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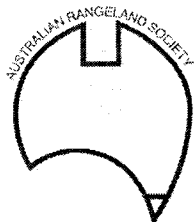
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MANAGING MITCHELL GRASS PASTURES - A TALE OF TWO QUADRATS

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INTRODUCTION

Monitoring in rangelands needs to be conducted over prolonged time periods to discriminate changes due to grazing management from that due to the long term rainfall variation that is so characteristic of Australian rangelands. Such discrimination is particularly important where the major plant species are long lived. This paper details changes in a long term grazing study as told by pasture measurements and associated photographs in two permanent quadrats that are grazed at contrasting grazing pressures.

METHODS

A grazing study incorporating six levels of utilization was established in *Astrelba* grassland at "Toorak", northwest Queensland. Sheep numbers are changed annually at the end of the summer so that anticipated proportions of 0, 10, 20, 30, 50 and 80% of the total forage available will be consumed over the ensuing year. Grazing commenced in 1984 and continues in 2002.

The population dynamics of *Astrelba* spp. is monitored annually by charting the position and diameter of individual tussocks in permanently located 1 x 1 metre quadrats and basal area is calculated from the number and the diameter (the living portion) of individual tussocks. In addition, photographs at two of these quadrats – at 10% and 80% utilization - provide a visual record of vegetation change at the individual plant scale. This paper details changes in plant density and basal area in relation to seasonal rainfall in these two quadrats and displays the photographic sequence over a range of years.

RESULTS

Basal area of *Astrelba* spp. declined in both quadrats (Figure 1a) during the 1985-1989 drought (Figure 1c). At 10%, basal area recovered between 1990 and 1994 after which it has declined steadily. Basal area at 80% failed to increase greatly between 1990 and 1998 but has increased between 1998 and 2001 during a sequence of favourable summer rainfall. Plant density increased substantially in 1989 following major episodic recruitment over the 1988-89 summer (Figure 1b). Some recruitment occurred at 80% treatment during 1999-2000. Figure 2 presents a photographic sequence.

DISCUSSION

Overall results from this study indicate that *Astrelba* grasslands are resilient to grazing when livestock numbers are altered in relation to summer rainfall (Orr 1998). Nevertheless, the decline in basal area at 10% since 1994 may reflect that this treatment is becoming increasingly moribund. Summer rainfall is the major driver of both basal area and plant density. The negative impact of below average summer rainfall increases with grazing pressure such that continued heavy grazing during drought reduces basal area. In contrast, basal area and yield of *Astrelba* spp. can recover, even under continued heavy grazing, with a sequence of years of above average rainfall. In contrast, prolonged heavy grazing reduces ephemeral species diversity and increases the occurrence of species that are less preferred by domestic livestock (Orr *et al.* 2000). Furthermore, this study has identified the importance of episodic *Astrelba* spp. seedling recruitment in maintaining density (Orr 1998).

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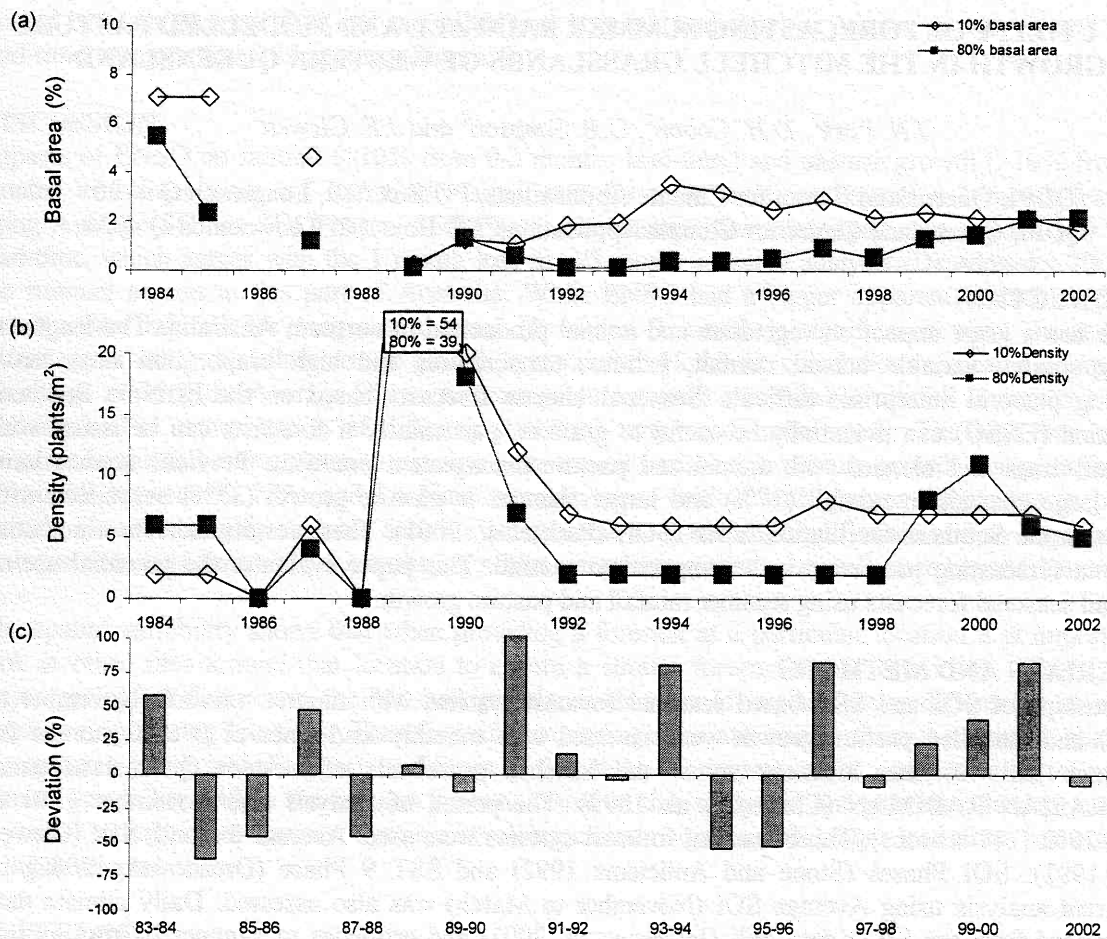


Figure 1. Changes in (a) basal area (%) and (b) plant density (plants/m²) of *Astrebla* spp. in relation to (c) deviation (%) of mean summer rainfall between 1984 and 2002 at Toorak Research Station.

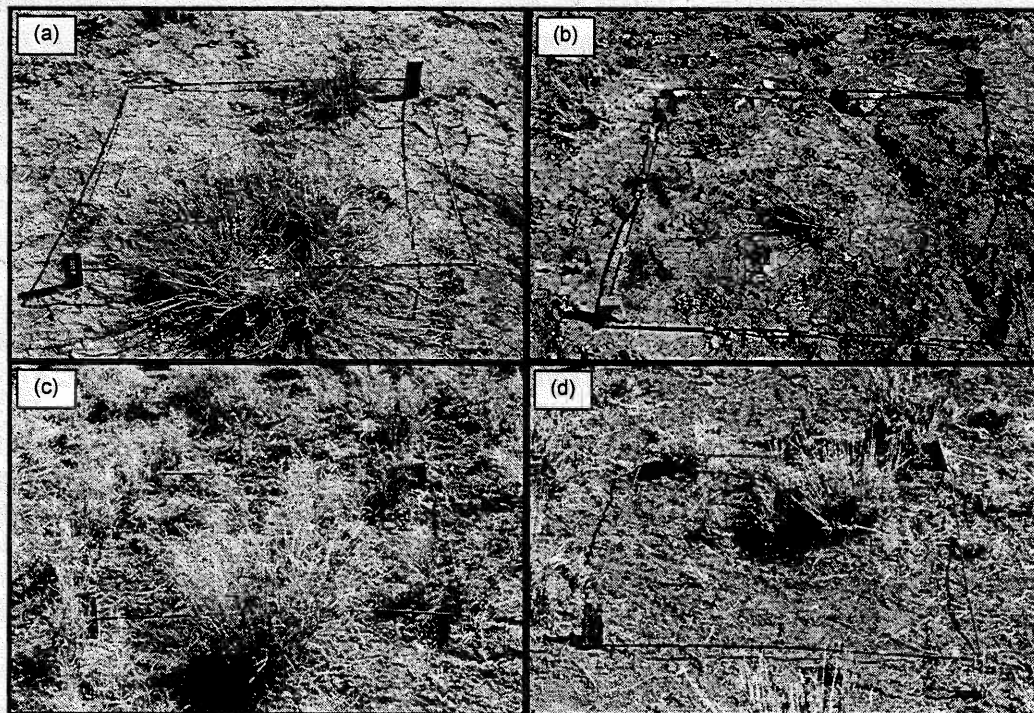


Figure 2. Visual presentation of two permanent quadrats for (a) 10% in 1986, (b) 80% in 1986, (c) 10% in 2002 and (d) 80% in 2002. (Note grazing commenced in 1984 and photography commenced in 1986).