

Successful use of sub-tropical grasses on-farm

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Abstract. As we receive most of our rainfall during summer, it is logical that summer growing (sub-tropical) perennial grasses should be considered for introduction to our pasture system; particularly if a good native alternative is not already part of the pasture. This paper shares the experiences of producers who have successfully incorporated sub-tropical grasses into their pasture systems and outlines some of the considerations for issues such as pasture establishment and species choice.

Introduction

"Towri" has been owned by George and Marce Avendano since 1990. It is west of Boggabri next to the Pilliga scrub and has an annual rainfall of 600 mm. They have accumulated 2830 ha of old cropping country with soils ranging from medium red-brown kurrajong country to deep sandy acid soils. Some of the medium textures soils are very hard. Their beef cattle enterprise consists of about 650 breeders. Most of the steers and heifers are grown out and sold at 400-500 kg to feed lots.

There is a strong focus on pasture improvement at "Towri". A range of winter legumes have been introduced and this has been complemented by a fertiliser program aimed at correcting nutrient deficiencies. During this time, summer growing perennial grasses have been established on 800 ha. The performance of these grasses has been so outstanding that the Avendano's have stopped growing summer forage crops and are aiming towards not having to farm winter forage crops either.

"Uambi" is a much smaller property which was purchased by Stuart and Denise Murray in 1995. It is 688 ha and is about 8 km north of "Towri". Many of the soils have been severely degraded and set like concrete when dry. These sandy soils are extremely acid, however there is some better medium red-brown country. "Uambi" runs a small herd of breeding cattle and is a second job for the Murray's with an average of about 1.5 days a week available for the farm. A combination of fertiliser, winter legumes and summer perennial grasses are gradually turning the degradation around.

On both properties the lessons learned during the drought (possibly the worst in our memory) support the continuation of this improvement programme.

Native or introduced species?

From time to time we read and listen to comments like "We are really going to have to go back to relying on native pastures to get us out of trouble when we have a drought".

A person I know well made a similar comment at a meeting. I rang him the next day to talk about this comment which resulted in a visit to his property. Whilst we were driving around looking at the pasture species my friend said "You know, 90% of my natives are introduced". In this case it was the introduced species that were producing almost all his feed as we started to recover from the drought.

The point is many of us don't realise there are lots of introduced species (some now naturalised) in our pastures making a significant contribution to our feed. A few that come to mind are soft brome (*Bromus molliformis*), annual ryegrass (*Lolium rigidum*), liverseed grass (*Urochloa panicoides*), hare's-foot clover (*Trifolium arvense*) and cluster clover (*Trifolium glomeratum*).

Probably the most abundant and extremely valuable introduced naturalised legume is burr medic (*Medicago polymorpha*) also called trefoil or clover. These together with the other more well known introductions such as subterranean clover (*Trifolium subterranean*), serradella (*Ornithopus* spp.) and phalaris (*Phalaris aquatica*) are now an important part of many pastures.

At present the list and distribution of desirable introduced summer growing perennial grasses on the

North-west Slopes and Plains is small, but increasing.

Introduced summer growing perennial grasses are performing

"Fancy grasses won't grow here" and "They won't grow on my place, I don't get as much rain as you" are a couple of the comments we have heard from producers in our area.

The use of these introduced summer perennial grasses is not new to Australia. In Queensland, buffel grass (*Cenchrus ciliaris*) and many other introductions have been widely sown. Buffel grass has colonised millions of hectares. There are some that claim they are too successful.

The history of these grasses in northern NSW is not

as long. However, with more varieties now available, plus information gained from NSW Agriculture trials (coordinated by BR McGuffie and I.H McCormick) sown throughout northern NSW in the mid-1990s, their use is gaining momentum.

Two of these trials were sown in the Narrabri region, one on a light soil, the other on a medium clay. The trials contained 31 introduced grass varieties and 2 native species (Table 1). It is now 10 years since the first was sown. The recent drought, possibly the worst in the last 100 years, severely tested the grasses providing valuable information about their ability to survive in our environment. The last time they were assessed was in February 2004, as conditions after the worst of the drought started to improve. The results of these trials and observations of producer

Table 1. Persistence of summer grasses in NSW Agriculture trials in the Narrabri district in February 2004 (Data collected by S. Murray). Data for the light soil are average persistence of grasses in a series of trials sown in 1994, 1996 and 1998. The medium clay site was sown 1998. Persistence was scored using a scale ranging from 0 to 10. A score of 0 was given when no plants were found. A score of 10 was given to grasses that survived the duration of the trial and were apparently unaffected by the drought. '-' indicates lines not sown in trial

Cultivar name	Common name	Genus	Persistence score		
			Light soil	Medium clay	
Biloela	Buffel	<i>Cenchrus</i>	10	10	
American	Buffel	<i>Cenchrus</i>	10	-	
Gayndah	Buffel	<i>Cenchrus</i>	10	-	
Bella	Buffel	<i>Cenchrus</i>	10	10	
Viva	Buffel	<i>Cenchrus</i>	10	10	
	Birdwood	<i>Cenchrus</i>	4	-	
Gatton	Guinea grass	<i>Panicum</i>	9	-	
Petrie	Green panic	<i>Panicum</i>	9	-	
Bambatsi	Makarikari	<i>Panicum</i>	6	9	
Premier	Digit	<i>Digitaria</i>	8	7	
Apollo	Digit	<i>Digitaria</i>	9	4	
Strickland	Finger	<i>Digitaria</i>	8	5	
Bisset	Creeping bluegrass	<i>Bothriochloa</i>	9	9	
Medway	Indian bluegrass	<i>Bothriochloa</i>	8	8	
Bowen Indian	Indian bluegrass	<i>Bothriochloa</i>	8	-	
Swann	Forest bluegrass	<i>Bothriochloa</i>	7	5	
Hatch	Creeping bluegrass	<i>Bothriochloa</i>	5	-	
Saraji	Sabi	<i>Urochloa</i>	9	7	
Consol	Lovegrass	<i>Eragrostis</i>	7	7	
Inverell	Purple pigeon	<i>Seraria</i>	1	9	
Callide	Rhodes	<i>Chloris</i>	3	-	
Katambora	Rhodes	<i>Chloris</i>	2	4	
Finecut	Rhodes	<i>Chloris</i>	2	6	
Topcut	Rhodes	<i>Chloris</i>	3	3	
Nemeat	Rhodes	<i>Chloris</i>	2	3	
Pioneer	Rhodes	<i>Chloris</i>	1	-	
Floren	Angleton or bluegrass	<i>Dichanthium</i>	1	3	
Competitor	Bahia	<i>Paspalum</i>	1	-	
Riba	Bahia	<i>Paspalum</i>	0	0	
Pensacola	Bahia	<i>Paspalum</i>	1	-	
Hi Gate	Atra paspalum	<i>Paspalum</i>	0	0	
-	Wallaby	<i>Austrodanthonia</i>	0	-	Native
-	Curley Mitchell	<i>Astrebula</i>	0	-	Native

plantings showed that many of the introduced grasses have what it takes to survive the extremes of weather in our area. Some varieties, including the 2 natives, could not be found in the trials at the time of inspection.

It can be seen from Table 1 that persistence varied with:

- Variety – some are very tolerant to drought, some are not.
- Soil type – some prefer sandy soil, some prefer clay soil.

Inverell purple pigeon grass is a good example being very persistent on the medium clay soil but had almost disappeared on the light soil. Other factors that can affect persistence include soil fertility, palatability and grazing management.

Persistence is not the only feature to be considered when choosing a summer grass. Other important criteria are palatability, soil type, soil fertility, tolerance of waterlogging, whether for sheep or cattle, and animal health issues. It is important to seek advice when choosing species or varieties to sow.

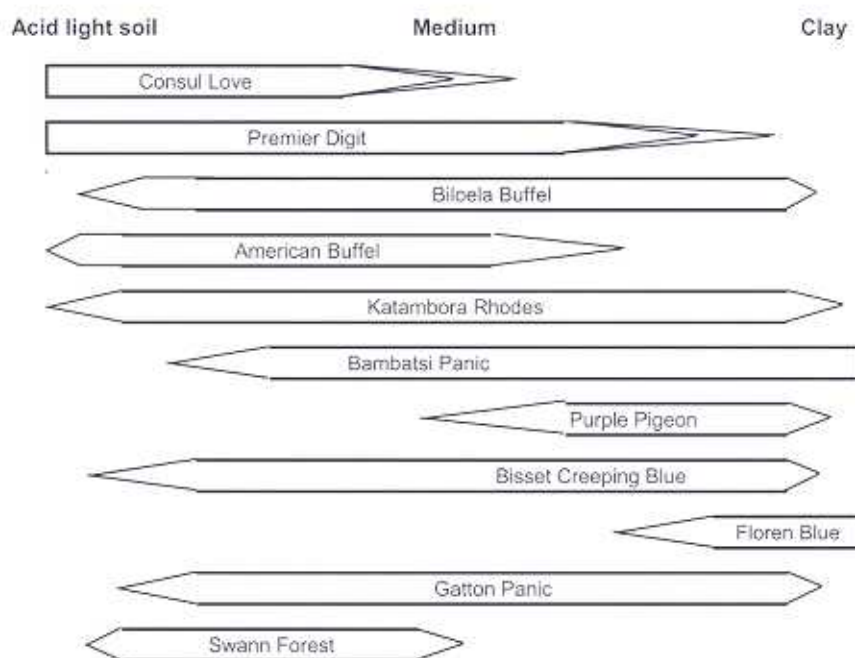
What's happening on the farms?

“Its like comparing an athlete on steroids with a lame tortoise” were the words of a producer comparing the introduced summer perennials with the native perennial grasses when it rained during the drought.

An outstanding feature of the better introduced grasses was their ability to produce abundant quick feed when it rained compared to the native perennial grasses. Where there was only natives we often noticed that the ground had dried and the moisture gone before they could produce significant feed. This seemed to be a waste of rain.

The 2003-04 summer started tough with 2 near record heat waves, but the second half was good. All grasses, natives, accidental introductions and the introduced summer perennials made an amazing recovery. Noteworthy, though was the performance of the introduced summer grasses which was outstanding. Most paddocks sown to these grasses are now the best we have ever seen them.

Figure 1. A guide to suitable soil types for summer grasses that have been used on “Towri” and “Uambi”. Based on information gathered from NSW Agriculture and Department of Primary Industry, Queensland.



Establishment

Establishment is a problem and control of competition at this stage is vital.

On "Towri" summer perennial grasses were first established in 1990 and on "Uambi" in 1995. New plantings have occurred almost every summer since then. There have been some establishment failures, but interestingly no more during drought than in good seasons.

The main issues concerning establishment are:

- Reducing weed competition is essential.
- Seed is generally expensive, so you need to keep failures to a minimum.
- Yes, we need some luck with rainfall events, especially on heavy soils.
- Plant shallow, about 1 cm deep as most species have very small seeds and produce weak seedlings.

By far the biggest hurdle is competition and its effect on soil moisture. During summer it is often hot, so moisture at 1 cm deep can disappear quickly. If seeds germinate, competition from other plants takes the moisture below the seedling and it dies.

Most "Towri" summer grasses are sown by broadcasting into roughly worked country where competition from weeds and other grasses have been controlled during the previous 1 or 2 years. These paddocks have mostly grown oats during the winter and been kept clean during the summer by spraying and cultivation. This method works particularly well where annuals like liverseed grass are prevalent.

On "Uambi" there was much less liverseed grass and most summer grasses were direct drilled into country that has been sprayed once with 2-2.5 L glyphosate (450 g/L) just before sowing.

For structurally stable soils, where fine firm seed beds are prepared, rolling after sowing or the use of press wheels ensures good seed-soil contact and enhances germination. After sowing, the luck part comes into play as it is the next good rain that germinates the seed. In general, the heavier the soil the more rain you need. It appears that many of these summer perennial grass seeds need 4 or 5 days of contact with moist soil for germination to start and then moist soil for the first root to establish. When sowing only 1 cm deep these conditions don't seem to happen as easily on heavy soils. Given a certain amount of rain, moisture will penetrate further in a light soil

than a heavy soil giving the seedling a better chance to establish. Once established small falls of rain on light soils often produce pasture growth compared with heavy soils where the same amount of rain produces little or no growth.

The best time to sow?

This is a hard question as it is difficult to tell when the next good rain is going to come. For example, on "Uambi" the best establishment ever was during the middle of the drought. A late December rain freshened things up enough to spray and sow. It was 2 months later in late February that we had a good fall of rain. Plants came up and struggled for almost 12 months, a few died, but now they are looking great due to this year's good summer rains.

Summer grasses have different minimum soil temperature requirements for germination. So as a general rule successful establishment can be achieved when soil temperatures are warm enough, which is usually between late September and mid April.

Within these dates, planting time will often be influenced by how well any competition has been or can be controlled. For example, a fall of rain is often needed to germinate the first wave of competition before planting. In a no-till situation, a fall of rain will be needed to freshen up existing competition, so it can be sprayed effectively.

Don't give up on what looks like a failure

Experience has shown that stands that look too thin and need replanting often get better and better over the next few years. Late summer and autumn sowings that do not get sufficient rain before winter can establish the following spring and summer.

Summer grasses and legumes

Annual winter legumes should be part of any grass pasture for winter-spring feed and the nitrogen (N) they produce for grasses. We are finding the introduced summer grasses in many instances are so productive that even good healthy winter legumes cannot always keep the N supply up to the grasses. We are still in the process of learning how best to tackle this problem.

- How can we make the winter legumes produce more N?
- Topdressing with N fertiliser works well.
- Include a summer legume with the grasses, but which varieties?

- Tolerate a level of production limited by the N supplied by the legumes.

Table 2. The main sub-tropical grasses used on "Towri" and "Uambi", * indicates the grasses that presently make up the majority of the summer grasses established on "Towri" and "Uambi".

Inverell purple pigeon	
Katambora Rhodes	*
Biloela buffel	*
USA buffel	
Consol lovegrass	*
Gatton panic	
Bambatsi panic	*
Premier digit	*
Streckland finger	
Bisset creeping bluegrass	
Swann forest bluegrass	

The grasses used on "Towri" and "Uambi"

In most instances a mix of 2-5 varieties are sown at a total sowing rate of approximately 3 kg/ha.

Table 2 lists the main grass species used to date. There are several other grasses in the NSW Agriculture trials which have shown some promise. Some were more prostrate and better suited for sheep pastures. For

these reasons do not take Table 2 as a general recommendation, as some grasses will have features to suit other situations.

Conclusion

There are some excellent grasses among the introduced summer growing perennials. On the Slopes and Plains their performance has been outstanding. Introduced summer grasses can be persistent and adaptable as we have seen during the recent drought. We have observed that they can produce a lot more feed per mm of rain than the species that were on our farms previously. For these reasons we would expect their use to expand, particularly on old country degraded by farming or grazing where there is an absence of good native grasses.

We understand people will have different ideas about the pasture system that will suit them. There are those who prefer systems with a low input-low output through to high performance pastures with high input and output. What I have discussed fits somewhere in between.

On "Towri" and "Uambi" introduced summer grasses are providing a large leap in pasture production.