

Technical note

Effect of time of tiller emergence and nitrogen on seed yield components of *Digitaria eriantha* cv. Premier

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Introduction

Digitaria eriantha (syn. *D. smutsii*) cv. Premier is a new pasture grass cultivar which was shown to be winter hardy and have good cool-season growth in south-eastern Queensland (Strickland 1987). Its use on a commercial scale has been limited by low seed availability because it has poor seed set (Strickland and Haydock 1978) which leads to low levels of seed production. Like many other tropical grasses, tillering is poorly synchronised and seed is lost through high levels of seed shattering. Management to improve seed yield needs to be based on an understanding of seed crop development. The present study was designed to establish the relative contribution to seed yield of tillers emerging at different times after plants were cut back and the effect of N nutrition. The first season results are presented in this report.

Materials and methods

The trial was planted at Redland Bay, S.E. Queensland, in December 1989 and regularly irrigated to avoid water stress. Three N rates, 0, 150 and 300 kg/ha, were applied as ammonium nitrate soon after the cleaning cut (January 12, 1990). All basal tillers within a fixed datum area,

of 1.00 m × 0.25 m were tagged at weekly intervals during the first 4 weeks after initial growth was removed. The crop was harvested at peak ripeness (March 23-25, 1990) judged by visual appearance and the extent of shedding. Inflorescence density, tiller survival at harvest and seed yield components were measured. Tiller fertility was considered as the ratio between the total number of basal tillers alive at harvest and the number of tillers with a seed head. Seed set was estimated as number of caryopsis in a sample of 100 spikelets.

Results and discussion

Rate of tillering declined from an average of 25 tillers/m²/day, in the first week to 15 by the fourth week (Table 1). Application of 150 kg/ha N increased the rate of tillering whereas 300 kg/ha N had no significant effect on tillering. This decline in the rate of tillering with time could be due to the reduction in light penetration to the base of the plant and to some internal factors operating during the reproductive phase (Loch 1983). It is unlikely that the high level of N had any toxic effect as there was no reduction in total dry matter associated with treatment.

Survival of late-emerged tillers was decreased by applying fertiliser N. This appeared to be due to increased competition for light from the early-emerged tillers. Nitrogen application caused the early-emerged tillers to produce a large aerial biomass which shaded the base of the plant earlier than that occurring in the crop without N. Crops which received N lodged at the start of anthesis.

Early-emerged tillers had a high tiller fertility and higher inflorescence density both of which were enhanced by the application of N. Early-emerged tillers also had a higher percentage of seed set but this was depressed by N. This depression in seed set by N may have been caused by the unfavourable micro-environmental conditions

Table 1. Seed yield component as influenced by time of tiller emergence and N nutrition.

Parameters	Level of N (kg/ha)	Time of emergence after cutting (weeks)				LSD ¹
		0-1	1-2	2-3	3-4	
Rate of tillering, (tillers/m ² /day)	0	22	17	14	13	
	150	29	27	19	19	6
	300	23	25	20	14	
Tiller survival, (%)	0	78	67	51	13	
	150	68	38	23	6	10
	300	62	36	23	5 [*]	
Tiller fertility, (%)	0	68	16	1	0	
	150	90	53	6	0	12
	300	96	49	9	3	
Inflorescence density, (no./m ²)	0	164	24	2	0	
	150	248	74	5	0	36
	300	202	62	7	1	
Seed set, (%)	0	24	21	0	0	
	150	14	10	8	0	10
	300	15	20	3	0	
Seed yield, (g/m ²)	0	5.6	1.1	1.1	0.0	
	150	6.1	1.2	0.0	0.0	1.8
	300	6.2	2.3	0.0	0.0	

¹ LSD, P = 0.05

associated with lodging (Burbidge *et al.* 1978). Thus seed yield was higher on the early-emerged tillers and there was no overall effect of N. The lack of response to N was probably due to a high amount of available soil N being mineralised during land preparation for the crop. Bahnisch (1975) also found no effect of N application in the first year of establishing a grass seed crop of *Setaria sphacelata*.

These results suggest that further research and management practices should focus on the high seed yield associated with early-emerged tillers.

References

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