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Production of giant *Panicum* in semi-arid Kenya

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Introduction

Giant panicum (*Panicum maximum*) is a tall, vigorous perennial grass that is native to tropical and subtropical Africa. It is drought-tolerant due to its deep and dense fibrous root system and grows in a wide range of soil types. It is an important livestock feed and has been extensively cultivated in Brazil (Santos et al. 2006). Despite its wide genetic diversity in East Africa, its potential for livestock feed has not been exploited there due to limited research. Our study aimed at evaluating the production of several giant panicum ecotypes in a range of environments in semi-arid areas of Kenya.

Methods

The study was conducted at Kambi ya Mawe (KYM) (1°57' S, 37°40' E), Katumani (1°35' S, 37°14' E) and Ithookwe (1°37' S, 38°02' E) in the semi-arid, mid-elevation region of eastern Kenya. The elevation of this area ranges from 1,100 to 1,600 m asl with mean annual rainfall between 500 and 1,000 mm. All locations have a bimodal rainfall distribution with long rains occurring from March to May and short rains from October to December. The soil ranges from chromic luvisols to red sandy soils.

Nineteen giant panicum ecotypes collected in Kenya were evaluated along with a commercial cultivar (cv. Makueni) as a control. The experiment was a randomized complete block design with 3 replications. Plot sizes were 4 m x 4 m with 1 m between plots and 1.5 m between replications. A single root split was planted in each hole at a spacing of 1 m both between and within rows in November 2008. Dry matter (DM) yields were measured every 8 weeks for a period of 3 years from 2009 to 2011and tiller numbers were recorded on a sample of plants in 2009, 2010 and 2011 at Katumani and KYM, and for Ithookwe in 2010 and 2011.

Data were subjected to analysis of variance, and least significant differences between means were calculated.

Results

The DM yields averaged over the 3 years at each site (2009-2011) differed significantly ($P<0.05$) among panicum ecotypes (Table 1). Mean yield was highest at Katumani (6.56 t/ha) and lowest at KYM (5.27 t/ha). Seven of the 20 ecotypes failed to survive at KYM, and this was attributed to low rainfall at this site (annual rainfall <500 mm). The DM yield averaged across sites was highest in 2010 (9.37 t/ha) and lowest in 2011 (3.60 t/ha).

The number of tillers accounted for 43.7, 48.2 and 59.4% of the variation in DM yield at Katumani, KYM and Ithookwe, respectively (Figure 1).

No ecotype achieved high yields consistently across sites and years. However, a number of them produced as much DM as cv. Makueni.

Conclusions

A number of giant panicum ecotypes were shown to be productive and have potential use as fodder in the semi-arid area of Kenya. However, before being integrated into the farming systems, management practices need to be developed for the most productive ecotypes and their feeding value to livestock needs to be evaluated.

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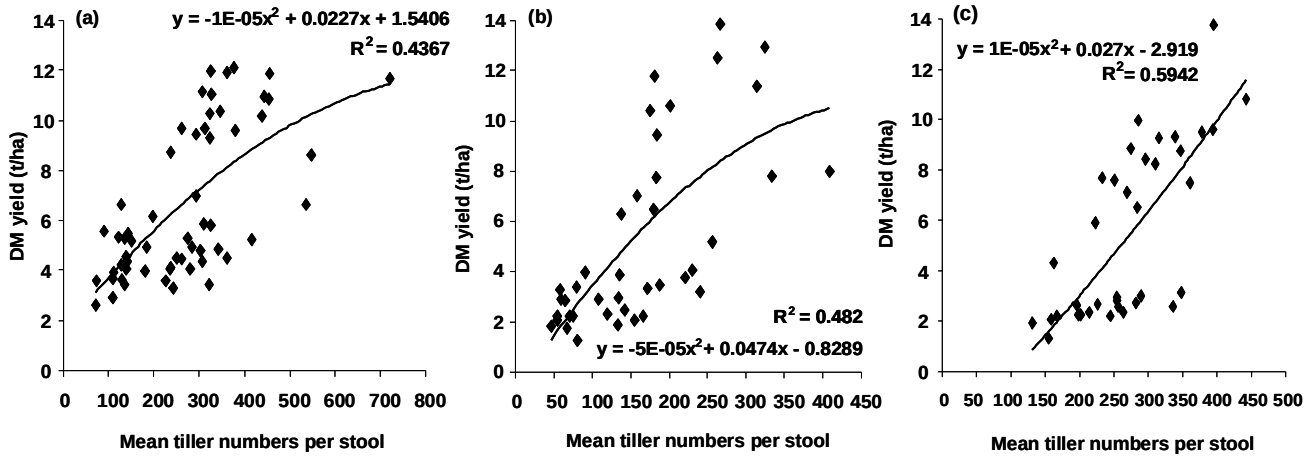

Figure 1. The effects of number of tillers on dry matter (DM) yield of giant panicum at: (a) Katumani; (b) Kambi ya Mawe; and (c) Ithookwe. The prediction equations were derived from data for total DM yield and tiller numbers obtained in 2009, 2010 and 2011 at Katumani and KYM, and for Ithookwe in 2010 and 2011.

Table 1. Dry matter yields (t/ha) of giant panicum ecotypes across locations and through time.

Ecotype Number	Location				Year			
	Katumani	Kambi ya Mawe	Ithookwe	Mean	2009	2010	2011	Mean
2	7.09	-[1]	2.87	4.98	-	-	-	-
15	6.62	-	3.93	5.27	-	-	-	-
17	5.45	7.30	6.64	6.46	4.75	10.93	3.71	6.46
19	5.64	6.36	6.31	6.10	4.38	10.27	3.66	6.10
25	7.01	6.15	6.15	6.44	5.47	10.17	3.66	6.44
35	6.52	4.86	4.98	5.46	3.12	8.00	5.25	5.46
64	6.02	-	4.87	5.45	4.47	6.96	-	5.71
76	7.68	4.02	7.83	6.51	5.73	9.84	3.95	6.51
85	6.87	5.41	5.85	6.04	5.01	10.00	3.11	6.04
93	6.48	3.48	5.31	5.09	4.49	7.72	3.07	5.09
97	7.64	-	7.45	7.55	-	-	-	-
99	5.99	3.49	5.65	5.04	3.50	8.88	2.75	5.04
100	7.61	5.05	7.64	6.77	6.02	10.26	4.03	6.77
104	5.88	7.01	6.01	6.30	4.94	10.00	3.96	6.30
105	5.79	-	10.41	8.10	6.98	-	-	6.98
106	6.67	5.39	5.42	5.83	4.82	9.33	3.33	5.83
107	6.38	-	6.29	6.33	-	-	-	-
108	6.89	-	7.30	7.09	-	-	-	-
K52-129	5.71	5.84	8.77	6.77	7.28	10.23	2.80	6.77
cv. Makueni	7.21	4.16	4.56	5.31	3.76	8.64	3.53	5.31
Mean	6.56	5.27	6.21	6.14	4.98	9.37	3.60	6.05

[1]Ecotype failed to survive at Kambi ya Mawe; LSD (P<0.05): ecotype effect = 1.68; location effect = 0.66; ecotype x location effect = 2.60. LSD (P<0.05): ecotype effect = 1.12; year effect = 0.54; ecotype x year effect = 1.95.

Reference

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