Forage Res., **42** (2) : pp. 140-142 (2016) **http://forageresearch.in**
SHORT COMMUNICATION

PERFORMANCE OF SINGLE-CUT FORAGE SORGHUM GENOTYPES TO FERTILITY LEVELS

KENDRA PAL SINGH*, P. C. CHAPLOT, H. K. SUMERIYA AND GOPAL LAL CHOUDHARY**

Department of Agronomy
Maharana Pratap University of Agriculture & Technology,
Udaipur-313 001 (Rajasthan), India
**(e-mail: kptogas@gmail.com ; **pcchaplot@gmail.com)*

(Received : 04 August 2016; Accepted : 13 September 2016)

SUMMARY

A field experiment was conducted during **kharif** season of 2015 at Udaipur, Rajasthan on clay loam soil to assess the effect of fertility levels [50% recommended dose of fertilizer (RDF)], 75 per cent RDF, 100 per cent RDF (80 kg N+40 kg P_2O_5+40 kg K_2O/ha) and 125 per cent RDF on single-cut forage sorghum genotypes (SPH 1752, CSH 13, PC 1080, SPV 2185, CSV 20 and CSV 23). Among single-cut forage sorghum genotypes, SPH 1752 proved significantly superior in respect to plant height, stem girth, leaves/plant, leaf : stem ratio and dry matter accumulation. These improvements in growth led the genotype SPH 1752 to produce significantly higher green and dry fodder yield by 9.9, 11.6, 15.2, 31.0, 34.7, and 9.7, 11.5, 13.5, 28.8 and 32.2 per cent over genotypes CSH 13, CSV 23, SPV 2185, PC 1080 and CSV 20, respectively. This genotype also fetched highest net returns of Rs. 57516/ha and B : C ratio of 2.40. The crop fertilized with 125 per cent RDF recorded significantly highest plant height, stem girth, leaves/plant, leaf : stem ratio and dry matter accumulation over application of 100, 75 and 50 per cent RDF. The magnitude of increase in green and dry fodder yield was of the order of 4.6, 11.4, 18.6 and 10.1, 17.8, 29.1 per cent, respectively. Application of 125 per cent RDF also fetched highest net returns (Rs. 50660/ha) and B : C ratio (2.00) as compared to lower fertility levels.

Key words : Single-cut sorghum genotypes, fertility levels, growth characters, fodder yield, economics

Indian rural economy with more than 90 per cent population of ruminants with small and marginal farmers strongly backed by livestock supported agriculture. We, with the largest livestock population of the world (530 million) and only 2.4 per cent of the world's geographical area are facing tremendous pressure on the availability of feed and fodder for the livestock. Only 4.4 per cent of the cultivated area in the country is under fodder crops. Estimates reveal that projected deficit of 63.5 per cent in green fodder and 23.6 per cent in dry fodder requirement by 2016 is unlikely to change in next decade indicating 64.2 and 64.9 per cent in dry fodder requirements, respectively, by 2020 and 2025. Thus, there is an urgent need to narrow down gap between demand and supply of good quality fodder to improve health and productivity of vast livestock by enhancing production and productivity of forage crop especially forage sorghum.

Sorghum is an important forage crop in India. As forage it is fast growing, palatable, nutritious and utilized as silage and hay besides fresh feeding. The yield potential of sorghum is much higher than other forage crops but the production is low. The low fodder yield of sorghum is due to use of low yielding and outdated varieties and plant nutrition is considered major factor. The potential of existing varieties of sorghum is deteriorating either due to loss in genetic stability or changed environmental condition. During last few years, a number of high yielding single-cut forage sorghum genotypes have been developed. These genotypes are required to be tested for their performance under various fertility conditions because the information on the response of newly evolved genotypes to fertility levels is scanty. Keeping this in view, the present experiment was framed to be conducted.

A field experiment was conducted during **kharif** season of 2015 at Instructional Farm, Rajasthan College of Agriculture, Udaipur (Rajasthan) situated at 24º35' N latitude, 74º42' E longitude and altitude of 579.5 m above mean sea level. The soil of the experimental field was clay loam in texture, slightly alkaline in reaction (pH 8.0), medium in available nitrogen (290.5 kg/ha) and phosphorus (17.2 kg/ha), while high in available potassium (265.7 kg/ha). The experiment consisted of 24 treatment combinations comprising six single-cut

forage sorghum genotypes (SPH 1752, CSH 13, PC 1080, SPV 2185, CSV 20 and CSV 23) and four fertility levels viz., 50 per cent recommended dose of fertilizer (RDF), 75 per cent RDF, 100 per cent RDF (80 kg N+40 kg P_2O_5+40 kg K_2O/ha) and 125 per cent RDF. These treatments were tested in factorial randomized block design with three replications. As per treatment, full dose of phosphorus and potassium and half dose of nitrogen were applied at the time of sowing. Remaining half dose of nitrogen was top dressed at crop knee high stage. The sorghum genotypes as per treatment were sown on 1 July, 2015 in opened furrows at 30 cm apart using seed rate of 30 kg/ha. A plant to plant distance of 10 cm was maintained by thinning and gap filling operation at 15 DAS. Other agronomic and plant protection measures were adopted as and when crop needed. The crop was harvested at 50 per cent flowering stage.

Effect of Genotypes

Data presented in Table 1 reveal that single-cut forage sorghum genotype SPH 1752 attained significantly higher plant height, stem girth, number of leaves/plant, leaf : stem ratio and dry matter accumulation (DMA) as compared to rest of genotypes under test. The magnitude of increase in DMA/plant at harvest was 17.6, 38.8, 50.7, 58.0 and 66.5 per cent, respectively, over genotypes CSH 13, SPV 2185, CSV 23, CSV 20 and PC 1080. The differential behaviour of these genotypes could also be explained solely by the variation in their genetic constituent (Meena *et al.*, 2012). Dry matter production efficiency of genotypes determines its potential to produce economics of yield (Rana *et al.*, 2013). Further single-cut forage sorghum genotype SPH 1752 also recorded significantly higher green (62.58 t/ha) and dry (22.39 t/ha) fodder yield over genotypes CSH 13, CSV 23, SPV 2185, PC 1080 and CSV 20. The corresponding increase in green and dry fodder yield was of the order of 9.9, 11.6, 15.2, 31.0, 34.7 and 9.7, 11.5, 13.5, 28.8, 32.2 per cent, respectively. The higher fodder yield registered by genotype SPH 1752 appeared to be a resultant of remarkable improvement in plant height, stem girth, leaf : stem ratio and DMA. Several workers have also noticed the variation among the genotypes of sorghum for fodder yield and growth characteristics (Singh and Sumeriya, 2012; Midha *et al.*, 2014). The genotype SPH 1752 fetched highest net returns of Rs. 57516/ha and B : C of Rs. 2.40 which were significantly higher by Rs. 7308, 8471, 10724, 19252, 20971/ha and Rs. 0.29, 0.35, 0.44, 0.79, 0.87 over genotypes CSH 13, CSV 23, SPV 2185, PC 1080 and CSV 20, respectively.

Effect of Fertility Levels

Data further show that fertility levels had

TABLE 1
Effect of single-cut forage sorghum genotypes and fertility levels on growth, fodder yield and economics

Treatment	Plant height (cm)	Stem girth (cm)	Leaves/ plant	Leaf : stem ratio	DMA (g/plant)	Fodder yield (t/ha)		Net returns (Rs./ha)	B : C ratio
						Green	Dry		
Genotypes									
SPH 1752	354.8	1.86	14.2	29.0	151.9	62.6	22.4	57516	2.40
CSH 13	317.8	1.65	12.6	28.8	129.1	57.0	20.4	50208	2.11
PC 1080	274.9	1.48	10.7	21.1	91.3	47.8	17.4	38264	1.61
SPV 2185	286.3	1.61	11.8	25.2	109.4	54.3	19.7	46792	1.96
CSV 20	283.6	1.43	11.7	21.9	96.1	46.5	16.9	36545	1.53
CSV 23	283.7	1.57	11.2	22.3	100.8	56.1	20.1	49045	2.05
S. Em±	4.91	0.02	0.26	0.63	2.66	0.95	0.48	1238	0.05
C. D. (P = 0.05)	13.98	0.06	0.74	1.79	7.58	2.71	1.36	3524	0.15
Fertility levels									
50% RDF	276.6	1.49	10.9	22.1	100.8	49.3	17.1	41757	1.87
75% RDF	294.4	1.56	11.6	23.7	107.7	52.5	18.7	44875	1.92
100% RDF	307.9	1.63	12.4	25.7	117.4	55.9	20.0	48288	1.98
125% RDF	321.8	1.74	13.1	27.4	126.6	58.5	22.1	50660	2.00
S. Em±	4.01	0.02	0.21	0.51	2.17	0.78	0.39	1011	0.04
C. D. (P = 0.05)	11.42	0.05	0.60	1.46	6.19	2.21	1.11	2878	NS

significant effect on growth and fodder yield. The sorghum crop fertilized with 125 per cent RDF (100 kg N+50 kg P_2O_5+50 kg K_2O/ha) recorded highest plant height, stem girth, number of leaves/plant, leaf : stem ratio and DMA at harvest. The magnitude of increase in DMA/plant over 100, 75 and 50 per cent RDF was to the tune of 7.8, 17.5 and 25.6 per cent, respectively. These improvements in growth parameters led the sorghum genotypes to produce significantly higher green and dry fodder yield over application of 100, 75 and 50 per cent RDF. The corresponding increase in green and dry fodder yield due to the application of 125 per cent RDF was to the tune of 4.6, 11.4, 18.6 and 10.1, 17.8, 29.1 per cent, respectively. The significant increase in fodder yield with increase in fertility levels was due to fact that all these nutrients were involved in increasing protoplasmic constituents, root, shoot growth and accelerating the process of cell division, enlargement and elongation which in turn showed luxuriant vegetative growth and resulted in higher green and dry fodder yield. Similar results were also obtained by Rana *et al.* (2013), Singh *et al.* (2014) and Kumar and Chaplot (2015). Application of 125 per cent RDF at par with application of 100 per cent RDF, both these fertility levels significantly enhanced net returns by Rs. 5785, 3413/ha and Rs. 8903, 6531/ha over 75 and 50 per cent RDF, respectively.

REFERENCES

Kumar, D., and P. C. Chaplot. 2015 : Performance of multi-cut forage sorghum genotypes to fertility levels. *Forage Res.*, **41** : 199-201.

Meena, A. K., P. Singh, and P. Kanwar, 2012 : Effect of nitrogen levels on yield and quality of sorghum (*Sorghum bicolor* L.) genotypes. *Forage Res.*, **37** : 238-240.

Midha, L. K., S. Arya, and U. N. Joshi, 2014 : Response of forage sweet sorghum genotypes under different nitrogen levels. *Forage Res.* **40** : 116-118.

Rana, D. S., B. Singh, K. Gupta, and A. K. Dhaka, 2013 : Performance of single-cut forage sorghum genotypes to different fertility levels. *Forage Res.*, **39** : 96-98.

Singh, P., and H. K. Sumeriya. 2012 : Effect of nitrogen on yield, economics and quality of fodder sorghum genotypes. *Ann. Plant and Soil Res.* **14** : 133-135.

Singh, P., H. K. Sumeriya, and A. K. Meena. 2014 : Response of sorghum [*Sorghum bicolor* (L.) Moench] single-cut forage genotypes to nitrogen levels. *Ann. Agri-Bio Res.*, **19** : 55-60.