

An evaluation of tropical pasture legumes on gidgee soils in the semi-arid tropics

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Abstract

A total of 44 tropical pasture legume accessions from the *Clitoria*, *Desmanthus*, *Macroptilium* and *Stylosanthes* genera were evaluated at 2 sites in semi-arid pastoral regions of north Queensland on gidgee clay soils. The results of the establishment phase of these trials are presented. A number of *Desmanthus* accessions survived well into the 2002 drought and their survival compared to other accessions and genotypes indicates their potential for such environments.

Key words

Acacia cambagei, Desmanthus

Introduction

Livestock in the semi-arid pastoral regions of north and western Queensland suffer regular protein droughts during their long annual dry seasons. Currently, no sown pasture legumes are recommended for these environments. In this region there are some 4.8million ha of woodlands of the native tree legume "gidgee" (*Acacia cambagei*) (1) which are being cleared and planted to buffel grass (*Cenchrus ciliaris*). After clearing the residual benefits of these native leguminous trees produces pastures of good quality and quantity (1, 2). However, in similarly cleared "brigalow" (*Acacia harpophylla*) areas the "run down effect" in crops and grass pastures is a concern and pasture legumes are being sought to sustain N fertility in these areas (3). As rainfall decreases, gidgee replaces the brigalow on heavy textured soils(1). Gidgee soils are typically neutral to alkaline clays, often with a stone mantle(4). As on the brigalow soils a suitable sown legume will be required to maintain the productivity and sustainability of cleared gidgee landscapes.

Methods

Pasture legume accessions and cultivars from *Clitoria*, *Desmanthus*, *Macroptilium* and *Stylosanthes* genera were evaluated on gidgee clay soils at "Trafalgar" Station, Charters Towers (642mm mean annual rainfall)(2) and one at "Redcliffe" Station, Hughenden (491mm mean annual rainfall). The trial sites had previously been cleared and sown to buffel grass. Many of the genotypes sown were known to have some adaptability to clay soils in more favourable environments(3). Several *Desmanthus* accessions selected for this trial (prefix "JCU") had survived years of drought, flood, frost and grazing in long abandoned plots in other correspondingly harsh environments (5). A crude seedbed was created by cultivation with offset disc harrows and scarified seed sown in late January 2002 into replicated plots. The wet season of 2001/2 was very poor at both sites with only 138mm of rainfall in the 6 months post planting a "Trafalgar" (cf mean of 344mm for the same period) and 166mm at Hughenden (230mm mean). Plant establishment data collected in March (60 days after planting) and July 2002 (176 days after planting) are presented here.

Results

Macroptilium bracteatum cv Cadarga and Juanita showed excellent early germination and seedling establishment at both sites (Table 1), however without any substantial follow-up rain, had almost completely failed by July. *Clitoria* cv Milgarra, *Stylosanthes* cv Seca, Primar and Unica all had poor to moderate establishment. A number of the *Desmanthus* accessions had good seedling establishment and by July these all had reduced plant densities but several accessions and one cultivar maintained relatively good numbers. *Desmanthus* accessions JCU-Kelso, JCU-R2 and JCU-W2 had superior establishment compared to the existing *Desmanthus* cultivars at the Charters Towers site and JCU Kelso and *Desmanthus* cv Uman were highly ranked at Hughenden compared to the other genotypes tested.

Table 1. Mean plant establishment (plants/2m row) March 2002 and July 2002 at 2 sites (not all data presented).

Species/Accession/Cultivar	Charters Towers				Hughenden			
	March Plants /row	Rank	July Plants /row	Rank	March Plants /row	Rank	July Plants /row	Rank
C. ternatea cv Milgarra	2.6	26	0	29	2.6	26	1	26
D. leptophyllus CPI 38351	10	12	1.3	16	17.3	5	9.6	3
D. pernambucanus CPI 40071	25	5	3.6	9	10.6	11	4.6	13
D. virgatus CPI 78372	6.3	16	4.3	7	13.3	8	9.3	4
D. virgatus CPI 83563	9.3	13	2.3	13	13	9	7.6	6
D. bicornutus CPI 91162	5	20	0.3	25	5.3	17	3.3	17
D. leptophyllus cv Bayamo	6.3	16	2.6	12	15.6	6	7.3	8
D. virgatus cv Marc	5.3	18	1.3	16	10	13	8.3	5
D. pubescens cv Uman	16.3	7	5	5	21	3	11.3	2
D. sp JCU BR2 plot 23 90857	14	8	3.3	11	5.3	17	3.6	15
D. sp JCU Kelso	25.3	4	12	2	23	2	12	1
D. sp JCU Milgarra	14	8	4.3	7	2	32	0.6	32
D. sp JCU R2	30.6	3	11.3	3	12.3	10	7.6	6
D. sp JCU T12	4.6	22	1.3	16	7.6	15	4	14
D. sp JCU TK 1 5-8 group	0.3	37	0	29	10	13	6	9
D. sp JCU TR1plot19 78372	5	20	0	29	5	19	3.6	15
D. sp JCU TR2 plot29 7052	8	15	0	29	3.3	25	1	26
D. sp JCU W2	32	2	15.6	1	5.6	16	2.6	19
D. sp JCU WR3 90751 115pl	4	23	1.6	15	3.3	25	0.3	34
D. sp JCU Wrotham	20.3	6	4.6	6	13.6	7	5.6	10
M. bracteatum cv Cadarga	37	1	1	20	19.3	4	5	12
M. bracteatum cv Juanita	8.6	14	0.3	25	25.6	1	2.3	21
S. seabrana cv Primar	12.3	11	9.3	4	1.6	34	0	39
S. scabra cv Seca	2.6	26	2.3	13	2.3	28	2.6	19
S. seabrana cv Unica	14	8	3.6	9	2.6	26	1.6	23

Discussion

The results illustrate the value of selecting accessions found surviving in long abandoned trials. Species such as *Clitoria* cv Milgarra and *Macroptilium* cv Cadarga and Juanita have an important role in sustaining ley pasture systems in brigalow areas (3). The present study on similar clay soils highlights several *Desmanthus* accessions suitable for harsher environments (viz. *Desmanthus* JCU-Kelso and JCU-W2, JCU-R2, cv Uman and CPI 38351). Of the *Stylosanthes* genotypes the *S.seabrana* cultivars Primar and Unica scored better than *S.scabra* cv Seca, with Primar being ranked 4th overall at the Charters Towers site in July. However, for unknown reasons it failed at Hughenden. Hall and Douglas (7) and others have found *S.seabrana* to be productive on clay soils in southern Queensland.

Several *Desmanthus* accessions were highly ranked and offer potential to enhance and sustain cleared gidgee landscapes. Survival of the abovementioned accessions through the current drought and regeneration over the next wet season(s) will be a further test of their adaptability.

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