Phenotypic variation in natural populations of kikuyu in Australia

K.F. LOWE[1], K. SINCLAIR[2], T.A. HOLTON[3] AND S.J. SKABO[3]
[1] *Department of Primary Industries and Fisheries, Mutdapilly Research Station, Peak Crossing, Queensland.*
E-mail: kevin.lowe@dpi.qld.gov.au
[2] *Department of Primary Industries, Wollongbar Agricultural Institute, Wollongbar, New South Wales*
[3] *Department of Primary Industries and Fisheries, Queensland Biosciences Precinct, The University of Queensland, Queensland, Australia*

Quality of tropical grass foliage limits animal production in tropical and subtropical areas. This is mainly associated with lower digestibility because C_4 grasses have higher fibre levels. Any improvement in quality would require a reduction in the lignin and an increase in the digestion of the neutral detergent fibre fraction of these plants (Clark and Wilson 1993). Kikuyu (*Pennisetum clandestinum*) is an important grass for the dairy and beef industries of the subtropics of Australia, South Africa and New Zealand (Mears 1970). Increased digestibility could substantially improve animal production in these industries. These experiments investigated the variation in agronomic characters and quality of natural populations selected from diverse regions within Australia.

Runners of 15 kikuyu selections were collected from areas considered to have grown kikuyu for over 30 years, while Whittet and Noonan were established by seed. They were established as single spaced plants on a 1.5 m grid in a randomised block

Table 1. Plant height, forage and runner yields and average foliage quality of regional kikuyu ecotypes and cultivars grown at Mutdapilly (MRS) (Dec 2004–Sept 2005) and Wollongbar (WAI) (Mar–Sept 2005).

Treatment	Height (cm)	Forage yield (g/plant)		Runner yield (g/plant)		Average leaf quality (MRS)[2]			
						CP	IVDMD	NDF	ADF
	MRS	MRS	WAI	MRS	WAI	(%)	(%)	(%)	(%)
Ecotypes									
Vasse (WA)	19	141	13	1177	231	24.0	75.7	50.1	21.5
Flaxley (SA)	—[1]	5	3	—	93	—	—	—	—
Bairnsdale (Vic)	15	111	25	881	425	24.5	74.1	51.0	22.5
Melbourne (Vic)	18	40	—	1260	—	24.8	73.7	47.4	23.3
Bega (NSW)	16	109	—	1937	—	26.5	76.3	48.1	21.3
Wollongbar (NSW)	22	173	25	1340	192	24.9	76.0	49.1	20.6
Numinbah Valley (Q)	24	235	13	1998	181	24.7	75.7	51.2	21.3
Beechmont (Q)	18	111	24	952	262	24.0	74.7	50.7	22.4
Mt Mee (Q)	15	60	10	1316	112	24.4	74.7	50.5	22.8
Gympie (Q)	19	156	12	1195	231	26.2	75.6	49.7	21.6
Atherton Tableland (Q)	15	87	8	587	342	26.0	75.2	48.5	20.1
Cultivars									
Crofts (Bonalbo, NSW)	12	88	24	997	346	27.5[a]	76.4	46.8	19.4
Noonan (Bonalbo, NSW)	21	177	20	1173	428	26.2[c]	75.0[c]	49.6	22.4
Noonan (seed)	18	159	14	1401	375	25.6	75.6	49.2	20.6
Whittet (seed)	25	252	52	1795	518	25.7	76.9	49.5	20.1
Cultivar A[3]	21	171	19	831	161	26.2	77.3	48.1	19.2
Cultivar B[3]	20	131	31	1338	219	26.1	76.4	48.3	19.7
LSD (P<0.05)	7	109	14	ns	211	1.8	1.7	2.1	2.1

[1] Flaxley ecotype died out at MRS. [2] WAI data showed similar trends in quality. [3] Experimental cultivars.

with 3 replicates and evaluated under irrigation on a brown podsol at Mutdapilly in December 2004 and on a red ferrosol at Wollongbar in February 2005. Foliage height (MRS only), runner mass, forage production and leaf quality (crude protein, CP), *in vitro* dry matter digestibility (IVDMD), metabolisable energy (ME), acid detergent fibre (ADF) and neutral detergent fibre (NDF) concentrations were assessed over autumn, winter and spring. Runner mass was assessed by removing all runner material back to a 20 cm central plant core after the forage above 2 cm had been harvested. Forage yield was assessed monthly and runner mass 2-monthly.

Significant differences in plant height and foliage yield, runner development, and leaf CP, IVDMD, ADF and NDF were demonstrated between the 11 ecotypes and 6 cultivars (Table 1). The Numinbah Valley ecotype was the tallest and the cultivar Crofts, the shortest. There were 6- and 4-fold differences in plant yield and runner production, respectively, between the ecotypes and cultivars at the 2 sites (ignoring the Flaxley ecotype). Generally the ecotypes produced lower forage yields than Whittet, the best performing cultivar, but equivalent runner yields. The Numinbah Valley, Mt Mee and Bairnsdale ecotypes produced the lowest quality leaf.

References

CLARK, D.A. and WILSON, J.R. (1993) *Proceedings of the XVII International Grassland Congress, Palmerston North, New Zealand*. **1,** 543–550.