

Grass-legume mixtures on the north-west slopes of New South Wales – finding a compatible legume

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Abstract

Tropical grass pastures have large potential in the north-west of New South Wales. However, there is a paucity of information as to which legumes could be compatible with a tropical grass so as to provide productive and persistent pastures in the region. This paper outlines a series of experiments which aim to evaluate temperate and tropical legumes as components of mixed tropical grass-legume swards.

Introduction

Tropical grasses have the potential to improve the resilience of farming systems on the north-west slopes of New South Wales (NSW), where seasonal variability is likely to increase with climate change predicted for this century. They are characterised as being drought-tolerant, having high water use efficiency, and have the capacity to grow rapidly under favourable conditions. These characteristics make them suitable in a variable and changing climate.

Over recent years, interest in tropical grasses has been increasing throughout the north-west slopes, with more producers sowing tropical grass pastures each year. In response to this trend, research and extension agronomists at Industry & Investment NSW, Tamworth have been developing components of an 'agronomic package' to

assist producers. Details for successful establishment, the importance of nitrogen (N) application and water use of tropical grasses have been quantified. Legumes are a cost-effective means of supplying N for the long-term productivity of a tropical grass pasture; however, there is little information on which legumes would be suitable companions for tropical grasses in mixed tropical grass-legume pastures in this region.

This paper describes a series of field experiments to evaluate tropical and temperate herbaceous and shrub legumes on the north-west slopes of NSW.

Materials and methods

In January 2009, replicated plots of a range of tropical and temperate herbaceous and shrub legumes were sown at the Tamworth Agricultural Institute, Tamworth [31°09'S, 150°59'E; 434 m elevation; 674 mm annual average rainfall (AAR); brown Vertosol soil] and 'Mitiamo', Bingara (29°56'S, 150°26'E; 296 m elevation; 741 mm AAR; red Chromosol soil). The species were sown in a series of 3 experiments at both sites, each experiment with 3 replicates.

Experiment 1 consisted of 6 herbaceous perennial summer-growing legumes (Table 1) sown in mixtures with *Digitaria eriantha* cv. Premier (digit grass) (1 kg/ha adjusted for germination) plus a 'no legume' control. Legume seeds were inoculated with appropriate rhizobia. Plot size was 7.2 m².

In experiment 2, Premier digit was also sown in January 2009, and 7 temperate annual legumes were oversown in May 2009 (Table 1).

Experiment 3 consisted of 4 shrub legumes sown in twin rows, each 4 m long with 5 m between replicates. Seeds of *Leucaena leucocephala* cv. Tarramba (leucaena), *Chamaecrista rotundifolia* cv. Wynn (cassia) and *Desmanthus virgatus* cv. Marc (desmanthus) were sown by hand in January 2009. Seed of the fourth species

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Table 1. Tropical and temperate legumes being evaluated in mixtures with Premier digit grass in experiments at Tamworth and Bingara.

Botanical name	Common name	Cultivar	Sowing rate (kg/ha) ¹
Experiment 1 – tropical legumes			
<i>Stylosanthes hippocampoides</i>	Finestem stylo	Common	4 (coated)
<i>Stylosanthes seabrana</i>	Caatinga stylo	Primar	3 (coated)
<i>Stylosanthes hamata</i>	Caribbean stylo	Amiga	4 (coated)
<i>Macropitium bracteatum</i>	Burgundy bean	B1	4 (coated)
<i>Lotus corniculatus</i>	Lotus	Phoenix	1
<i>Medicago sativa</i>	Lucerne	Venus	1
Experiment 2 – temperate legumes			
<i>Trifolium subterraneum</i>	Subterranean clover	York	4
<i>Trifolium subterraneum</i>	Subterranean clover	Dalkeith	4
<i>Trifolium vesiculosum</i>	Arrowleaf	Cefalu	1
<i>Trifolium purpureum</i>	Purple clover	Electra	1
<i>Trifolium hirtum</i>	Rose clover	SARDI	1
<i>Medicago truncatula</i>	Barrel medic	Caliph	2
<i>Vicia villosa</i>	Woolly pod vetch	Namoi	6

¹Sowing rates were adjusted for germination.

Cullen australasicum (SA 4966) was germinated in petri-dishes then transferred into peat balls. Seedlings were transferred into the field in February 2009. Premier digit grass will be sown in the 5 m gap between replicates in spring 2009.

Rainfall in February assisted establishment. Established seedlings were counted in March, 4–6 weeks after sowing. From spring 2009, herbage mass of both components of each mixture will be assessed every 6 weeks. After an assessment, the experiments will be grazed by either sheep (Tamworth) or cattle (Bingara). Plant frequency will be assessed twice a year in spring and autumn to monitor persistence of the species in mixtures over time.

Conclusion

These studies will provide quantitative information on the production and persistence of a range

of tropical and temperate herbaceous and shrub legumes on the north-west slopes of NSW. Identifying suitable legumes for mixed tropical grass-legume pastures in northern NSW will provide a low-cost alternative to applying nitrogen fertiliser to tropical grass pastures.

Acknowledgements

This project is funded by Industry & Investment NSW (formerly NSW Department of Primary Industries) and the Future Farm Industries Cooperative Research Centre. We also thank Don, Gay and Jason Mack, 'Mitiamo', Bingara for use of their land, as well as Heritage Seeds, Progressive Seeds, Leucseeds, PlantTech, Seed Distributors and Premier Seeds for kindly donating seed.