Persistence of native & introduced perennial grasses on an acid soil

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Surveys have shown that there is a wide tolerance of some native grasses to soil acidity (Munnich, 1991). There is no comparative information on this field persistence under these conditions when compared with introduced perennial grasses, where there is both top soil and sub soil acidity.

Methods

A trial was sown in 1989 on a recently cleared site on a sedimentary duplex soil which was strongly acid to a depth of 1 m. There were four replicates of each treatment. Lime at 2.5 t/ha (F70 grade) was broadcast and incorporated to a depth of 8 to 10 cm prior to sowing. All species were sown with a 50:50 lime super mix at 500 kg/ha at commercial rates with subterranean clover. Superphosphate at 125 kg/ha has been applied either annually or biannually. A 1 m row was permanently marked and plant counts were made annually in late summer. The trial area was only lightly and infrequently grazed, but never below 1000 kg/ha total dry matter.

Results

Red grass, wheat grass and Bunderra wallaby grass failed to establish and the initial germination of weeping grass was low. All other grasses germinated and established well and were allowed to seed (Table 1).

Discussion

With the exception of *Microlaena*, all grasses declined over time. The most persistent grasses have been the native grasses, *ie., Danthonia racemosa, Danthonia richardsonii* (Hume), and weeping grass (*Microlaena*). Porto cocksfoot was the most consistent of the introduced grasses, but it thinned out badly during the he 1994/95 drought, even under low grazing pressure (not grazed below 1000 kg/ha).

Even though lime significantly raised soil pH and reduced aluminium and manganese, lime responses have been generally small and variable including the subterranean clover (16% ground cover minus lime versus 18% ground cover plus lime -October 1996).

Microlaena density has generally increased and it had the highest herbage quality in late spring and summer (crude protein and digestibility).

These results question the economic validity of sowing pastures based on introduced perennial grasses on this type of country. They should also be a sobering insight into what is likely to occur if we attempt to replace acid tolerant native perennial grasses in non arable areas that are strongly acid (Simpson, 1996).

References

Munnich, D.S., Simpson, P.C. and Nicol, H.I. (1991). *Rangelands Journal*, **13:** 118-29.

Simpson, P.C. and Langford, C.M. (1996). "Managing High Rainfall Native Pastures on a Whole Fram Basis. *Technical Bulletin, NSW Agriculture.*

Table 1. Relationship between plant density and acidity for a range of pasture species.

Species/common name/ cultivar	Lime 2.5 t/ha	Soil test (1994[1])				Plant density (number/m row)			
		pH	%Al	%Mn	CEC[2]	1989	1993	1995	1997
Control	+	4.7	10	1.0	7.4				
(no grass)	-	4.2	38	0.7	4.9				
Microlaena spp.	+	4.9	5	2.4	7.4	3.8	7.0	7.0	5.5
Weeping grass	-	4.3	28	1.3	4.7	0.8	4.3	4.8	2.0
Danthonia richardsonii	+	4.5	7	0.8	6.1	11	6.8	4.8	4.0
Wallaby grass cv. Hume	-	4.3	30	0.5	5.1	7	8.3	4.5	1.0
Danthonia racemosa	+	4.6	8	0.8	6.3	7	8	5.8	5.3
Wallaby grass	-	4.3	29	1.2	5.1	8	8	7.3	6.3
Phalaris aquatica	+	4.7	11	1.2	6.5	14	2	1.8	0
cv. Australian	-	4.4	30	1.2	5.9	13	4	3.5	0.3
Dactylis glomerata	+	4.7	10	0.8	7.0	15	7	6.3	2.5
Cocksfoot cv. Porto	-	4.3	29	1.0	5.7	18	8	6.3	2.5
Lolium perenne	+	4.7	10	3.1	6.6	13	1.2	0.8	0
Perennial ryegrass cv. Victorian	-	4.2	33	1.1	5.3	12	1.5	1.0	0

[1]0-10 cms depth; [2]Cation Exchange Capacity measured in m-eq/100 g soil.