Perennial Pastures in the Wimmera-Mallee

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Abstract

In 2006, the Birchip Cropping Group commenced a three-year project investigating a range of perennial pasture species for their potential adaptation in the Wimmera-Mallee farming region. Twenty farmers were identified to participate in the project, establishing a range of perennial pasture species on their properties. The main aim of this project was to use these pasture paddocks as demonstrations to encourage expansion of perennial pastures in the Wimmera-Mallee region. Throughout this project, pasture establishment and growth was recorded and, where establishment was successful, data collection continues. Due to the large area involved in each demonstration site, a range of different sowing methods were used. In 2007, where rainfall was limited, an observation from the Dumosa site was that sowing with press wheels produced better establishment compared to broadcasting and harrowed sowings. Lucerne, tall fescue and cocksfoot appear suitable to the region, as they had higher rates of establishment in 2007. The establishment of *Phalaris* was quite poor overall and in many cases failed.

Key Words

establishment phase.

Introduction

Livestock production in the Victorian Wimmera-Mallee region declined over the last 20-30 years due to a reduction in wool prices and fluctuating lamb prices (Pengelly *et al*. 2006) After recent droughts in 2002, 2004, 2006 and 2007, farmers have been forced to reconsider their risk management strategies and the subsequent role of livestock in current farming systems. Increases in lamb prices and a correction in the wool market has highlighted the need for farmers to identify viable pasture options that will support their reinvestment in livestock. Perennial pastures have many benefits to farming systems in the Wimmera-Mallee which include filling feed gaps in livestock/cropping systems, providing an option for herbicide resistant weed management and reducing groundwater recharge (Cransberg *et al*. 1994). However, two of the challenges of growing successful pastures are the establishment phase and herbicide options prior to sowing and during the pasture phase.

In 2006, the Birchip Cropping Group (BCG) was funded for three years through the National Landcare Program (NLP) in collaboration with the Mallee Catchment Management Authority (MCMA) to undertake the “Perennial Profit in the Wimmera-Mallee” project. The project aimed to increase the awareness and adoption of perennial pastures in the region. At the commencement of the project, 20 farmers were identified to grow a perennial pasture, either as a monoculture or mixed sward, on a large-scale in a 10ha paddock. Measurement of establishment and species growth rates is on-going and the results will be presented at the completion of the 3-year project in 2009. When each paddock has been successfully established, grazing and economic data will be recorded and determined.

As part of the NLP funded project, grazing systems in the Wimmera-Mallee region were investigated and benchmarked against novel grazing systems being used elsewhere in Australia and the world. The “audit” was conducted in 2006 by a group of national pasture experts and modeled potential pasture species options for the Wimmera Mallee (Pengelly *et al* 2006). A large diversity of pasture species were modeled including grasses and legumes, native and exotic, and subtropical and Mediterranean species. Each of the pasture species included in the report is described in terms of potential advantages of a system (adaptation, seed availability), benefits (biodiversity, water/salinity management), and constraints (establishment, anti-nutritional compounds).

Methods

Twenty three demonstration paddocks were sown in 2006 and 2007. All paddocks were sown by the landholder. A range of sowing methodologies were used including conventional combines and press wheels, or broadcasted and later incorporated with harrows or prickle chain. All demonstration sites were chosen based on their proximity to water or to other paddocks used by the farmer for livestock production. Soil type and paddock history were also taken into account. Each established paddock was also mapped using EM 38 technology. Ten sample points in each paddock were marked, using the EM maps for different soil types, and regular monitoring occurred at these points.

Plant height was recorded from fifteen randomly selected plants at each point in each paddock every during January and February. Dry matter production was also estimated using 3 x 1 m^2 cuts at the 10 points in each paddock. .

In addition to the large scale demonstrations, two replicated small plot trials were established at Hopetoun and Manangatang, north-west Victoria. A range of perennial grasses and legumes were evaluated at the Manangatang sites in 2007, and a sub-tropical pasture trial was established in November 2006 at Hopetoun. The two trials compare the relative performance of a variety of species (Tables 3 and 4). Emergence counts, using a 50cm ruler both sides, and dry matter production were recorded to assess establishment and suitability in the region.

Results

The best way to describe the 2007 season is “so close yet so far away”. The region received a perfect start with warm temperatures and above average rainfall in Autumn which produced exceptional growth. After July, unfortunately all sites, with the exception of Nhill, received below average rainfall and many crops and pastures failed. Of the 23 paddocks sown, six established successfully.

The exceptional Autumn rains provided a perfect opportunity for weed control with most of the weeds germinating early in the season and allowed most site hosts to control most of the weeds prior to sowing. Subsequently, the majority of the paddocks were sown in mid June, just before the rain stopped. However, further weeds came up after sowing and as a result, some of the emerging pastures were out competed and failed. This was one of the contributing factors that led to many of the failures in 2007.

One interesting observation was that the method of sowing had a considerable effect on pasture emergence. Lucerne establishment was greater when sown with press wheels compared to broadcasted and incorporated by harrowing (the standard method). The reason that the difference in establishment would have occurred is because press wheels provide much better seed-to-soil contact and hence greater establishment plants can be achieved. This and the fact that the furrows formed by the press wheels are great at harvesting water by concentrating rainfall into the furrows. The average plant establishment across the five established demonstration sites was 33 plants/m? (ranging from 3 to 77 plants) as shown in Table 1.

Table 1. Emergence counts for each of the established demonstration sites.

Site No.	Location	Area (ha)	Sowing Date	Sowing Rate (kg/ha)	Species	Variety	Emergence (pl/m?)
1	Nhill	10.1	28/06/2007	6kg/ha 1kg/ha	Lucerne Chicory	Sardi Ten PunaII	18.8 3

2	Birchip	6.8	16/06/2007	4kg/ha	Lucerne	Sardi Seven	37.4
3	Wilkur	4.2	13/06/2007	3kg/ha	Lucerne	Sardi Seven	70.2
4	Kinnabulla	10.4	13/06/2007	2kg/ha 2kg/ha	Lucerne Cocksfoot	Sardi Seven Currie	28 77
5	Charlton	7.7	20/06/2007	4kg/ha 0.5kg/ha	Lucerne Chicory	Sardi Ten Punal	23 7

Plant height and dry matter production was measured at 4 of the 5 successfully established sites in January and February 2008 (Table 2). The monitoring points were randomly selected on each occasion but replicated three times. The Nhill site was not monitored during January and February and subsequently the results cannot be compared.

Table 2. Plant Height and Dry Matter in January and February 2008 for selected sites.

Site No.	Location	Area (ha)	Ave. Plant Height Jan (mm)	Ave. Dry Matter Jan (t/ha)	Ave. Plant Height Feb (mm)	Ave. Dry Matter Feb (t/ha)
1	Nhill	10.1	N/A	N/A	N/A	N/A
2	Birchip	6.8	139.5	0.102	145.3	0.132
3	Wilkur	4.2	106.42	0.216	131.7	0.363
4	Kinnabulla	10.4	96.6	0.052	83.3	0.055
5	Charlton	7.7	97.14	0.08	108.3	0.065

The perennial pasture small plot trial was based on the recommendations in the CSIRO species audit. The aim of the trial was to use it both as an extension tool for the various species available and also to identify any species that could be suited to the region that were not included in the demonstration trials. The species chosen are listed in Table 3.

The plots have had establishment counts (2007) and dry matter cuts (2008) taken. The results are shown in Table 3 and as it indicates, the perennial grass lines emerged but did not survive the spring. The plots were also put under a large amount of competitive pressure by weeds that came up after sowing and, with the limited spraying options available the weeds out competed most of the grass lines and slowed the growth of the legumes. The legume plots were hand weeded and held on to provide some useful results.

Table 3. Establishment and Dry Matter monitoring for small plot trial in Manangatang.

Species	Common name	Variety	Establishment (plants/m^2)	Dry Matter (t/ha)
Medicago sativa	Lucerne	Stamina GT6	66	0.42
Medicago sativa	Lucerne	Siriver MK II	62	0.86
Medicago sativa	Lucerne	SARDI Ten	40	0.53
Medicago sativa	Lucerne	SARDI Seven	68	0.71
Medicago sativa	Lucerne	Stamina GT6 + Goucho[?]	65	0.53
Medicago sativa	Lucerne	Force 5	72	0.55
Medicago sativa	Lucerne	Force 10	74	0.51
Medicago sativa	Lucerne	L55	55	0.4
Medicago sativa	Lucerne	L69	57	0.65
Trifolium tumens	Tumens	Tumens bulk	64	0.22
Trifolium tumens	Tumens	TAS2691	47	0.24
Trifolium ochroleucun	Ochroleucun	Ochytas	46	0.13
Dorycnium hirstum	Hairy canary clover	TAS1002	52	0.48
Medicago sativa ssp. sativa X Medicago sativa ssp. falcate		KICreepa	39	0.31
Trifolium fragiferum	Strawberry clover	Palestine	44	0.43
Cichorium intybus	Chicory	PunaI	44	0.58
Cichorium intybus	Chicory	PunaII	39	0.37

Medicago littoralis	Medic	Angel		
Triticum aestivum	Wheat	Yitpi	98	Failed
Dactylis glomerate	Cocksfoot	Uplands	120	Failed
Dactylis glomerate	Cocksfoot	Sendace	65	Failed
Dactylis glomerate	Cocksfoot	Currie	77	Failed
Dactylis glomerate	Cocksfoot	Porto	110	Failed
Phalaris aquatica	Phalaris	Atlas	86	Failed
Festuca arundinacea	Fescue	Flecha	95	Failed
Festuca arundinacea	Fescue	Resolute	Failed	Failed

Sub-tropical pastures adapted to the summer rainfall dominant areas of northern NSW and southern Qld for grazing sheep and cattle were established at Hopetoun in Novemeber 2006. Plant counts were taken in March and dry matter cuts in May 2007 (Table 4). The trial site received 240mm of rain between January and May 2007 allowing good establishment and early growth. The production of dry matter varied between varieties as Table 4 indicates. 4540 kg/ha for Petrie, to 681 kg/ha for ATF-714. Swann failed to establish, Marc emerged but didn't survive through the summer. The two different sowing rates did not suggest major differences in dry matter production, even though the established plant numbers were higher when sown at 6kg/ha.

Table 4. Sub-tropical plant counts (plants/m?) and dry matter production (kg/ha) measured at two sowing rates

Species	**Variety**	**Plant Counts (plants/m?)**		**Dry Matter (kg/ha)**	
		3kg/ha	**6kg/ha**	**3kg/ha**	**6kg/ha**
Panicum maximum	Gatton	142	204	2796	1988
Panicum maximum	Petrie	177	250	4540	4468
Panicum coloratum	Bambasti	177	209	1119	903
Panicum coloratum	ATF-714	171	229	793	681

Digitaria milanjiana	Strickland	193	275	1180	1677
Bothriochloa bladhii ssp.glabra	Swann	0	0	0	0
Desmanthus virgatus	Marc	121	138	0	0

Conclusion

Perennial pastures have the potential to have numerous benefits for farming systems in the Wimmera-Mallee including filling feed gaps, resistant weed management and reduction of groundwater recharge. Two major challenges highlighted in this paper were achieving acceptable weed control and establishment in low rainfall areas. Both challenges seem to go hand-in-hand, successful establishment requires good weed control. By delaying sowing to achieve optimal weed control, establishment and germination of pastures maybe reduced although the use of press-wheels may improve germination hence the delay may be negligible. Starting the pasture on a fallow will obviously improve the establishment and the weed control.

Subtropical pastures could be considered if early summer rains occur in November/December, although given the unreliability and uncertainly in summer rainfall predictions and at $20/kg of seed, further investigation is required.

For farmers considering a perennial pasture phase, lucerne and saltbush have proven to be the best performers and the most reliable. Lucerne is best suited to the better soil types and saltbush can survive on some of the poorer, more marginal soils. Both of these provide very good stock feed but some supplementary feeding (hay and grain) will be necessary if weight gain is required to maintain weight for sheep grazing on saltbush.

References

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