Forage Res., **40** (4) : pp. 251-253 (2015) **http://forageresearch.in**
SHORT COMMUNICATION

EFFECT OF FERTILITY LEVELS ON QUALITY OF MULTI-CUT FORAGE SORGHUM GENOTYPES[1]

DURGESH KUMAR* AND P. C. CHAPLOT**

Department of Agronomy
Maharana Pratap University of Agriculture & Technology,
Udaipur-313 001 (Rajasthan), India
**(e-mail : kumawat90durgesh@gmail.com; **pcchaplot@gmail.com)*
(Received : 15 October 2014; Accepted : 6 February 2014)

SUMMARY

A field experiment was conducted on clay loam soils of the Instructional Farm, Rajasthan College of Agriculture, Udaipur (Rajasthan) to study the effect of fertility levels viz., control, 50 per cent recommended dose of fertilizer (RDF), 75 per cent RDF and 100 per cent RDF (80 kg N+40 kg P_2O_5+40 kg K_2O/ha) on quality of multi-cut fodder sorghum genotypes (SPH 1697, SPH 1698, CSH 20 MF, CSH 24 MF and SSG 59-3) during *zaid* season of 2013. In both the cuttings, genotype SPH 1697 exhibited maximum crude protein, crude fibre and lowest nitrogen free extract, and total digestible nutrient content. While concentration of mineral ash and ether extract was maximum in genotypes SPH 1698, SPH 1697 and CSH 20 MF. Genotype SPH 1697 proved significantly superior in respect to crude protein, crude fibre, mineral ash, ether extract, nitrogen free extract and total digestible nutrient in both the cuttings. Application of 100 per cent RDF significantly increased content and uptake of crude protein, crude fibre, mineral ash and ether extract over lower fertility levels in both the cuts. While application of fertility levels caused significant reduction in TDN and NFE content in dry fodder which were highest in unfertilized control.

Key words : Fertility levels, fodder quality, multi-cut forage sorghum

India supports nearly 20 per cent of the world's livestock being the leader in cattle (16%) and buffalo (5.5%) population. The livestock sector contributes 32 per cent of the agricultural output which is 22 per cent of the total GDP in India. Deficiency in feed and fodder has been identified as one of the major component in achieving the desired level of livestock production. The shortage in dry fodder is 21.8 per cent compared with requirement of 560 million tonnes for the current livestock populations (Rana *et al*., 2013). Continuous supply of well balanced nutritive forage is essential to the milch animals for enhancing milk productivity (Meena *et al*., 2012). Sorghum is an important crop widely grown throughout the year with high fodder production. It is fast growing, adaptive to vast environmental condition and provides palatable nutritious fodder to the animals.

Considering this, multi-cut genotypes of sorghum were developed for continuous supply of fodder for longer period. Being an exhaustive crop, yield and quality of sorghum fodder suffer heavily if proper amount of fertilizers is not applied. Therefore, these new multi-cut genotypes were grown to get information on their nutritive value under different fertility levels.

A field experiment was conducted during *zaid* season of 2013 at Instructional Farm, Rajasthan College of Agriculture, Udaipur (Rajasthan) situated at 24º34' N latitude, 73º 42' 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 (295.3 kg/ha) and phosphorus (16.6 kg/ha) while high in available potassium (270.7 kg/ha). The experiment consisted of 20 treatment combinations comprising five multi-cut forage sorghum genotypes (SPH 1697, SPH 1698, CSH 20 MF, CSH 24 MF and SSG 59-3) and four fertility levels viz., control, 50 per cent recommended dose of fertilizer (RDF), 75 per cent RDF and 100 per cent RDF (80 kg N+40 kg P_2O_5+40 kg K_2O/ha). These treatments were tested in factorial randomized block design with three replications. As per treatment, full dose of phosphorus and potassium and one-third dose of nitrogen

[1]Based on part of M. Sc. (Agri) thesis.

was applied at the time of sowing. Remaining nitrogen dose was splitted into two equal parts, first half was applied at knee high stage while second half at 30 days after first cutting. The sorghum genotypes as per treatment were sown on 25 April 2013 in opened furrows at 30 cm apart using seed rate of 40 kg/ha. A plant to plant distance of 10 cm was maintained by thinning and gap filling operation at 15 DAS. The crop was irrigated at 10-15 days interval as per need during summer. Other agronomic and plant protection measures were adopted as and when crop needed. The 1st and 2nd cuttings for green fodder were taken at 55 days after sowing (DAS) and 40 days after 1st cutting, respectively.

An examination of data (Table 1 & 2) reveals that multi-cut forage sorghum genotype SPH 1697 registered significantly higher concentration of crude protein (CP) and crude fibre (CF) in dry fodder in both the cuts over genotypes SPH 1698 and CSH 20 MF but at par with SSG 59-3 and CSH 24 MF. Further all genotypes under test except CSH 20 MF were equally efficient in improving mineral ash (MA) and ether extract (EE) content. While significantly higher concentrations of nitrogen free extract (NFE) and total digestible nutrient (TDN) were noted in genotypes CSH 24 MF and CSH 20 MF, respectively, in both the cuts. Further the production of CP, CF, MA, EE, NFE and TDN was significantly influenced due to multi-cut sorghum genotypes. Among genotypes, SPH 1697 exhibited significantly higher CP and CF production in 1st and 2nd cuts as compared to rest of the genotypes. Similar findings were also noted by Sadhu *et al*. (2008) and Rana *et al*. (2013).

Maximum production of MA and EE was recorded by genotype SPH 1697 which was significantly higher over SPH 1698, CSH 24 MF and SSG 59-3 in 1st cut and CSH 20 MF and SSG 59-3 in 2nd cut. Genotype SPH 1697 also accumulated significantly higher NFE and TDN over rest of the genotypes except CSH 20 MF in 1st cut and CSH 24 MF in 2nd cut. Thus, when compared to check genotype SSG 59-3, the genotype SPH 1697 significantly enhanced the production of CP, CF, MA, EE, NFE and TDN 107.1, 108.5, 109.3, 110.0, 108.3 and 108.0 per cent in 1st cut and 35.3, 36.8, 36.1, 37.5, 36.6 and 36.2 per cent in 2nd cut, respectively. The corresponding increase in above parameters due to genotype SPH 1697 over SPH 1698 was 24.3, 22.3, 20.0, 23.5, 19.8 and 20.7 per cent in 1st cut and 12.2, 9.3, 6.5, 10.0, 7.3 and 8.1 per cent in 2nd cut, respectively.

Data further reflect that fertility levels had significant influence on content and production of quality parameters during 1st and 2nd cuttings. The crop fertilized with 100 per cent RDF registered highest CP, CF, MA and EF which were significantly higher than lower dose of fertilizer and control in both the cuts.

TABLE 1
Effect of multi-cut forage sorghum genotypes and fertility levels on fodder quality (%)

Treatment	1st cutting						2nd cutting					
	CP	CF	MA	EE	NFE	TDN	CP	CF	MA	EE	NFE	TDN
Genotypes												
SPH 1697	6.51	31.53	6.86	1.60	53.48	55.15	6.43	32.25	6.82	1.54	52.95	55.16
SPH 1698	6.30	31.19	6.87	1.61	54.02	55.19	6.22	31.91	6.82	1.55	53.49	55.20
CSH 20 MF	6.00	30.42	6.69	1.59	55.28	55.34	5.92	31.13	6.65	1.53	54.75	55.35
CSH 24 MF	6.42	29.85	6.83	1.60	55.30	55.20	6.34	30.56	6.78	1.54	55.77	55.21
SSG 59-3	6.44	31.47	6.18	1.61	53.68	55.21	6.37	32.19	6.74	1.55	53.15	55.22
S. Em±	0.06	0.15	0.05	0.005	0.17	0.03	0.06	0.15	0.03	0.005	0.17	0.03
C. D. (P=0.05)	0.18	0.44	0.09	0.01	0.49	0.09	0.18	0.44	0.09	0.01	0.49	0.09
Fertility levels												
Control	4.76	27.76	5.61	1.29	60.58	56.10	4.69	28.30	5.55	1.23	60.21	56.11
50% RDF	6.11	31.55	7.12	1.65	53.57	55.08	6.04	32.30	7.06	1.59	53.00	55.09
75% RDF	7.18	32.06	7.21	1.71	51.83	55.87	7.09	32.81	7.15	1.65	51.28	54.89
100% RDF	7.29	32.30	7.30	1.76	51.43	54.82	7.21	33.00	7.29	1.70	50.79	54.81
S. Em±	0.05	0.14	0.03	0.005	0.15	0.03	0.05	0.14	0.03	0.005	0.15	0.02
C. D. (P=0.05)	0.16	0.39	0.08	0.01	0.44	0.10	0.16	0.39	0.08	0.01	0.44	0.06

CP–Crude protein, CF–Crude fibre, MA–Mineral ash, EE–Ether extract, NFE–Nitrogen free extract and TDN–Total digestible nutrient.

TABLE 2
Effect of multi-cut forage sorghum genotypes and fertility levels on production of quality parameters (q/ha)

Treatment	1st cutting						2nd cutting					
	CP	CF	MA	EE	NFE	TDN	CP	CF	MA	EE	NFE	TDN
Genotypes												
SPH 1697	8.7	41.7	9.0	2.1	70.2	72.8	4.6	23.4	4.9	1.1	38.1	39.9
SPH 1698	7.0	34.1	7.5	1.7	58.6	60.3	4.1	21.4	4.6	1.0	35.5	36.9
CSH 20 MF	7.9	39.6	8.7	2.1	71.5	72.0	3.9	20.7	4.4	1.0	36.1	36.7
CSH 24 MF	6.0	27.5	6.3	1.5	50.4	50.8	4.2	20.8	4.6	1.0	37.5	37.4
SSG 59-3	4.2	20.0	4.3	1.0	33.7	35.0	3.4	17.1	3.6	0.8	27.9	29.3
S. Em±	0.18	0.91	0.21	0.05	1.72	1.85	0.12	0.60	0.12	0.03	1.01	1.15
C. D. (P=0.05)	0.53	2.58	0.60	0.14	4.90	5.25	0.34	1.71	0.35	0.08	2.88	3.26
Fertility levels												
Control	3.6	21.5	4.3	1.0	47.5	43.6	2.2	13.7	2.7	0.6	29.7	27.4
50% RDF	5.8	30.4	6.8	1.6	52.1	53.2	3.6	19.5	4.3	1.0	32.5	33.4
75% RDF	8.4	37.8	8.4	2.0	61.6	65.9	5.0	23.8	5.2	1.2	37.6	40.0
100% RDF	9.2	41.1	9.2	2.3	66.1	70.0	5.6	25.8	5.7	1.3	40.2	43.1
S. Em±	0.16	0.81	0.19	0.04	1.54	1.65	0.11	0.54	0.11	0.02	0.90	1.03
C. D. (P=0.05)	0.47	2.30	0.53	0.12	4.38	4.69	0.30	1.53	0.31	0.07	2.57	2.92

Abbreviation details are given in Table 1.

While application of 50, 75 and 100 per cent RDF significantly reduced NFE and TDN content in dry fodder compared to unfertilized control in both cuts. The improvement in CP under the influence of 100 per cent RDF application seemed to be on account of increased N concentration in fodder. Further increase in protein content in fodder resulted in reduction in NFE content. The crop under influence of 100 per cent RDF recorded maximum CP, CF, MA, EE, NFE and TDN yield which was significantly higher over control, 50 and 75 per cent RDF in 1st and 2nd cuts. When compared to unfertilized control, application of 100 per cent RDF increased CP, CF, MA, EE, NFE and TDN yield by 155.5, 91.2, 114.0, 130.0, 39.2 and 60.6 per cent in 1st cut and 154.5, 88.3, 111.1, 116.7, 35.4 and 57.3 per cent in 2nd cut, respectively. Meena *et al*. (2012) and Dhakar *et al*. (2014) also reported the similar findings.

REFERENCES

Dhakar, R. C., R. K. Dubey, L. N. Dashora, and R. C. Tiwari. 2014 : Productivity of elite sorghum genotypes under different plant population and fertility levels in southern Rajasthan. *Ann. Biol.,* **30** : 249-252.

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.

Rana, D. S., B. Singh, K. Gupta, A. K. Dhaka, and S. K. Pahuja. 2013 : Effect of fertility levels on growth, yield and quality of multi-cut forage sorghum (*Sorghum bicolor* L.) genotypes. *Forage Res.,* **39** : 36-38.

Sadhu, A. C., M. R. Patel, R. M. Patel, and D. J. Parmar. 2008 : Effect of stubble height and fertility levels on yield and quality of multi-cut forage sorghum cv. SSG 59-3. *Res. on Crops,* **9** : 328-330.