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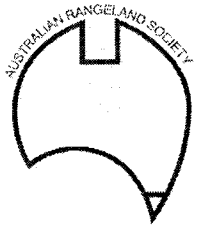

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CONDITION AND VARIABILITY OF NORTH-EAST QUEENSLAND RANGELANDS

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ABSTRACT

*Plant composition (relative frequency) and ground cover data were collected from typically grazed black speargrass (*Heteropogon contortus*) and* Aristida/Bothriochloa *pasture community sites in the semi-arid woodlands of north-east Queensland. After a prolonged drought, desirable decreaser perennial grass frequency was low on the majority of sites but this did not relate to a larger than expected frequency of undesirable increaser* Aristida *spp. The intermediate grass* Chrysopogon fallax *had moderate frequencies. Cover was low regardless of community. The data are presented as a benchmark of condition with regard to previous surveys, state and transition models and the inherent variability of these rangelands.*

INTRODUCTION

Variability in land type, rainfall and management are features of the eucalypt woodlands of the semi-arid tropics of northern Queensland. Evidence exists of significant changes in species composition due to increased grazing pressure in these rangelands (Tothill and Gillies 1992). A 1990 survey of land degradation in the Dalrymple shire (de Corte *et al.* 1991) found that, after two years of above average rainfall, pastures on 23% of sites assessed were in poor to very poor condition, pastures on 59% of sites were in good to excellent condition, and scald and sheet erosion were widespread. This paper presents data collected from monitoring sites in the Dalrymple, Flinders and Thuringowa shires during 1995 after a prolonged period of below average rainfall. These are used to examine the pasture condition of speargrass and *Aristida/Bothriochloa* communities (according to Weston *et al.* 1981) in this region.

METHODS

During April to June 1995, 36 speargrass and 13 *Aristida/Bothriochloa* community sites were recorded. Each 4 ha monitoring site had previously been established in typically grazed areas across the region as part of the Queensland grazing lands monitoring project (QGRAZE). Presence or absence of species was recorded in 100 quadrats ($0.25m^2$) placed at regular intervals along each of five 100 metre transect lines spaced 50 metres apart. Total (grasses, forbs, litter) and plant (grasses, forbs) projected foliar cover were estimated from hand drawn standards.

RESULTS AND DISCUSSION

At the time of recordings the region was in drought, with the majority of the region receiving, since late summer 1991, an average annual rainfall of less than 50% of the long-term average. From relative frequency data (Table 1), both the speargrass and *Aristida/Bothriochloa* monitoring sites display predominantly low frequencies of desirable decreaser perennial grasses (*Heteropogon contortus*, *Bothriochloa* spp., *Dichanthium* spp. and/or *Themeda triandra*). On the *Heteropogon* sites, this is not reflected by a large frequency of undesirable increaser perennials (*Aristida* spp. on both communities), but rather moderate frequencies of the intermediate perennial (increaser or decreaser depending on grazing period and intensity) golden beard grass (*Chrysopogon fallax*) (intermediate on both communities). On the *Aristida/Bothriochloa* sites there appears to be greater dominance of the normally co-dominant increaser *Aristida*. In the context of state and transition models for the region (Ash *et al.* 1994), the main initial transitions occurring appear to be a change to *C. fallax* on the speargrass sites and to greater dominance of *Aristida* on the *Aristida/Bothriochloa* sites. However, with a range of frequencies (low, medium and high, depending on site) of all indicator species, a level of inter-site variability exists.

Over 80% of all sites had less than 40% cover of rooted grasses and forbs, regardless of community (Table 2). McIvor *et al.* (1995) defined 40% cover as a desirable level to prevent soil loss from rainfall events on neutral red duplex soils in this region. With 46% of sites below 40% total cover at a time of peak pasture cover (i.e. at the end of summer), there appears a strong risk of accelerated soil movement with early summer storms at the end of the dry, when cover could be expected to be further reduced.

While evidence of changes in composition due to increased grazing pressure does exist (Tothill and Gillies 1992), it is difficult to determine if the cause of inter-site variability is due to variable rainfall or, as appears likely, a combination of variable rainfall and grazing management (mainly stocking) strategies. The composition and cover data indicate low plant densities. This suggests that at the time of the survey the majority of sites were displaying low potential productivity. If the current survey sites are comparable to the 1990 sites of de Corte *et al.* (1991), then it appears productive potential (as shown by composition) of the region has declined during the period 1990-1995.

Table 1. Percentage of *Heteropogon* and *Aristida/Bothriochloa* sites recorded with indicated relative frequency ranges of decreaser, increaser and intermediate perennial grasses.

Community	*Heteropogon* Community			*Aristida/Bothriochloa* Community		
Frequency	<20%	20-60%	>60%	<20%	20-60%	>60%
Decreasers	43	43	14	62	38	0
Increasers	84	16	0	31	62	7
Intermediate	32	51	16	46	23	31

Table 2. Percentage of sites recorded for two pasture communities with indicated range of total (grasses, forbs, litter) and pasture (rooted grasses and forbs) percent cover.

Cover Class	Total Cover		Pasture Cover	
Cover	<40%	>40%	<40%	>40%
Heteropogon Community	46	54	86	14
Aristida/Bothriochloa Community	46	54	85	15

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REFERENCES

Ash, A.J., Bellamy, J.A. and Stockwell, T.G.H. (1994). Application of state and transition models to rangelands in northern Australia. *Trop. Grassl.* 28: 223-228.

de Corte, M., Cannon, M., Barry, E., Bright, M. and Scanlan, J. (1991). Land degradation in the Dalrymple Shire: A preliminary assessment. CSIRO, Townsville.

McIvor, J.G., Williams, J. and Gardiner, C.J. (1995). Pasture management influences runoff and soil movement in the semi-arid tropics. *Aust. J. Exp. Agric.* 35: 55-65.

Tothill, J.C. and Gillies, C. (1992). The pasture lands of northern Australia. Tropical Grassland Society of Australia. Occasional Publication No. 5.

Weston, E.J., Harbison, J., Leslie, J.K., Rosenthal, K.M. and Mayer, R.J. (1981). Assessment of the agricultural and pastoral potential of Queensland. Agric. Branch Technical Report 27. QDPI.