Evergreen FARMING

Sustainable "Green Farms All Year Round"

Newsletter of Evergreen Farming **Issue JANUARY 2004**

New sub-tropical grasses for the west

Perennial pasture research in WA received a welcome Christmas boost with some news hot off the press.

Cameron Allan from Meat and Livestock Australia announced the MLA Board has approved a 5 year national perennial grass improvement program in collaboration with the CRC for Plant-based Management of Dryland Salinity.

"The plan is to develop new perennial grasses for southern Australia to increase water use and out-of-season production. There are three breeding projects; the first two will extend the zone of adaptation of the temperate grasses cocksfoot and tall fescue into lower rainfall areas, while the third activity is to develop new sub-tropical (C4) grasses specifically for temperate and Mediterranean regions of southern Australia. The goal for the sub-tropical breeding is elite lines that have greater persistence, higher out of season dry matter production and digestibility relative to control cultivars." The sub-tropical grass component will be based in WA.

Key researchers from the Department of Agriculture WA involved in the project are Paul Sanford (Albany), Tim Wiley (Geraldton) and Geoff Moore (South Perth), plus Dr David Henry (CSIRO) who will be considering aspects of feed quality.

A recent workshop funded by MLA (Evergreen Farmers were represented by Philip Barrett-Lennard) set the priorities for the project and helped develop links with researchers in Queensland where there has been a long history of sub-tropical grass improvement. Most of the varieties currently being grown in WA were developed in Queensland for sub-tropical and tropical environments.

One of the first activities will be to develop a collection of potential germplasm. This will be sourced from the Tropical forages seed bank in Biloela, Queensland, and international germplasm centres, and then seed supply increased in north Queensland.

The material will then be assessed at three key field evaluation sites, in the West Midlands, on the south coast of WA in a medium rainfall environment and in northern New South Wales on marginal cropping land west of Inverell.

An example of successful sub-tropical grass breeding are these leafy and highly salt tolerant Rhodes Grass varieties under development in southern Queensland

From the President

David Monks, Badgingarra, Phone: 08 9652 4004

The last few months have been very active for Evergreen commencing with the Spring field day on 29th October 2003. Over 75 members and guests met at Badgingarra to listen to Tim Wiley (Dept of Ag), Dr Phil Ward (CSIRO), Rob Davidson (UWA & WAMMCO), Brad Nutt (Dept of Ag) and Craig Forsyth talk on an excellent variety of topics. Articles by Dr Phil Ward and Rob Davidson are included in this newsletter.

Dr Ward's presentation confirmed that perennials are essential to control recharge (and the subsequent long term health of the soil) on all soil types while tagasaste or oil mallees are the only options for white gutless sand. Rob Davidson's paper is based on trial work on my farm and what I learnt was fantastic. Perennials are not always highly palatable or digestible and we must understand them to optimize animal production. In addition, supplementary feeding on perennial pastures gave me an approx 650% return on capital due to improved feed conversion efficiency.

Brad Nutt gave an excellent talk on the new French Hard seeded Serradella's he has developed named Erica (prostrate) and Margarita (erect). When asked the chief use for these varieties, he was wise enough to answer "to provide nitrogen for perennial grasses". Given the complimentary growth of both Blue lupins and Cadiz with C4 grasses, growers now have another option to get biologically derived nitrogen into their soil.

Craig Forsyth said "I feel like a dog between 4 trees – not a leg to stand on!" since he was following such high profile speakers. However, our laconic cattleman from Dongara kept everyone chuckling while delivering the message that profit will drive progress and perennials mean profit. Establishing perennial pastures can be paid for in their first year by weight gain, the rest is profit. In addition, it is a sustainable low cost production system that will give him a long term comparative advantage.

At the conclusion of the talks one member said to me "We should be doing this every week, not every 3 months". I too was very impressed with the quality of the content and presentation of the talks and we will endeavor to retain this format for future field days.

After lunch, we traveled to the Bibby Springs trial site to view Geoff Moore's work. The results of his trial on sowing annuals into established Rhodes grass saw Balansa clover produce 200% more Dry Matter than the unimproved control. In addition, the cows that broke into the plot chose the Balansa on the taste test. Again, it appears we can get complimentary production by sowing annuals with perennials and that total production is optimized by correct species selection. Also, Callide Rhodes grass outperformed all other species by 100% for autumn production (30/3/03-18/6/03).

We then moved to CSBP's site where Flexi-N trials showed that strategic applications on grass pastures can triple Dry Matter, Crude Protein and Metabolisable Energy. Spring applications of Flexi-N may assist under-sown perennials and this looked the case judging by plant vigor in the sprayed plots. Their new Flexi-N plus potash looks to be another good option for rapid quality feed production in winter or autumn.

The raised bed trial at Gary Peacocks was next. Having just finished harvesting this for him, he has grown a crop that would not have been possible previously. I must congratulate Gary on his foresight to establish this trial, and look forward to his new trials in 2004.

My thanks must go to Phil Barrett-Lennard for organizing such a stimulating day, the speakers, our sponsors (Dept of Ag, CSBP, RCS, CRT and Gallagher), and to all our volunteers for making it happen. Well done to you all.

Evergreen, with its message of "sustainable green feed year round" is now starting to attract the big players. Dee Margetts (Greens MLC) attended the Spring Field day to hear our message.

In November, I attended both the MLA and AWI AGM's in Perth to get a better understanding of both organizations and to push our barrow. MLA is a huge organization with over $123m in annual revenue and $56m in reserves. AWI is not so big with $81m in annual revenue and $91m in reserves. Perennials are crucial to long term animal production and both organizations are committed to them. It was very pleasing to get positive feedback from AWI directors and staff on our application which has finally passed all final amendments and is waiting on presentation to the board.

The big item for both these organizations is their relevance to the farmers who pay the levies. Only approx 60 growers from all over Australia attended the AWI AGM (not helped by being held in the middle of harvest). And less than 15% of MLA members voted in their AGM. In a recent Rural Press poll, 70% of wool growers wanted 50% or more of the AWI levy spent on farm. The directors of AWI in particular are committed to open and transparent management to satisfy their responsibility to farmers and the Federal Government. However, research trials by groups such as Evergreen get acceptance and adoption by farmers and graziers at the grass roots level. Without this acceptance and adoption, growers may be disinterested in continuing current levy levels. Therefore, I see a big future for Evergreen and other such groups to provide a direct linkage between farmers and these bodies.

It was also interesting to hear that the Salinity CRC had received a $5m grant for work on perennial pasture species. As Evergreen has a good relationship with the Salinity CRC, we hope that members can directly benefit from the additional work spent on perennials.

Thanks to all those who attended our Spring Field day – we attracted more producers than AWI did to its AGM. Your support by turning up at a field day is crucial in the numbers game to attract further funding. It's also crucial to keep the brain ticking over and the motivation levels up. I also think its great fun.

Have a happy and safe Christmas and New Year.

Sheep production off rotationally grazed Kikuyu and Strawberry Clover

Fiona Jones, Rob Davidson (Phone: 08 9380 1953) and David and Sue Monks

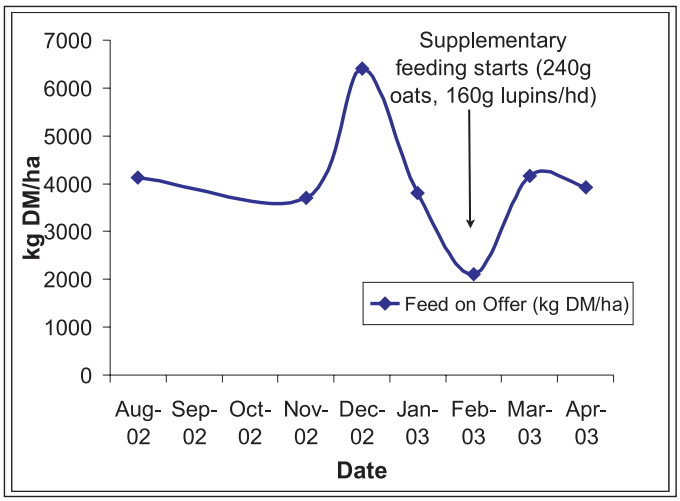
The planting of perennial pastures state-wide is rapidly increasing with a preliminary analysis indicating that environmental conditions and soil types would support up to 1 million hectares being sown in WA. The majority of this potential area sown to perennials will be along the south coast and in the west midlands. Perennial pastures extend the duration of the "green feed" season and have the potential to reduce the need for high levels of supplementary feeding over the summer autumn period. However, we need to determine the best grazing strategies and importantly what levels of production can be achieved off these pastures. The following report is based on work determining how the introduction of perennial pastures into the grazing system increases farm productivity in the Badgingarra area.

The study was established to answer the following questions.

- What is the carrying capacity and productivity of stock grazing perennial pastures?
- Do stock grazing perennial pastures require any grain supplementation?
- Can worm burdens in stock grazing perennial pastures be controlled?
- Does staple profile remain constant on stock grazing perennial pastures?

The study commenced in October 2002 when 60 Merino weaners out of 1613 weaners grazing the pastures were individually ear tagged. The weaners were rotationally grazed between October 2002 and April 2003 on 30 hectares of Kikuyu, strawberry clover and other grasses stocked at 54 weaners per hectare. They were monitored every 6 weeks for live weight, condition score, staple profile and faecal egg count. The pasture quality and quantity was also assessed at the same 6 weekly intervals.

Figure 1 Changes in Feed on Offer (FOO) over the monitoring period



The peak feed on offer (FOO) recorded was obtained in December when the weaners were grazing in excess of 6 T DM/hectare. FOOís were maintained at above 2T DM/Ha on a rotationally grazed system with the time spent in each in each rotational section varying depending on pasture availability and quality

Initially the percentage of Kikuyu, Strawberry Clover and other grasses was similar, however as the season dried out the Kikuyu pasture established itself as the dominant pasture in the sward (Figure 2)...

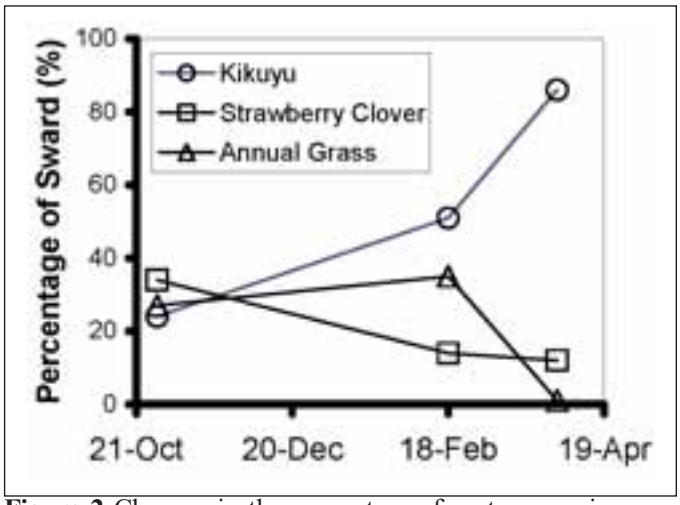
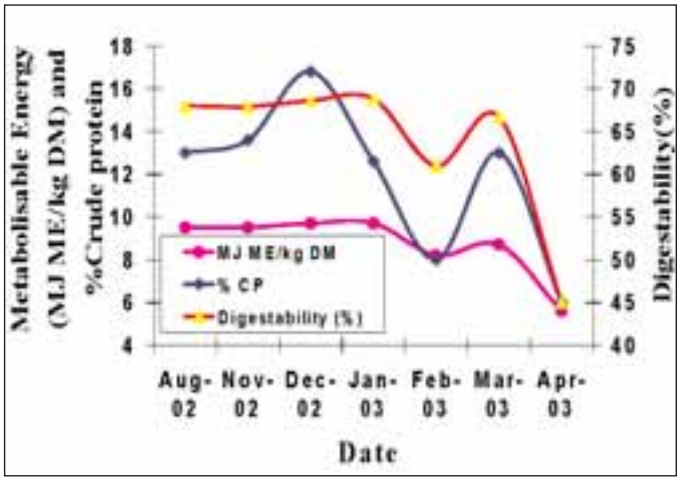


Figure 2 Changes in the percentage of pasture species over the trial period

The levels of crude protein, metabolisable energy and digestibility of the perennial pasture up to and including December 2002 were sufficient to maintain and support moderate growth rates of most classes of sheep (Figure 3). A reduction in the amount of water available to the pasture in the new year reduced its value to the extent that the weaners were supplemented with an oat:lupin grain mix from late February through to June.

Figure 3 Changes over time of metabolisable energy, crude protein and digestibility levels of Kikuyu and Strawberry clover based pastures.



The perennial pastures supported moderate growth rates. The provision of supplementary feed, the reduction in stocking rate after the wethers were sold as shippers and provision of new seasons pasture improved the growth rates and condition score of the weaners (Figure 4).

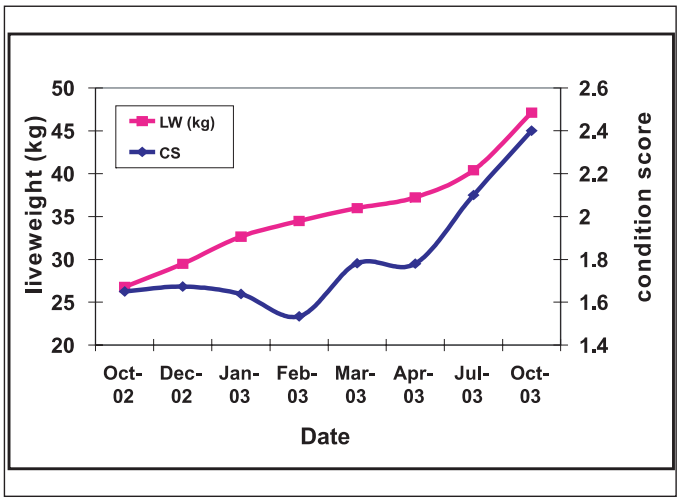


Figure 4 Changes in live weight and condition score of 60 weaners

The worm burden of the weaners was exceptionally high at the beginning of the study. However through constant monitoring and strategic drenching the faecal egg counts were well managed under an intensive grazing system with a year round supply of green pastures.

It is assumed that animals rotationally grazed on perennial pastures would have a reasonably consistent staple profile however the average profiles taken during the trial (figure 5) indicate a drop of almost 3 micron in a four month period. This drop would have been even greater had the weaners not been supplemented from February onwards.

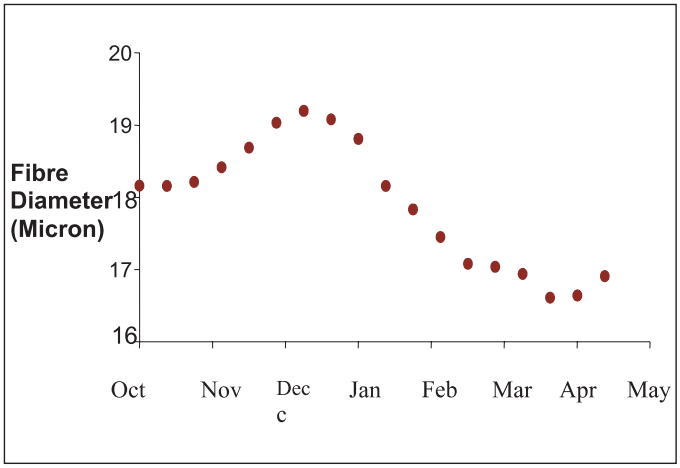


Figure 5 Changes in wool fibre profile of 60 weaners grazing kikuyu and strawberry clover based pastures

The weaners were offered 13.5T of lupins and 15.9T of Oats over the February to June period at a cost of $7953. The result of the supplementary feeding was that the weaners were 15kg heavier immediately off shears in 2003 (37kg) than in 2002 (22kg). This provided flexibility in the farming system and allowed the stocking rate to be approximately halved with the wethers being sold as light shippers.

What are the key findings?

- Perennial pastures supported greasy wool growth of 135kg/ha and grossed $935/ha based on weaners cutting 1.75kg clean fleece, 70% yield and 990c/kg.
- Perennial pastures alone are unable to maintain live weight gain, condition score and staple profile of the weaners year round and supplementary feed needs to be offered to maintain productivity of the pastures year round.
- Constant monitoring is necessary to ensure intestinal worm burdens remain controlled as they can increase quickly in a tightly grazed system.

Acknowledgments

- David and Sue Monks
- Department of Agriculture sheep and pastures group and wool program for providing the funds to undertake the project
- Tim Wiley, Tony Gray and Xuerong Wang for assisting when required.

STOP PRESS

Sub-tropicals on Kangaroo Island showing explosive growth after 30mm of summer rain.

Integrating perennial pastures into the farming systems of the Northern Agriculture Region of Western Australia

Tim Wiley, Department of Agriculture, Geraldton, Phone: 08 9956 8555

The Northern Agriculture Region (NAR) of Western Australia is made up of a diverse range of soil types. The mix of soil types not only varies between districts and farms, but also within paddocks. This diversity has traditionally been seen as an obstacle to farming, but can be turned into an advantage if the diversity is exploited within a 'systems' approach.

The NAR has a Mediterranean climate with cool wet winters and hot dry summers. Farming systems have traditional been based solely on annual crops and pastures. The carrying capacity has been limited by the shortage of feed in autumn and early winter. Animal performance is also restricted by the poor quality of feed over summer and autumn. In autumn animals must be fed quality supplements just to maintain weight.

In recent years a wide range of new pastures species have become available. This includes the fodder shrub tagasaste, lucerne and sub tropical perennial grasses. These perennials all have different seasonal patterns of growth. By integrating a range of these types, or 'functional groups', of perennials into farms it should be possible to increase carrying capacity and year round animal performance. This could be achieved by strategically moving stock around the farm so as they only graze each pasture type when it is most productive and of best quality.

The soil niche and performance of some of the newer perennial pastures in the NAR are not well understood. For many of the newer perennial species there is still much to be learned about where they grow and how they perform. For these species data is needed on pasture growth rates and feed quality across the season on sites representing the diversity of the region. However there are measurements from some farms that give us an indication of how perennials may be able to significantly improve animal production.

Example of an integrated whole farm grazing system

An example of how new types of pastures could be integrated into a grazing system is Peter, Caroline and Andrew Nixon's farm at West Gillingarra. Their farm consists of gravely ridges with the slopes and valleys filled with poor white sands. In the valley floor there is a narrow strip of land where there is a fresh water table that is no more than 1 metre from the surface.

'Set stocking' on annual pastures had led to wind erosion, rising water tables and poor economic returns. Nearby there are areas of Banksia woodlands that have been killed by rising water tables. As much as 30% of this sandplain district could be lost to salinity in the future.

The Nixon's have fenced the farm to soil type. The new 'wet sand' paddocks are very small, being only 40 metres wide in some places.

Paddock history	Paddock ungrazed in winter & spring
Grazing method	Intensive cell grazing
Feed On Offer 19/11/98	8.7 t/ha
Strawberry clover growth rates	Not considered in feed budget
Grazing days available*	8,700
Budgeted stocking rate*	370 cross bred weaners on 1.4 ha for 28 days
Actual stocking rate	264 weaners/ha
Equivalent 12 month stocking rate**	27 weaners/ha
Live weight change 19/11/98 to 15/12/98	+ 4.2 kg
Live weight gain / ha	1,100 kg/ha
Income (assume $1.10 kg live weight, 1999 figures)	$1,210 / ha

A mix of annual legumes and perennial pastures appropriate to the soil type have been planted on sections of the farm. Not all the new species being tried have worked. The agronomic package for each soil type is being modified and improved continuously.

Pasture species showing promise to date are.....

Wet sands:

Balansa & Strawberry clover, Cadiz serradella, Setaria, Rhodes, Kikuyu, Paspalum

Sand over clay:

Tagasaste & Acacia saligna alleys 20 m apart (water table at 1 to 2 m), Rhodes grass, Setaria, Panic grasses, Cadiz & yellow serradella

Deep sand:

Cadiz serradella, Tagasaste alleys, Rhodes grass, Setaria and Green panic in the inter row, Cadiz serradella over the perennial grasses or on itís own

Gravel ridges:

Wheat, Oats, Lupins & Canola in rotation, Sub clover, Cadiz serradella, Lucerne

While the wet sands only represent a small part of the farm, they can be very productive and affect whole farm performance. The animal production on one of these areas has been measured. The Nixon's wanted to graze a mob of Merino weaners on one paddock for a month. One of the wet sand paddocks had been locked up during spring and had a bulk of Balansa and Strawberry clover. The perennial grass underneath was still coming out of dormancy and was contributing little at that time of year. The Feed On Offer was measured in the paddock and the area required to feed the mob for a month was calculated. An appropriate area of the long thin paddock was then fenced off using temporary electric fencing. The weaners were weighed in and out of the 'cell'.

With the mix of pasture types it should be possible to run high stocking rates year round with little need for hand feeding. A grazing strategy might be as listed below. This plan is being continually modified as more is learnt. With the mix of pastures it may be possible to graze stock on green feed (& crop stubbles) year round and avoid the need to put stock on fragile dry pastures in summer.

	Crop stubble's	Wet flat	Alley pasture	Sub clover on gravel	Shrub plantation
January	x	x			
February	x	x			
March		x	x		
April			x		
May		x	x		
June		x	x		
July		x		x	
August				x	
September				x	x
October			x	x	x
November		x	x		x
December	x	x			

Establishment Survey 2003

Rob, Sally and Ben McTaggart
Area:
Mingenew 20ha - alkaline red/brown crumbly clay
Dandaragan 25ha - sand over gravel to wet sand

Species:
Mingenew - Katambora rhodes/Bambatsi panic (mix) 4kg/ha + Heavy land subclover/medic mix 10kg/ha
Dandaragan - Katambora, Callide and Finecut rhodes, Narok setaria and Green panic (sown separately) 4kg/ha

Time of Sowing:
Mingenew - 16th August
Dandaragan - 6th September

Preparation and Sowing:
Mingenew -
24/7 Sprayed 2L Roundup + 250mL 2,4D Ester 600
28/7 Stocked at approx. 25DSE/ha
16/8 Sprayed 1L Sprayseed
18/8 Seeding using combine with full cut points. Carrier of single super approx 10:1.
19/8 Rolled with tyre roller

Dandaragan -
15/8 Sprayed 1.5L Touchdown
6/9 Seeding using combine full cut points and DBS press wheel (18" spacing). Seed dropped on surface and pressed in. Carrier of single super approx 25:1

Happy with your weed kill:
Weed kill was very effective in Mingenew, however there was a germination of various weeds following late august rains. These don't appear to be a competition issue.
In Dandaragan some brassica weeds survived. However because the non-wetting topsoil was scooped aside with the wide points, the seedlings have had very little early competition.

Happy with the germination:
Germination in Mingenew has been a bit patchy, very thick in some areas and nothing in others. Two reasons could be: that the carrier was not mixed properly and therefore distribution of seed was patchy, or that because of the use of a tyre roller the surface was left very smooth which has caused it to dry and seal rapidly.
Germination in Dandaragan has been very good. Narok setaria was the last of the 5 lines to germinate.

Next year:
In Mingenew we will use the DBS system for seeding. The creation of more defined furrows will prevent wind from drying and sealing the soil surface too quickly to allow better germination. This will also help with water harvesting. We will also use a higher rate of carrier to get seed to flow better.

8) Other comments:
The sub clover/medic mix germinated and set seed within 75 days which will hopefully give a good legume base next season.
Using wide points at Dandaragan appears to have been very effective in moving the non-wetting topsoil (0-4cm) aside to allow the seed to be pressed into wet soil.

W.R. Carpenter Agriculture - Badgingarra
Area: 335 ha

Species:
Callide Rhodes grass, Setaria splenda, Signal grass, Green panic,
Puccinellia and Tall Wheat grass.

Time of Sowing:
Early October.

Preparation and Sowing:
Double knockdown and sown 1 - 2 cm deep with airseeder and press
wheels.

Happy with your weed kill: Yes.
Happy with the germination:
Very good germination on low lying areas. Poor germination on sandy banks.

Next year:
Possibly seed sandy banks in winter with Cadiz / ryegrass mix.

WR Carpenter

Garry and Debbie Collins - Morawa

Area: 25ha

Species: Evergreen Mix

Time of Sowing: end Aug early Sept

Preparation and Sowing:
Double knock with glyphosate 2L/ha first, 10 days later 1.5L/ha sprayseed
Air seeder/presswheels & knife points, sown shallow some deeper??

Weed kill: Some break through radish

Happy with the germination? No

Next year:
Still establishing what happened with germination this yr.

Other comments:
Could ants be eating the seed?

Thys and Erin Gorter - Kojonup

Area: 50 ha

Species: Evergreen Mix with Sceptre Lucerne

Time of Sowing: 19 September 2003

Preparation and Sowing:
Knockdown spray 26th Aug, then a follow up spray the day before sowing. Seeded Evergreen mix at 3kg/ha and lucerne at 2 kg/ha with airseeder.

Happy with weed kill?
Weed kill was effective. Certainly needed both sprays as a small area only had the 2nd spray and was not as effective - there were still a lot of weeds there and less germination.

Thys & Erin Gorter

One problem we did have was the germination of weeds after seeding. We killed everything off, but felt that the seeding operation must have encouraged weed seeds to germinate also.

Happy with the germination?
Absolutely stoked! Lucerne has definitely been the strongest and fastest out of the ground, but also first to wilt without moisture. Rhodes was next with the Setaria. Now the signal grass has taken over the Setariaand the Bambatsi has come through. Bambatsi plants are very strong, but not a lot of them.

Next year?
Try to prevent weed seeds from germinating. Open to suggestions on how to do this other than a hard graze with sheep.

Other comments:
Had cutworm infestation late November. Had to spray insecticide instead of graze, as we didn't have the fence finished! Would normally graze it to destroy them as we have done in the past with a lucerne stand.
Finding that all the perennials are establishing best on gravel country and taking a while on the gutless sand country. The plants are there, just taking a bit longer to grow. Wondering if we should have put a serradella in with the mix as well to cater for these areas. Might do that next time!

David Monks - Badgingarra

Area: 65 ha

Species:
Evergreen Mix, Superdan and Sub-tropical legumes with 30 kg super /ha as a carrier.

Time of Sowing: 19-26 September 2003

Preparation and Sowing:
2 L/ha Glyphosphate + 2% Amm Sulphate 2 weeks prior to seeding, 1.5 L/ha Sprayseed preseeding 2-5 days, Min Till combine with "v" shape press wheels

Weed Kill:
Very effective on dry sand although erodium struggled back, poor on damp country, grasses came back well. Damp areas may need 2 x Sprayseed following Glyphosphate for 100 % control.

Germination: Overall Yes, first year of using Evergreen mix and very easy to use. Signal grass is strong on high dry sand, Rhodes going ballistic on damp ground. However I expected better and I suspect seed was sown too deep reducing potential germination. *Continued on Page 13*

Gary Peacocks SGSL raised bed trial at Bibby Springs. This section was sown to a mix of ryegrass, Balansa and sub clover. This paddock had become Barley grass dominant with some bare scalds due to winter waterlogging and salinity. The raised beds were able to handle the very wet winter this year and resulted in good pasture and Barley (another section of the paddock) establishment. However it appeared that there was more leaching of fertiliser and split applications will be necesary. 29 October 2003

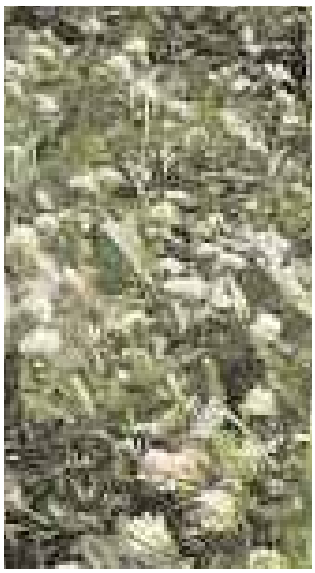
Greg Johnsson of Kangaroo Island reports that two small paddock sowings of ST perennials sown in early November this year have had a really good germination.

The seed mix contained Callide and Katambora Rhodes Grass, Bambatsi Panic, Gatton Panic, Signal Grass, Strickland Tall Finger Grass and Solander Setaria.

Sowing rate was 4 kg/ha through a T boot seeder mixed with single super. The paddocks were bad fog grass areas so the last 2 years they have had hay crops sown on them using both mechanical and chemical preparation to get rid of the fog. This year they had a light sowing of oats which was sprayed out with Roundup 6 weeks pre-sowing and then Roundup was applied again 4 days before sowing. Weed kill is excellent and area is very clean with good moisture preservation.

Matt Ryan from the Department of Agriculture in Esperance successfully used a mixture of 24D Amine and Dicamba (700 ml/ha each) over sub-tropical grass seedlings to control wireweed.

Desmanthus is a sub-tropical legume grown in Queensland. This impressive stand was seen at Gympie not far north of Brisbane. We hope to test this species in nursery trials next year.



A Geoff Moore trial at Bibby Springs showing Balansa clover growing over established Rhodes grass. Other annual legume species doing well are Persian clover, Cadiz, slender serradella, Gland clover, arrowleaf, medic and sub clover. The site was sprayed twice in May (2 x 1.5 l/ha Sprayseed) before sowing with a disc drill. While some of the legumes are doing exceptionally well in their first year, the challange will be to persist over time in a perennial grass stand. Pic 26 September 2003

Paul Sanford, Tim Wiley and Philip Barrett-Lennard examining a Queensland DPI sub-tropical grass trial at Gympie, Queensland. Some useful species untried in WA were observed. We plan to trial some of these species next year.

Rachel Bagshaw from the Mingenew-Irwin Group is working on a seed production project with Chris Gillam from Irwin. They have a range of sub-tropical grasses including Rhodes, Signal, Panic and Setaria under irrigation. They also have a small amount of the sub-tropical legume Lotononis (pictured) that was harvested recently. Stay tuned for more details.

Water use by annuals and perennials

Phil Ward and Ian Fillery, CSIRO, Perth, Phone: 08 9333 6681

Main points

- Leakage can only be controlled by creating storage space in the soil for excess water.
- Annuals can't adequately control leakage.
- It is difficult to control leakage on deep gutless sands.
- Perennials can play a role in controlling leakage on other soil types.

Background

With the recent expansion of dryland salinity, the requirement for greater inclusion of perennials into the farming system is now widely acknowledged. However, the economic reality is that annual crops are likely to remain as the favoured land use option for much of south-western Australia. Therefore, it is important that we develop an understanding of the way in which annual crops use water, and how rates of water use are limited by environmental and biological factors.

General principles

The rate of water use by plants can be thought of in terms of supply and demand. The actual rate of water use will be limited by whichever of supply and demand is the lowest.

Supply is determined by rainfall (the amount of water entering the soil) and root growth (the availability of water in the soil to the plant). Therefore, the supply side of the equation can be manipulated to some extent by choosing plant types with different rooting patterns.

Demand is determined mostly by the capacity of the air to take water, and is limited to about 1 mm/day on average in winter, and 8 mm/day on average in summer. Demand does not change much with different plant species. The practical implication of this is that during a wet winter, when leakage beyond the root zone and eventual groundwater recharge are likely, there is no scope to increase the rate of water use, as it is limited to 1 mm/day by atmospheric conditions. The best we can do is to use more soil water during summer, so that when the next wet winter arrives, there is more storage space in the soil to absorb the excess water before leakage and recharge commence.

Annuals

Annuals, by definition, only live for a short period of time. Because of this, and the harsh nature of many Australian soils, there is not a lot of opportunity for different annual species to develop substantially different rooting patterns, and so their rates of water use tend to be very similar. In recent trials at Esperance and Merredin, different crops (wheat, barley, lupins, canola), either fertilized or unfertilized to achieve different production levels, were monitored throughout the growing season. Total differences in water use within a whole growing season were less than 15 mm in most cases, despite three-fold differences in dry matter production. The only exception was lupins grown at one of the Esperance sites, where their ability to maintain growth under favourable spring and summer conditions, combined with their ability to root deeply into the deep sandy soil, allowed them to use an extra 50 mm of soil water compared with canola or barley. At this stage we don't know how often seasonal conditions will allow this to happen.

Perennials

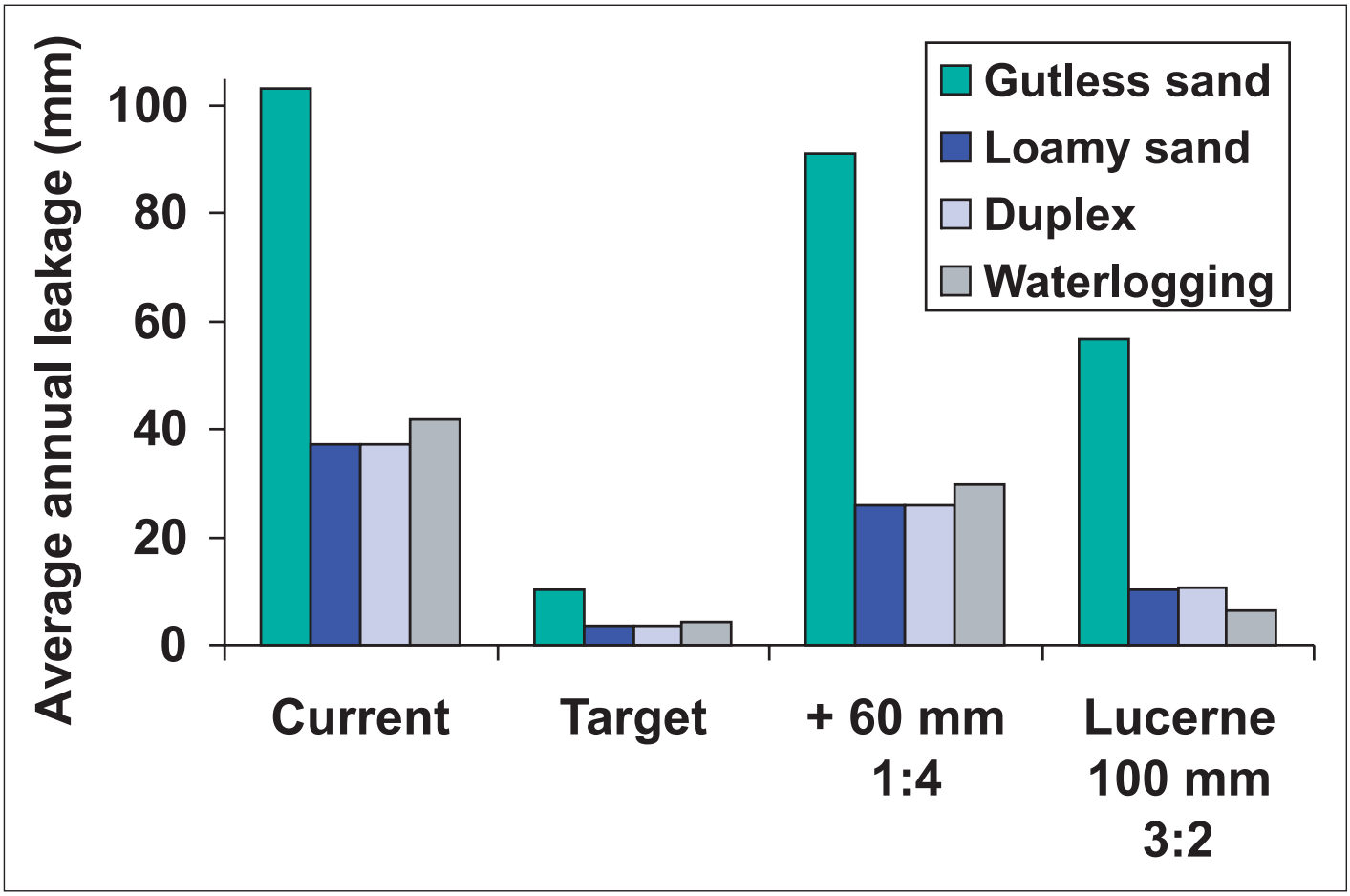
Perennials can be incorporated into farming systems as either plantations (permanent blocks), belts (permanent strips with annual crops in between), or as a phase rotation (a phase of perennials, followed by a phase of annual crops).

Because of their extended period of growth over several years, perennials have the capacity to develop root systems more tailored to individual plant species and soil and environmental conditions. Therefore, there can be considerable variation between different perennial species in terms of their patterns of soil water use. As a general rule, trees (e.g. tagasaste) tend to have deeper root systems than perennial legumes such as lucerne, which in turn have deeper roots than the perennial grasses (Phalaris, Rhodes grass, etc). In many trials around Australia, lucerne created an average of about 100 mm of extra soil water storage space, sometimes referred to as a buffer. The perennial grasses tend to create buffers of around 50 mm.

Impact of water use on leakage

In the West Midlands, average annual groundwater recharge is of the order of 50 mm/year for most soil types, and more than 100 mm/year on deep sandy soils. Under native vegetation, average annual leakage was probably of the order of 5-10 mm/year (see graph). With this in mind, the buffer sizes generated by perennials look encouraging in terms of controlling leakage from the root zone. However, annual leakage varies considerably depending on the seasonal conditions, and this has the effect of decreasing the effectiveness of buffers in preventing leakage. In dry years where leakage was only going to be a small amount anyway (say, 5 mm), the presence of the buffer of 50 mm doesn't make much difference (5 mm, in fact!). In wet years, leakage may have been 200 mm, and the presence of the 50 mm buffer reduces leakage to 150 mm.

Calculations based on rainfall for Moora show that if annuals (eg lupins) can use an extra 50 mm of soil water one year in four, average annual leakage is reduced from 103 to 91 mm on gutless sands, and from 37 to 26 mm on other soil types (see graph). A phase rotation of 3 years perennial (with a buffer of 100 mm), followed by 2 years annual crop, reduced average annual leakage to 57 mm and 10 mm for the same soils.



Establishment Survey 2003

Continued

Germination of perennial legumes was shocking - only Lablab germinating. Butterfly pea, Joint Vetch, Wynn Casia and Siran stylo have failed to germinate - possibly the seed was non viable due to storage time. All seed was inoculated with the correct rhizobia prior to seeding into damp to dry soils.

Next year:
Use a Snake chain following the tyne pre press wheel to reduce seeding depth

Other comments:
Magnificent melon germination post seeding effectively taken out by 700ml/ha LVE 24D amine + 2% oil (due to heat) + 180 ml/ha Alpha Cypermethrin (Fastac) to take out wingless grasshoppers & Heliothis. Pest control on perennial legumes will be a big item in the future.

Richie Morcombe - Jurien Bay

Area: 23 ha

Species: Evergreen Mix

Time of Sowing: 13 September 2003
Preparation and Sowing:
Sprayed 2lt/ha glyphosate 12/8/03 - grazed. Resprayed 2/9/03 1lt/ha glyphosate.
Seeded with combine (1 row digging) and coil packers

Happy with your weed kill: Yes, mostly.

Happy with the germination:
Some areas very good, other areas very thin

Next year:
Consider rolling again, seed more to contour, heavier grazing earlier in year

Other comments:
Very strong winds and rain just after seeding has done some damage. Huge germination of melons, not sure about spraying??

Perennial grasses for light weight weaners

Matt Ryan and Megan McDowall, Department of Agriculture, Esperance, Phone: 08 9083 1111

A three year cattle trial looking at the response of light weight weaners grazing summer active perennial grass species is set to begin in January 2004. This trial has been developed by the Department of Agriculture in Esperance and funded by the Cattle Industry Compensation Fund to focus on feeding options for lighter weight weaners.

With an increasing focus on later calving throughout the agricultural region as well as an increase in cattle production from lower rainfall areas, which experience a shorter green feed season, the occurrence of lighter weight weaners is set to increase. Calves that are weaned at a lighter weight require feed that is of higher quality to maintain or grow at the same rate as heavier weaners. It is for this reason that light weight weaners are often harder to finish to a marketable weight over the summer and autumn period.

The trial will be carried out at Esperance Downs Research Station which is 35 km north of Esperance. It is set to investigate whether a mix of subtropical grass pastures can nutritionally sustain a moderate growth rate in lighter weight weaners (180 - 230 kg) over the summer and autumn.

There are two mixed grass pastures that will be investigated in the trial and they consist of a lower quality perennial grass pasture and a higher quality perennial grass pasture. The growth of the weaners grazing the different quality grass pastures will be compared against weaners grazing a lucerne pasture and weaners grazing stubble supplemented with lupins. The full treatments and species within the grass pastures treatments can be seen below:

1. Control: Light weight weaners grazing stubble + lupin supplement of 1 kg/hd/day
2. Light weight weaners grazing lower quality subtropical perennial grasses (kikuyu, Finecut rhodes grass and Callide rhodes grass)
3. Light weight weaners grazing higher quality subtropical perennial grasses (Solander setaria, Splenda Setaria, Bambatsi panic, Gatton panic and Dundas tall wheat grass)
4. Light weight weaners grazing lucerne

The grasses for this trial have been established this year and were sown on the 20th and 21st of October through a normal combine seeder which was set up with knifepoints and press wheels. The seed was mixed with fertiliser at a rate of 15kg to 1 kg of seed to act as a carrier and sown at a depth of 5mm. The photos below were taken seven weeks after sowing.

The Department is currently looking for 100 steers of between 6 to 8 months of age and 170 to 230 kg in liveweight. If you are able to supply animals that fit these specifications the Department is prepared to pay a competitive price as we realise that in a good season lighter weaners may be difficult to source.

For more information on the trial contact Matt Ryan on 90831107

One of the trial plots at EDRS showing an excellent establishment of sub-tropicals

Flexi-N boosts grassy pasture production.

Stephen Loss, CSBP Field Research Manager, Kwinana, Phone: 08 9411 8437

Background

For many years applying nitrogen (N) to pastures was considered undesirable because it was thought to suppress the legume component and possibly reduce N fixation. Many pastures have poor legume component for one reason or another, and recent trials have shown that the application of Flexi-N can boost their productivity enormously.

CSBP has conducted two demonstration trials investigating the N response of perennial pastures to Flexi-N at "Bibby Springs", west of Badgingarra.

Results

In mid July 2002, up to 400 L/ha Flexi-N (168 kg N/ha) and 160 kg/ha potash were applied to a pasture dominated by ryegrass and capeweed. Two months later these applications had increased dry matter production from 800 to 4400 kg/ha (Fig. 1).

The Flexi-N also improved the quality of the pasture, more than doubling the protein content (from 6.6 to 18.2%) and increasing the metabolisable energy (ME) from 8 to 9.4 MJ/kg (Fig. 2). The increase with 100L/ha Flexi-N (42kg N/ha) plus potash was equivalent to about 56 MJ/ha/day, enough to support an extra 5.6 DSE/ha.

In 2003, up to 400L/ha of Flexi-N was applied to a similar grassy pasture on September 17. Only 22 days later the dry matter production had increased from 720kg/ha in the nil to 1970 kg/ha with 400 L/ha (168kg N/ha). This is equivalent to an extra 57 kg/ha/day growth. Quality measurements (protein and ME) of samples from these treatments are currently underway.

Further replicated work investigating the benefits of Super, potash and Flexi-N on perennial pastures is planned for 2004.

Take Home Messages

Flexi-N applications can dramatically increase pasture dry matter production and quality in a short period of time, especially if dominated by grasses.

Strategic applications of N can be used to increase pasture carrying capacity during winter when feed is in short supply. Spring applications of Flexi-N may benefit summer grasses in addition to the ryegrass.

Flexi-N may have an advantage over urea for N applications to perennial pastures in warmer months, since it is less prone to volatilisation losses.

Fig. 1: Dry matter response 2002

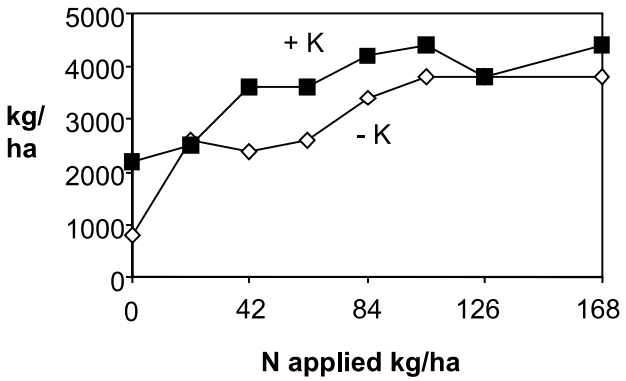


Fig. 2. Protein and metab olisable energy

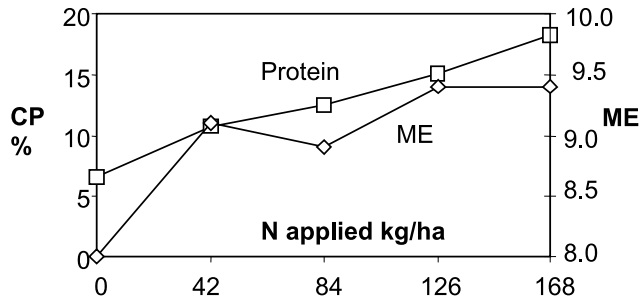
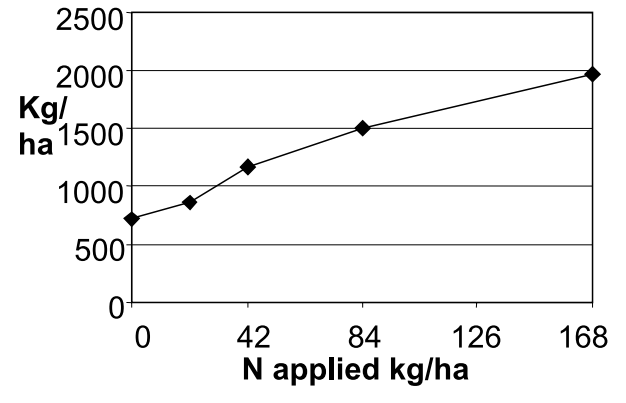


Fig. 3: Dry matter response 2003



Growth and Quality Response of Kikuyu to Summer Nitrogen Application

Megan McDowall, Department of Agriculture, Esperance Phone: 08 9083 1111
David Johnson, The Ireland Farm, Esperance, Phone: 08 90713842

Introduction:

Kikuyu pasture is a summer active sub tropical grass species. When moisture and temperature are not limiting, kikuyu can be highly responsive to increased nitrogen availability. There is a potential opportunity to use a strategic nitrogen application during the warmer months on an opportunity basis to provide out of season green feed. The range of responses to nitrogen application reported in the literature vary significantly, however are commonly close to 20 kg green DM/kg N. Another less commonly discussed outcome of improved N status is an increase in Dry Matter Digestibility (DMD%). Kikuyu growing on sandy soil in the Esperance region has been commonly measured at a DMD of 55 - 60%. A DMD increase of 5% can result in the pasture being of sufficient quality for a moderate level of production, compared to maintenance at the currently measured levels.

The trial was initiated in response to observed differences in kikuyu paddocks where cows had urinated. The patches were much greener and apparently growing better than areas that had not been urinated on. The cows were preferentially grazing these patches.

Aim:

This trial aimed to measure the qualitative and quantitative response of kikuyu pasture to application of three levels of Nitrogen in conjunction with a significant summer rainfall event. Nitrogen was also applied in conjunction with other nutrients to determine whether other nutrients were limiting

Method:

A section of an existing kikuyu pasture paddock was fenced off and divided into plots.

The treatments consist of :

1. Control
2. 100 kg/ha Urea
3. 200 kg/ha Urea
4. 400 kg/ha Urea
5. 3:1 Urea Ammonium Sulphate (at equivalent rate of nitrogen to treatment 3; 92 units N)
6. Complete Garden Fertiliser (at equivalent rate of nitrogen to treatment 3; 92 units N)

The plots run in an east/west direction, dimensions are 3m x 33 m. A further (3 m wide) treatment of 100kg potash was applied across the end of all the plots

The trial has been replicated three times. The trial site is located on the south western end of paddock 10 (high kikuyu) at Ireland Farm.

Results:

The amount of green dry matter harvested from each of the plots was estimated by assessing Feed on Offer (kg DM/ha) before and after cows crash grazed the plots for a 24 hour period. This occurred at approximately three weekly intervals after the initial application of fertiliser.

The results illustrated in Figure 1for the first two harvest periods show a clear linear trend in dry matter harvested relative to the application rate of Nitrogen fertiliser. These first two harvest periods accounted for a 42 day (6 week) period post fertiliser application. The third harvest period showed no clear trend, except for perhaps an ongoing production response from the 400 kg Urea treatment.

There was no clear trend of an additional response from either the UAS or complete fertiliser treatments, remembering that their N application rates were equivalent to the 200 kg Urea treatment.

Figure 1: Green dry matter harvested from fertiliser plots by cows allowed to crash graze for a 24 hour period.

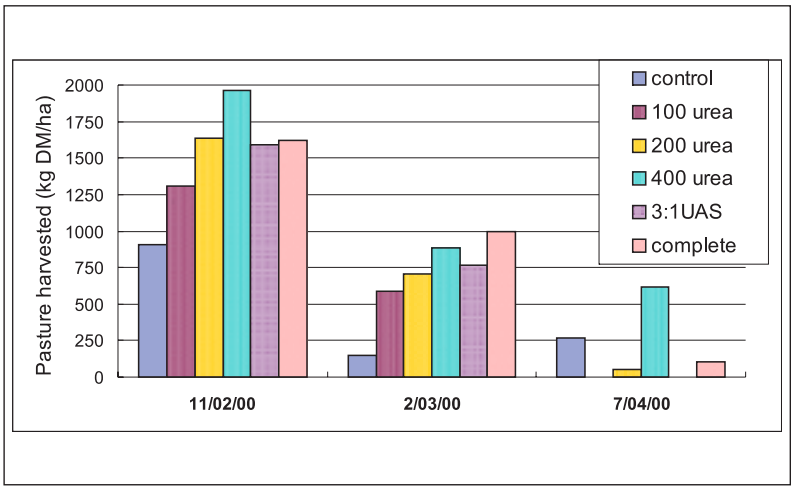


Table 1: Total amount of extra green DM (kg/ha) harvested by cows fertilised plots relative to control plots, and the cost of the green DM according to fertiliser applied

Treatment	Units N Applied	Response kg green DM	$/t green DM
Urea 100 kg/ha	46	523	74.2
Urea 200 kg/ha	92	1074	72.3
Urea 400 kg/ha	184	2142	72.5
3:1 Urea AmmSul	92	977	84.0

Table 1 illustrates that there was very little difference in the efficiency of the response at different rates of urea application. This is also indicated by the linear response urea application. The cost of the green dry matter harvested by the grazing cows was very similar at $72 - $74/tonne. The cost of the green dry matter harvested from the 3:1 Urea Ammsul treatment was slightly higher at $84/t due to the higher cost of the total application to achieve a similar response.

The other factor of interest was whether application of nitrogenous fertiliser generated a response in quality of the green dry matter produced. Figure 2 illustrates a significant response in dry matter digestibility at all levels of nitrogen application

This response lasted for 77 days after the original application. This response was no longer apparent when the plots were sampled 111 days after the initial application.

How the research can or will be integrated into WA farming systems:

These results indicate that an application of up to at least 400 kg of nitrogen to kikuyu pasture on deep sandy soil when temperature and moisture are not limiting can result in the production of green feed of better quality than most hay for between $70 - $80/t. This is very price competitive with hay and other supplements available.

The results also indicate that, up to 400 kg of urea application there was no reduction in the efficiency of the total DM response and there was an additional increase in the quality of the green DM produced. This extra improvement in DMD% was, in effect a freebie, because the same amount of green DM was being produced relative to the quantity of urea added. The improvement of DMD% from 50-55% to 60-70% is significant as the pasture is able to support a level of growth in most classes of animal as opposed to maintenance to sub-maintenance prior to N application.

This looks like a very attractive option, however there are a couple of cautionary factors. Firstly; this response was achieved under ideal conditions. The urea was applied the day before a 50mm rainfall event, therefore there would have been very little wastage through volatilisation. The soil was poor quality deep sand, therefore the kikuyu would perhaps have been more highly responsive than in a more hospitable environment. The cattle crash grazed the pasture at high stocking rates over a short period, therefore there was very little wastage.

Therefore this small trial indicates that strategic nitrogen application to summer active grass species potentially has a place in the range of options available to manage animal nutrition through the summer months. Care needs to be taken, however that the conditions are conducive to a response, and that a response is consumed by animals, not left in the paddock to be admired.

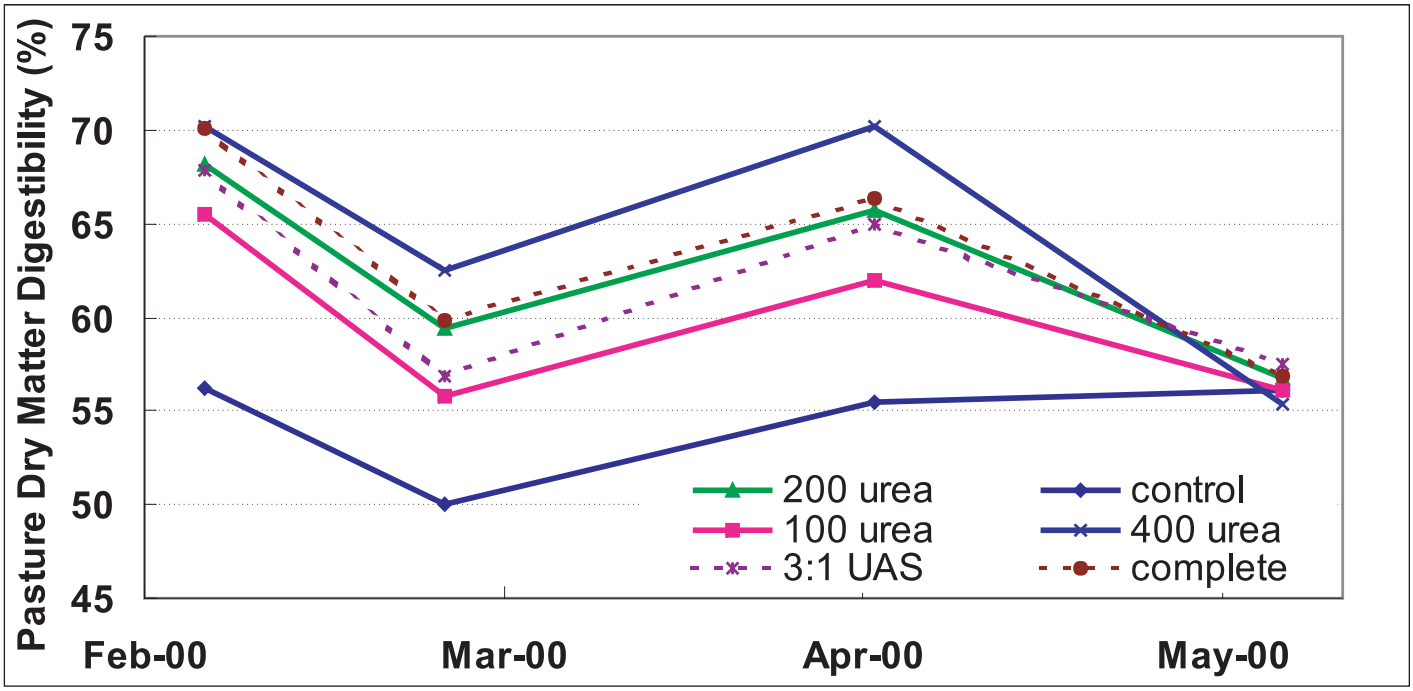


Figure 2: Dry matter digestibility of kikuyu pasture in response to application of various rates of urea, urea/sulphate of ammonia or complete fertiliser on January 20th 2000.

Pasture researcher abroad in South Africa

Paul Sanford, Department of Agriculture, Albany, Phone: 08 9892 8444

Earlier this year I was fortunate enough to travel to South Africa to attend the International Rangeland Congress with support from Meat and Livestock Australia and the Department of Agriculture. In addition to attending the congress I also took the opportunity to visit a number of researchers with expertise in sub-tropical perennial grasses of African origin. These are some highlights from my trip.

Prior to the Congress I attended a two-day workshop run by Professor Fred Provenza from Utah University entitled 'Application of behaviour principles to management of rangelands'. The workshop was excellent and the subject matter thought provoking. Fred presented a lot of information most of which is available on his website www.behave.net, here are a couple of interesting subjects.

Social factors involved in diet selection

Historically researchers have typically only considered foraging behaviour in terms of how plant physical and chemical characteristics influence an animal's ability to achieve high rates of nutrient intake. The social environment is rarely considered, yet a young animal's interaction with its mother and peers has a lifelong influence on what it eats.

As offspring begin to forage they learn to eat foods mother eats and they remember those foods for years. Research has shown that lambs fed wheat with their mothers eat more wheat than lambs exposed to wheat without their mothers. Even 3 years later intake of wheat is nearly 10 times higher if lambs were exposed to wheat with their mothers compared to those exposed without mothers.

As young animal's age they interact increasingly with peers, who then become a major influence on one another's behaviour. Young animals encourage one another to explore new foods and environments.

Changing in grazing management

Changes in grazing management affect every part of the system, soils, plants, herbivores and people. It may take as many as 3 or more years for systems to adapt to changes of this nature. For example, when a rancher in Montana changed grazing practices to enhance and maintain biodiversity, it took 3 years for his cows to adapt to the new diets they were required to eat and as many years for soils and plants to adapt. In the end the productivity of the system improved, soils and water were healthier, plant diversity increased and more animals were produced. During adaptation, however, animal performance – food intake, weight gains, reproductive rates – typically declined before they improved.

Therefore producers need to understand that there will be a transition period when changing from one grazing system to another and grazing trials need to be run for more than 3 years to capture all the benefits of any new system.

Top-down control of grassy ecosystems

One of the most interesting papers presented at the congress was this one written by William Bond from Capetown University.

The current importance of fire in many grassy ecosystems may be an artefact of large mammal extinctions in many parts of the world during the Pleistocene. Grazer-maintained, very short "grazing lawns" occur in parts of east and southern Africa with an intact African mammal fauna. The grasses maintain high productivity under intense grazing pressure. The ecology and extent of grazing lawns is not well understood. Lawn grass species have generally been lumped with unpalatable pioneers indicative of overgrazed rangelands in the South African literature. However grazing lawns support a high biomass and diversity of mammal grazers compared to the tall grasslands preferred by cattle producers. Studies on grazing lawns in South Africa show that they are maintained by heavy grazing across diverse soil types. Lawns revert to tall grasslands if grazing pressure is reduced. These grazer-maintained systems have a distinctive flora and fauna suggesting a long evolutionary history. They may have been much more extensive in the world's rangelands when there was still an existent megafuna. Fire and large mammal grazers appear to act as alternative agents of top-down control, producing ecosystems with different suites of plant and animal species. We are only just beginning to explore how they interact to determine the proportions of tall and short grasslands in savanna landscapes.

The productive grass species that occur naturally in African "grazing lawns" may be useful additions to grazing systems in southern Australia.

A trial site north of Durban South Africa with Napier Grass in the foreground. ***Photo: Paul Sanford.***

Sub-tropical grass research

In the last decade comparatively little research has been done on sub-tropical grasses in South Africa in comparison to earlier times. The current research effort is directed, at least in the north east, on developing temperate species like lucerne to fill the winter feed gap caused by naturally occurring dry winters.

Richard Reynolds stationed at Owen Sitole College of Agriculture north of Durban is one of the few researchers actively evaluating new sub-tropical grasses. I visited Richards trial and found the following species/cultivars interesting.

1. Forage peanut

There were 2 interesting forage peanuts included in the trial, Arachis pintoi and A. glabrata. A. glabrata is a high quality forage legume for intensively grazed pastures on infertile, acid soils. Unfortunately A. glabrata is non-seeding and can only be planted vegetatively. A. pintoi is better suited to moderately fertile soils and is less tolerant of intensive grazing however it does seed freely.

2. Napier grass *(Pennisetum purpureum)*

Napier grass is a very productive, warm-season grass that is typically very tall. Interestingly Richard Reynolds has been trialing some dwarf types that have been developed by the Taiwanese, that would be worth evaluating in Australia however one major disadvantage is the fact they have to be propagated vegetatively.

2. Star grass *(Cynodon nlemfuensis)*

Star grass is a warm-season perennial creeping grass that is similar to couch (Cynodon dactylon). Star grass however is leafier than couch and as a consequence may be superior for livestock production in medium to low rainfall environments. Negatives include propagation by rooted runners and potential weed risk (is less weedy than couch).

3. St Lucia grass *(Brachiaria brizantha) and*
Kennedy ruzi grass *(Brachiaria ruziziensis)*

Brachiaria species produce high yields, show excellent response to fertiliser, are persistent and remain green long into the dry season. Both signal grass (B. decumbens) and Humidicola (B. humidicola) have shown considerable potential. It is therefore reasonable to suggest these two species are also worthy of testing given how highly they are regarded in South Africa. St Lucia grass is reported to have better forage quality and be more palatable than signal grass. However, unfortunately it can only be propagated vegetatively. Main attributes of kennedy ruzi grass are good seed production and ease of establishment, poor cold and frost tolerance.

4. Guinea grass *(Panicum maximum)*

Guinea grass is probably one of the most valuable grazing grasses in South Africa. It is particularly palatable and delivers high leaf production. The cultivar Gatton has performed very well in WA. Richard Reynolds has been comparing Gatton to the cultivars Mombasa and Tanzania, both are producing around twice as much dry matter as Gatton.

6. Wool grass *(Anthephora pubescens)*

Wool grass is a tropical perennial grass that is highly palatable and well utilised by stock and game in South Africa. In South Africa it occurs in the 250 to 650 mm rainfall areas, is very drought resistant and performs well on soils with low fertility. Could be very useful for the medium to low rainfall areas of southwest WA.

Next I visited Alan Short and John Cunningham at the Cedara Research Station just west of Durban. Of interest was the all year round beef cattle production on kikuyu. This system relies on split applications of nitrogen through the wet summer and large quantities of frost affected kikuyu (foggage) through the dry winter. The trial has been running for 15 years, consistently performing better than the traditional system that typically relies on dry residue and supplement through winter. Recently nitrogen rates have been reduced in response to increased soil nitrogen fertility.

Sub-tropical perennial species of interest at Cedara included, Paspalum notatum cv. Tifton 9 which was described as being superior to previous cultivars. A cross between couch (Cynodon dactylon) and star grass (C. nlemfuensis) named K11, which is more productive than couch and finer leaved than star grass. Vetiver grass (Vetiveria zizanoides) which is used as a biological contour bank and is also harvested for essential oils contained in its roots.

I also had a useful discussion with John Cunningham regarding sub-tropical legumes in the genera Lotononis and Indigofera. John considers Lotononis to have the greatest potential for forage as it typically has low tannin content in comparison to Indigofera. Just out of interest there are 150 different species of Lotononis naturally occurring in South Africa, a few of which have potential as forage plants.

My final visit was to Dr Albert Smith at the ARC Roodeplaat Grassland Institute near Pretoria just north of Johannesburg. Albert gave me a tour of the gene bank and its associated nursery, which contain a large number of sub-tropical grass and legume lines collected from throughout South Africa. A number of these lines may be useful for a new Salinity CRC project that will be selecting sub-tropical grasses that are better suited to temperate environments. In addition to the gene bank the Grassland Institute also has a large database containing the distribution of flora throughout South Africa. This database could prove most useful for locating promising cold tolerant sub-tropical grasses that naturally occur in the cooler parts of South Africa.

Overall my trip to South Africa was a great success, which improved my knowledge considerably, hopefully much of which I learnt will be applied to some degree in the development of new pasture systems based on sub-tropical grasses.

The Fifth International Herbage Seed Conference

Dr Jesse Skoss, Pasture Agronomist, Manjimup, Phone: 08 9772 1225

Well, does a cat like liver? YES! And do I appreciate any information regarding perennial pastues that I might not know? YES, again! So, when I read about the fifth International Herbage Seed Conference being held at the Queensland University Agriculture Collage at Gatton, I quickly enrolled. This conference was held from November 23 to 26 with a post-Conference tour of temperate herbage seed production in central and northern Victoria and southern New South Wales from November 27 to 29.

The conference was titled:

HERBAGE SEED FOR THE NEW MILLENIUM – NEW MARKETS, NEW PRODUCTION, NEW OPPORTUNITIES

The International Herbage Seed Conference is held every four years under the auspices of the International Herbage Seed Group. In line with IHSG's objectives, the Conference aims to encourage cooperation and to facilitate communication between workers involved in herbage seed production, and research in the extension and application of such research. The previous four conferences were held in Tune (Denmark – 1987), Corvallis (Oregon, USA – 1991), Halle (Germany – 1995) and Perugia (Italy – 1999).

Over seventy people attended the Gatton portion of the conference; and sixty in attendance at the post conference tour. All eastern Australian states had members presenting papers or posters. Eighteen countries were represented at the Conference giving papers or posters. They were Norway, Sweden, Poland, Denmark, Holland, Germany, France, England, Wales, Scotland, U.S.A, Canada, Australia, New Zealand, Japan, china, Iran, and Libya.

The proceedings were opened by the President of IHSG, Dr. William C. Young, Professor and Extension Seed Production Specialist of Oregon State University at Corvallis, Oregon, USA.

Dr. Young stressed the Conference objective was to encourage continued cooperation and communication between workers actively engaged in herbage seed production and research. The early development of pasture seed production for individual use by farmers metamorphosed gradually to the highly skilled and specialized production for worldwide demand. Thus the Seed Industry developed in areas conducive for production, or amenity usage, i.e. landscaping or sportfield planting.

While the Seed industry may be, highly competitive, there is cooperation in sharing research which is not generally found in Industry.

The take home lesson I gained from the Symposium was the absolute need for complete weed control in any pasture seed production enterprise.

The production of pasture seeds to suit our Western Australian requirements are met only by several Queensland organizations who are producing small numbers of grass species for which we pay high prices.

Production of perennial grass (and legume) seed should occur in Western Australia in order to lower shipping costs and inspection charges.

Very few grass species that are amenable to our environment have been grown here. Most are still unknown to us.

I am fully aware that the "Establishment" has not shown much interest regarding "pasture species for the future."

I base the above statement on the fact that, as of the year 2000, ninety percent of pastures in WA were still annual and it would be good to have cooperation in alleviating this situation!

My intention is to continue to investigate alternative species of perennial grasses and legumes for Western Australia.

Gatton vs a higher yielding Panic grass at a South African trial site north of Durban. Photo: Paul Sanford