Plant Species Diversity as an Indicator of Sustainable Use of *Astrebla* Grasslands in Australia

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The 21st International Grassland Congress / 8th International Rangeland Congress took place in Hohhot, China from June 29 through July 5, 2008.

Proceedings edited by Organizing Committee of 2008 IGC/IRC Conference

Published by Guangdong People's Publishing House

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Key words : *Astrebla* grassland , plant species diversity , sustainable use

Introduction A preliminary study of plant species diversity in a long term grazing study indicated that diversity was impacted by grazing pressure : species diversity was highest at the lowest grazing pressure and lowest at both the highest grazing pressure and in exclosure (Orr and Phelps 2003) . This paper presents further results from the continuing diversity study and discusses these results in terms of sustainable use in *Astrebla* grasslands .

Materials and methods A grazing study incorporating 6 grazing treatments was established in *Astrebla* grassland near Julia Creek , Australia in 1984 and remains current in 2007 . The climate is semi arid with mean annual rainfall of 458 mm with 85% falling in summer (October-March) . Treatments are unreplicated paddocks with sheep numbers adjusted annually in autumn to consume 0 , 10 , 20 , 30 , 50 and 80% of the end of summer available forage . Plant species was determined in 2001 and 2004 by germinating seed within soil samples collected within a 60 x 60 metre grid using a Geographic Positioning System . Each sample comprised 4 individual cores of 5 cm diameter to 5 cm depth (Orr and Phelps 2003) . A total of 16 , 162 , 69 , 49 , 36 and 20 soil samples were collected from the 0 , 10 , 20 , 30 , 50 and 80% treatments respectively .

Results and discussion The 2001 sampling occurred after 3 consecutive summers of above average whilst the 2004 sampling occurred after 2 consecutive summers of below average rainfall . Despite this , the overall pattern of diversity was similar with the highest number of species recorded under the lightest grazing pressure (Figure 1) . High species numbers at the lightest utilisation was due mainly to the high number of forb species . This high diversity at light utilisation was dominated by palatable species including the native legumes *Glycine falcata* and *Rhynchosia minima* .

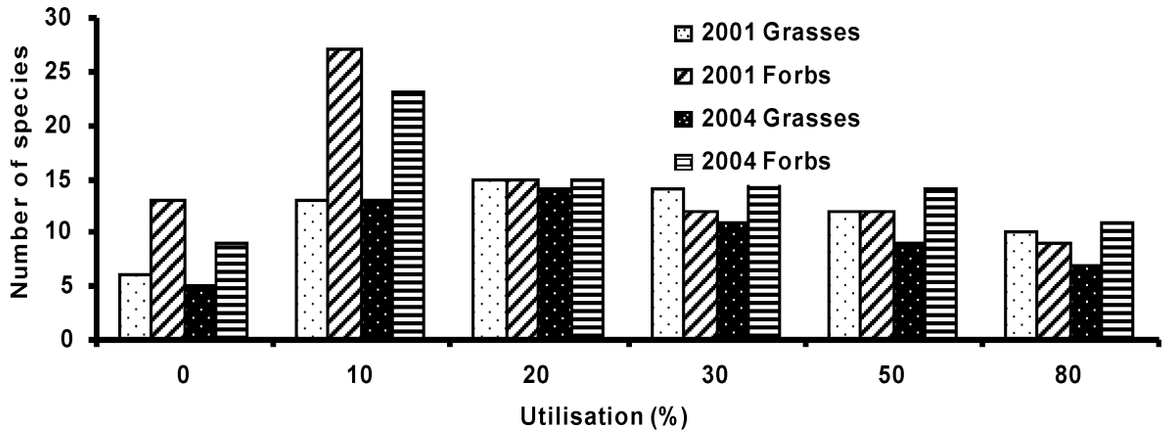

Figure 1 *Number of grasses and forb species present in* Astrebla *grassland in 2001 and 2004 .*

Phelps *et al* . (this volume) report 40-50% of the Astrebla grasslands as being in poor" condition following 7 years of drought , based on rapid assessment of pasture , soil and woodland condition . The main indicator of this poor condition was low density of live *Astrebla* spp . tussocks . The data on species diversity presented in the current paper provide evidence of the useful role of soil seed bank analyses to assess sustainable use in *Astrebla* grasslands .

Conclusions High forb species diversity , especially of more palatable species , is indicative of sustainable use in *Astrebla* grasslands .

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