not highly competitive but cattle cannot reach grass growing under the canopy. However, this allows enough grassy fuel to accumulate. Although currant bush is quite resistant to fire, burning in spring will halt its spread. Currant bush needs to be burnt at least every five years, and the area needs to have at least one-year's growth of grass available for a hot enough fire. This reduction in the shrub canopy cover leads to a proportional increase in pasture available for grazing.

**Fertilisation of creeping signalgrass and bahiagrass under grazing in Florida**—by R.S. Kalmbacher, M.B. Adjei, I.V. Ezenwa and F.G. Martin, on pages 75–87.

Bahiagrass provides much of the minimal-input pasture in Florida, but is susceptible to mole crickets. Creeping signalgrass (*Brachiaria humidicola*) could be an alternative pasture grass for these low fertility and poorly drained conditions; however, it is more difficult to manage because it produces less herbage than bahiagrass in spring and much more in summer.

P and K fertiliser is needed, but nitrogen should not be applied until the beginning of the rainy season (late May-early June). Without extra nitrogen, protein levels might be too low for lactating cows.

**Emergence and seedling survival of leucaena on poorly drained soil and management practices to mitigate negative effects**—I.V. Ezenwa and R.S. Kalmbacher, on pages 88–98.

Leucaena has potential in Florida but poorly drained soils make establishment

difficult. Since leucaena can handle dry conditions better than flooding, sowing before or after the rainy season may give better establishment. Leucaena K636 and K340 survived better and might be better for southern Florida and offer more flexible establishment options. Raised beds did not improve survival of seedlings during high rainfall periods. So far, large scale commercial plantings of leucaena have not established uniformly and larger trials are needed to confirm the applicability of the research findings.

***Brachiaria* species in north-east Thailand: dry matter yields and seed production**—by Mike Hare, P. Tatsapong, A. Lunpha and K. Wongpichet, on pages 99–106.

Marandu and CIAT 6387 (both *B. brizantha*) and common signal grass all yielded about 50% more dry matter than ruzi grass with the brizanthas also having 30% more leaf. CIAT 26297 (*B. decumbens*) had the highest leaf protein levels. Common signal grass and CIAT 6387 produced as many inflorescences as ruzi but negligible amounts of seed while Marandu and CIAT 26297 had few flowers. Only ruzi grass produced reasonable yields of viable seed (30 and 80 kg/ha in the two years). This seed failure in the flowering accessions was attributed poor seed set and caryopsis maturation.

**Seed yield and quality of buffel grass (*Cenchrus ciliaris*) as influenced by row spacing and fertiliser level**—by D. Kumar, G.K. Dwivedi and S.N. Singh, on pages 107–111.

On an infertile soil, seed yield increased with wider row spacing (75 cm) and up to the highest level of fertiliser (60 kg N, 26 kg P/ha). Seed quality increased with wider row spacing but not with fertiliser.

**Effects of a fibrolytic enzyme supplement on the performance of Holstein Friesian cows grazing kikuyu**—by B.C. Granzin, on pages 112-116.

The low digestibility of tropical grasses reduces herbage intake and cow productivity. Fibrolytic enzymes (FE), such as cellulases and hemicellulases, help the digestion of structural carbohydrate and can increase milk yield when fed with grain-based concentrates. Feeding up to 4 g of FE (as Promote®) increased yield of milk and milk protein in first-calving heifers but not in older cows—maybe because the effective dose was higher in the lighter animals. There were no effects of FE on the digestibility of organic matter or fibre.

**The nutritive value of laboratory ensiled lablab (*Lablab purpureus*) and pearl millet (*Pennisetum americanum*)**—by J.T. Amodu, A.M. Adamu, I.A. Adeyinka, J.P. Alawa and J.O. Jegede, on pages 117–123.

Various proportions of lablab were added to millet to see whether it improved the quality of the silage. All silage mixtures fermented well but

adding lablab increased crude protein, crude fibre and nitrogen-free extract. However, all mixtures would barely supply enough protein to maintain cattle, and would need extra sulphur and sodium for lactating cows.

**Effect of different seed treatment options on dormancy breaking, germination and emergence of *Ziziphus mucronata* (buffalo thorn) seed: research note**

by—Abubeker Hassen, N.F.G. Rethman and W.A. Van Niekerk, on pages 124–128.

Buffalo thorn is a valuable fodder tree for livestock and game animals in the drier parts of Africa. The leaves are high in protein and digestible. Establishment has been constrained by poor germination and seedling emergence due to an impermeable seed coat.

Scarification with sandpaper gives the best germination but is labour-intensive; immersing seed in concentrated sulphuric acid for 20 minutes, followed by soaking in water for 24 hours resulted in the best germination and emergence.

Editor's note: *Z. mauritiana* (Chinese apple) is classified as a declared weed of grazing land in northern Australia.

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## New rules for 21<sup>st</sup> Century Farming

### Is this how you see yourself?

1. Become a business, not a way of life
2. Do not blame other countries; play a different game.
3. Grow what the market wants, not what has always been grown.
4. Do not pray for rain, make sure there is a supply of water.
5. Outsource activities, such as ploughing, seeding, harvesting and shearing, that can be done cheaper and better by others.
6. Do not own land, buildings, equipment, stock or debtors.
7. Work the brain (intellectual property) harder than the body.
8. Add value at the farm, not the factory (i.e. high-quality fresh food is often better than processed).
9. Have long-term contracts and relationships, not spot markets.
10. Franchise or be a franchisee wherever possible.

(from BRW)

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