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Assessment of Hybrid Fodder Sorghum (*Sugargraze*) Quality Parameter

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ABSTRACT

A field experiment was conducted during two consecutive years of kharif 2014 and 2015 at Agricultural Research Station, Kota, to evaluate the quality of fodder sorghum .Significantly higher green fodder yield (907 q/ha), leaf: stem ratio (0.34 & 031), cruid protein (7.15 & 6.97 per cent), cruid fibre (24.92 & 24.46 per cent) and ash content (15.01 & 14.96 per cent) were observed during the both cutting with sowing of sugargraze 9.5 kg seed ha^{-1} over local chari (control).

Key words: *Sugargraze, ash, crude fibre, crude protein and leaf: stem ratio.*

INTRODUCTION

Sorghum [*Sorghum bicolor* (Linn.) Moench] is an important crop in the world, used for food (as grain or sorghum molasses), fodder, the production of alcoholic beverages and biofuels. Most varieties are drought and heat tolerant, and are especially important in arid regions, where the grain is one of the staple food for poor and rural people. It is an important food and fodder crop grown in India, and among cereals, it is the fourth most important crop after rice, wheat and maize[1].

Sorghum grain is used as staple food by millions of people and is grown for grain in southern and central states of India, whereas in northern states of the country (Punjab, Haryana, Uttar Pradesh, Rajasthan, etc.) it is mainly grown as fodder during *summer* and *kharif* seasons as a single as well as multicut crop. Among forage crops, forage sorghum could be a strategic option because of the crop's xerophilic characteristics, adaptation potential, quick growing habit, good ratoonability, palatability, digestibility and wide range of potential uses as green fodder, dry roughage, hay and silage[3].

Among crop management practices seeding densities or plant population greatly affect crop growth and then finally grain yield. Therefore seeding density is a key factor in assessing the flexibility and yielding ability of cultivars. Both over and substandard plant population is the major cause of low yield[2].

Optimum seed rate plays an important role in contributing to the high yield because in case of thick plant population, most plants remain sterile, easily attacked by diseases as compared to normal population[4].

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To obtain high quality preserved forage (silage or hay), harvest sugargraze at knee height stage. For silage, let plants wilt prior to ensiling and lower moisture content will reduce effluent losses from silage. In the India, two to three subsequent harvests are possible. To stimulate recovery growth, fertilize with nitrogen immediately following the initial harvest[5].

MATERIAL AND METHODS

An experiment was conducted during two consecutive years of *kharif* 2014 and 2015 at Agricultural Research Station, Kota. The experiment was laid-out in RBD with four replications and having six treatments *i.e.* T_1: sugargraze (seed rate 3.5 kg/ha), T_2: sugargraze (seed rate 5.5 kg/ha), T_3: sugargraze (seed rate 7.5 kg/ha), T4: sugargraze (seed rate9.5 kg/ha), T_5: sugargraze (seed rate11.5 kg/ha) and T_6: Local chari (seed rate 10.0 kg/ha).The experimental field was well prepared by two ploughing followed by harrowing & cultivator and one planking for uniform levelling, *etc.* were performed for sowing of sorghum crop. The recommended dose of nitrogen, phosphorus and potash i.e.125 kg N/ha, 60 kg P_2O_5 / ha and 60 kg K_2O /ha was given in the form of urea, di-ammonium phosphate (DAP) and muriate of potash (MOP). Full dose of DAP and MOP and half N were drilled just before sowing and remaining half dose of nitrogen was applied in two split doses as per recommendation. The bulk density, pH and cation exchange capacity of these soils varies between 1.30-1.60 Mg/m^3, 7.75-8.50 and 30-40 Cmol/kg, respectively. The soils of the region are poor in organic carbon (0.50±0.08) and available nitrogen (275±5 kg/ha) but are low to medium in available P_2O_5 (24.2± 1.0 kg/ha) and medium to high in available K_2O (290 ± 8 kg/ha).

RESULTS

Ist cutting: Two years pooled data indicated that (Table 1) the maximum leaf : stem ratio (0.38) was recorded with the sowing of sugargraze by 3.5 kg seed/ha over sowing of sugargraze with 5.5,7.5,9.5 & 11.5 kg seed ha^{-1} and local chari 10 kg ha-1 (0.27). Significantly increasing the quality of sugargraze as compared to local chari, sowing of sugargraze with 9.5 kg seed ha^{-1} gave higher cruid protein (7.15 per cent), cruid fibre (24.92 per cent) and ash (15.01 per cent) over local chari sowing with 10 kg seed ha^{-1} cruid protein (6.40 per cent), cruid fibre (23.39 per cent) and ash (13.99 per cent). However, it was found at par with sowing of sugargraze by 3.5,5.5,7.5 & 11.5 kg seed ha^{-1}, respectively. Pooled data indicated that the fodder yield was significantly influenced by sowing of different seed rate of sugargraze (Table 1). Sowing of sugargraze with 9.5 kg seed/ha was observed maximum green fodder yield (568q/ha) over local chari sowing with 10.0 kg seed ha^{-1} green fodder yield (413q/ha), sowing of sugargraze with 3.5,5.5 & 11.5 kg seed ha^{-1}, respectively. However, it was found at par with the sowing of sugargraze by 7.5 kg seed ha^{-1} green fodder yield (560 q/ha). These results are in close proximity with those of Dehinwal *et al.*[1], Smith *et al*[5]. and Jan *et al.*[2].

IInd cutting: It is evident from pooled data (Table 2) the maximum leaf: stem ratio (0.36) was observed with the sowing of sugargraze by 3.5 kg seed ha^{-1} over sowing of sugargraze with 5.5, 7.5, 9.5 & 11.5 kg seed ha^{-1} and local chari 10.0 kg seed ha^{-1} (0.26). Significantly increasing the quality of sugargraze as compared to local chari, sowing of sugargraze with 9.5 kg seed ha^{-1} gave higher cruid protein (6.97 per cent), cruid fibre (24.46 per cent) and ash (14.96 per cent) over local chari sowing with 10.0 kg seed ha^{-1} cruid protein (5.98 per cent), cruid fibre (23.03 per cent) and ash (13.97 per cent).However, it was found at par with sowing of sugargraze by 3.5,5.5,7.5 & 11.5 kg seed ha-1, respectively. Pooled data of two years shows that the fodder yield was significantly influenced by sowing of different seed rate of sugargraze (Table 2). Sowing of sugargraze with 9.5 kg seed/ha was recorded maximum green fodder yield (339 q/ha) but it was found at par with the sowing of sugargraze 7.5 kg seed ha^{-1} green fodder yield (336 q/ha) over local chari sowing with 10.0 kg seed ha^{-1} green fodder yield (255 q/ha), sowing of sugargraze with 3.5, 5.5 & 11.5 kg seed ha^{-1}, respectively. These results are in close proximity with those of Satpal *et al.*[6], Kumar and Chaplot[3].

Table 1: Effect of different seed rate on quality parameters of sugargraze during first cutting

Treatments	Leaf: Stem ratio			Cruid protein (%)			Cruid fibre (%)			Ash (%)		
	2014	2015	Pooled	2014	2015	Pooled	2014	2015	Pooled	2014	2015	Pooled
Sugargraze (seed rate 3.5 kg/ha)	0.37	0.38	0.38	7.15	7.16	7.16	24.87	24.92	24.90	15.05	15.06	15.06
Sugargraze (seed rate 5.5 kg/ha)	0.36	0.37	0.37	7.16	7.17	7.17	24.82	24.92	24.87	15.03	15.05	15.04
Sugargraze (seed rate 7.5 kg/ha)	0.34	0.35	0.35	7.19	7.19	7.19	24.84	24.96	24.90	15.03	15.05	15.04
Sugargraze (seed rate 9.5 kg/ha)	0.33	0.34	0.34	7.14	7.15	7.15	24.88	24.95	24.92	15.00	15.02	15.01
Sugargraze (seed rate 11.5 kg/ha)	0.32	0.32	0.32	7.10	7.11	7.11	24.85	24.90	24.88	14.95	14.96	14.98
Local chari (seed rate 10.0 kg/ha)	0.26	0.28	0.27	6.39	6.41	6.40	23.33	23.45	23.39	13.98	14.00	13.99
SEm ±	0.003	0.003	0.002	0.04	0.04	0.036	0.180	0.170	0.161	0.040	0.030	0.032
CD at 5 %	0.010	0.008	0.008	0.12	0.11	0.106	0.530	0.530	0.460	0.120	0.100	0.092

Table 2: Effect of different seed rate on quality parameters of sugargraze during second cutting

Treatments	Leaf: Stem ratio			Cruid protein (%)			Cruid fibre (%)			Ash (%)		
	2014	2015	Pooled	2014	2015	Pooled	2014	2015	Pooled	2014	2015	Pooled
Sugargraze (seed rate 3.5 kg/ha)	0.35	0.36	0.36	6.97	6.98	6.98	24.45	24.46	24.46	14.99	15.00	15.00
Sugargraze (seed rate 5.5 kg/ha)	0.33	0.35	0.34	6.99	7.00	7.00	24.45	24.46	24.46	14.98	14.99	14.99
Sugargraze (seed rate 7.5 kg/ha)	0.32	0.33	0.33	6.98	7.01	7.00	24.46	24.49	24.48	14.97	14.98	14.98
Sugargraze (seed rate 9.5 kg/ha)	0.30	0.31	0.31	6.96	6.97	6.97	24.44	24.48	24.46	14.95	14.96	14.96
Sugargraze (seed rate 11.5 kg/ha)	0.29	0.30	0.30	6.80	6.82	6.95	24.48	24.48	24.48	14.92	14.93	14.93
Local chari (seed rate 10.0 kg/ha)	0.25	0.27	0.26	5.97	5.99	5.98	22.95	23.10	23.03	13.90	14.03	13.97
SEm ±	0.003	0.005	0.003	0.03	0.02	0.023	0.090	0.080	0.078	0.060	0.080	0.064
CD at 5 %	0.009	0.014	0.010	0.08	0.07	0.066	0.270	0.250	0.220	0.200	0.250	0.180

Table 3: Effect of different seed rate on green fodder yield of sugargraze during Ist and IInd cutting

Treatments	Green fodder yield (q/ha)						Green fodder yield (q/ha)		
	Ist cutting			IInd cutting					
	2014	2015	Pooled	2014	2015	Pooled	Ist cutting	IInd cutting	Total
Sugargraze (seed rate 3.5 kg/ha)	386	388	387	247	250	249	387	249	636
Sugargraze (seed rate 5.5 kg/ha)	424	427	426	263	266	265	426	265	691
Sugargraze (seed rate 7.5 kg/ha)	558	562	560	334	337	336	560	336	896
Sugargraze (seed rate 9.5 kg/ha)	566	569	568	338	340	339	568	339	907
Sugargraze (seed rate 11.5 kg/ha)	516	519	518	265	268	267	518	267	785
Local variety (seed rate 10.0 kg/ha)	411	414	413	253	256	255	413	255	668
SEm ±	4.0	4.03	3.63	3.00	2.87	2.70	3.63	2.70	-
CD at 5 %	11.70	12.14	10.48	9.05	8.66	7.79	10.48	7.79	-

CONCLUSION

Significantly higher green fodder yield (907 q/ha), leaf: stem ratio (0.34 & 031), cruid protein (7.15 & 6.97 per cent), cruid fibre (24.92 & 24.46 per cent) and ash content (15.01 & 14.96 per cent) were observed during the both cutting with sowing of sugargraze 9.5 kg seed ha^{-1} over local chari (control).

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