

Persistence of perennial pastures in variable seasons

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Abstract

This paper details the survival of 28 cultivars of four commonly grown, introduced pasture species, at Braidwood on the southern tablelands of NSW from 1999 to 2007, when annual rainfall consistently averaged only 77% of the long-term mean (range 58-88%).

Key words

Persistence, temperate perennial pastures.

Introduction

Rainfall in southern NSW during the last 20 years has been up to 30% below the long-term average, with autumn rainfall more variable and dry spells more extended and frequent. If this trend continues, it will have a significant impact on production and survival of temperate pasture species in the region. This paper compares survival of introduced pasture grasses on the southern tablelands during a period of well-below average rainfall.

Methods and Management

In August 1999, an experiment was established near Braidwood, NSW (long-term mean annual rainfall 720 mm). Four replicates of 7 perennial ryegrass, 6 tall fescue, 7 cocksfoot and 8 phalaris cultivars were direct-drilled into 15 m long plots, following surface application of 2.5 t/ha of lime to one half of every plot, 12 months earlier. The soil was a granite-derived, sandy loam with pH_{Ca} 4.3 in the top 20 cm, and with 10% aluminium and a Colwell phosphorus of 28 mg/kg. Plots were regularly fertilised with Nitram and superphosphate to ensure adequate nutrition. Grazing management was arguably 'ideal' for persistence of perennial grasses - the area was quickly grazed with from 80-200 ewes/ha for 2-3 days every 6 or 12 weeks, depending on the amount of available feed. Persistence was measured in autumn each year using a 1 m x 1 m mesh grid with 100, 10 cm x 10 cm squares. The number of 10 cm squares containing the base of a sown species was recorded, and converted to a percentage (basal frequency).

Results and Discussion

Generally, both phalaris and ryegrass had 15% better basal frequency (establishment) scores in March 2000 where lime had been applied 12 months earlier.

However, neither the cocksfoot nor the fescue cultivars showed any change in response to surface-applied lime. Ryegrasses had the best establishment, with an average of 71% basal frequency with lime and 62% without. Cocksfoots averaged 51% basal frequency, fescues 41%, and phalaris had the lowest values; 38% with lime and 33% without lime.

One way to compare the drought severity is to examine the spring/summer rainfall totals (6 months from September-February) when potential production (but also heat stress) is high. In 1999/2000 the rain during this period totalled 395 mm, in 2000/01, 435 mm and in 2001/02, 330 mm. The relatively plentiful rainfall during these months, especially in the first two years, enabled most plants to become bigger and, in the case of cocksfoot, new seedlings also established. Only perennial ryegrass frequency declined in the first two years (from 71 to 62% with lime and from 63 to 57% without lime). Table 1 shows the basal frequency of the 4 species from autumn 2000 to autumn 2007. Basal frequency of ryegrass and fescue had declined to very low levels by 2003, although fescue made some recovery in later years. Cocksfoot declined from over 70% in 2001 and 2002 to 22% by 2007. Only phalaris was able to maintain basal frequency of over 50% until 2007. This suggests that phalaris has better drought tolerance than most of the other sown perennial grasses. Details of the basal frequency of individual cultivars of each species are given in Table 2.

Conclusion

These data clearly show the value of phalaris as a species that is able to persist over the long-term and allow graziers to recoup the considerable cost in sowing pastures. Depending on whether lime is

required or not, it takes from 8-12 years to reach a break-even point and, so, perennial pastures must last at least this long and preferably much longer.

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Table 1. Change in basal frequency (%) of 4 pasture species over 8 years, and annual rainfall. (Figures in brackets in 2000 are basal frequency values from the unlimed ends of the plots).

Year	Rainfall (mm)	Ryegrass	Fescue	Cocksfoot	Phalaris
1999	631	Species sown mid-August			
2000	598	71 (63)	41 (41)	52 (50)	38 (33)
2001	608	63	61	74	48
2002	416	25	60	70	55
2003	614	9	2	42	55
2004	500	5	27	55	52
2005	620	3	18	28	46
2007	-	0	11	22	61

Table 2. Change in basal frequency (%) of 28 temperate grass cultivars over 8 years near Braidwood, NSW.

Species/cultivar	2000	2000	2002	2003	2005	2007
<u>Perennial Ryegrass</u>	Lime	No lime				
Victorian	60	59	35	22	3	0
Yatsyn	73	67	18	7	1	0
Camel	78	57	31	5	2	0
Roper	65	50	20	10	3	0
Lincoln	75	68	19	5	1	0
Meridian	74	68	25	9	8	0
Cobber	71	68	27	11	4	0
<u>Tall Fescue</u>						
Dovey	25	25	40	23	16	5
Advance	49	47	48	16	8	1
Freydo	40	28	52	35	11	14
Quantum	44	60	71	34	26	16
Triumph	49	42	66	38	27	17
Demeter	38	43	64	35	25	11
<u>Cocksfoot</u>						
Tekapo	58	46	79	49	53	20
Condor	27	47	59	15	16	7
Cambria	58	48	75	38	43	16
Howlong	57	59	74	48	54	32
Kara	68	50	62	30	27	4
Currie	54	39	76	58	59	41
Porto	40	58	66	56	66	34
<u>Phalaris</u>						
Australian	26	13	50	58	58	62
Holdfast	37	33	63	64	47	74
Australia II	43	43	69	62	61	69
Landmaster	46	22	62	60	44	67
Atlas PG	34	27	52	57	28	57
Sirosa	47	53	55	49	44	55
Sirolan	29	33	31	30	28	45
Maru	42	41	53	61	42	68