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SHORT COMMUNICATION

EFFECT OF FERTILITY LEVELS ON QUALITY OF SINGLE-CUT FORAGE SORGHUM GENOTYPES

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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.*, 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^{-1}) and 125 per cent RDF on quality of single-cut forage sorghum genotypes (SPH 1752, CSH 13, PC 1080, SPV 2185, CSV 20 and CSV 23) during *kharif* season of 2015. Single-cut forage sorghum genotype SPH 1752 synthesized significantly higher chlorophyll content in leaves as compared to rest of genotypes under study. The lower HCN content in green forage was recorded in genotype PC 1080 as compared to rest of the genotypes. Genotype SPH 1752 exhibited maximum crude protein, crude fibre and ether extract content. While concentration of mineral ash was maximum in genotype CSH 13. The genotype PC 1080 and CSV 20 recorded highest concentration of nitrogen free extract and total digestible nutrient in fodder, respectively. Genotype SPH 1752 proved significantly superior in respect to crude protein, crude fibre, mineral ash, ether extract, nitrogen free extract and total digestible nutrient uptake in dry fodder. The crop fertilized with 125 per cent RDF recorded highest chlorophyll content and HCN content in green fodder. This fertility level significantly increased content and uptake of crude protein, crude fibre, mineral ash and ether extract over lower fertility levels. Increasing fertility levels caused significant reduction in nitrogen free extract and total digestible nutrient content in dry fodder which were highest in 50 per cent RDF but application of 125 per cent RDF significantly increased uptake of nitrogen free extract and total digestible nutrient uptake by dry fodder.

Key words : Single-cut forage sorghum, genotypes, fertility levels, fodder quality, HCN content

India supports nearly 20 per cent of the world's livestock being the leader in cattle (16%) buffalo (55%), goat (20%) and sheep (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). The low productivity and poor performance of the livestock are mainly due to unavailability of nutritious fodder in sufficient quantity. The availability of nutritious fodder is inadequate in the country. India faces a net deficit of 61 percent green fodder, 21.9 percent dry crop residues and 64 percent feed. The most important constraints in the fodder production and productivity is the non availability of improved variety seed of forage crop to the farmers. (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. There is a great need to maintain regular well balanced supply of more nutritious feed and fodder for stall feeding animals, productive milch herds can be maintained, which would accelerate the growth of milk production in the state (Meena *et al*., 2012).

Identification of good quality sorghum genotypes and development of location specific production technology offer an excellent opportunity to provide fodder for better nutrition to bovine population

(Singh *et al.*, 2014) of Amongst growth factors, adequate inorganic fertilizers are considered to be of prime importance. Balanced and adequate use fertilizer has played a key role in the modernization of Indian agriculture and in making the country sufficient in fodder production for animals. Therefore, newly evolved single-cut forage sorghum genotypes were grown to get information on their nutritive value under different fertility levels.

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^{-1}) and phosphorus (17.2 kg ha^{-1}), while high in available potassium (265.7 kg ha^{-1}). 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^{-1}) 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 was 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 01^{st} July, 2015 in opened furrows at 30 cm apart using seed rate of 30 kg ha^{-1}. 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.

An examination of data (Table 1 & 2) reveals that single-cut forage sorghum genotype SPH 1752 synthesized significantly higher chlorophyll content in leaves as compared to rest of genotypes under study. The lower HCN content in green forage was recorded in genotype PC 1080 at each growth stages and at harvest as compared to rest of the genotypes. The genotype SPH 1752 registered significantly higher concentration of crude protein (CP), crude fibre (CF) and ether extract (EE) in fodder. While concentration of mineral ash (MA) was maximum in genotype CSH 13. The genotype PC 1080 and CSV 20 recorded highest nitrogen free extract (NFE) and total digestible nutrient (TDN) content in fodder, respectively. Further the production of CP, CF, EE, MA, NFE and TDN was significantly influenced due to single-cut sorghum genotypes. Amongst genotypes, SPH 1752 exhibited significantly higher CP

TABLE 1

Effect of single-cut forage sorghum genotypes and fertility levels on chlorophyll, HCN content and fodder quality

Treatment	HCN (ppm)	Chlorophyll (mg/g fresh wt.)	CP (%)	CF (%)	EE (%)	MA (%)	NFE (%)	TDN (%)
Genotypes								
SPH 1752	86.50	1.82	6.27	31.34	1.72	7.16	53.85	55.06
CSH 13	92.28	1.79	6.20	31.00	1.67	7.30	53.48	54.96
PC 1080	72.86	1.59	6.03	28.48	1.63	7.24	56.63	55.04
SPV 2185	91.55	1.71	5.84	29.88	1.69	7.18	55.41	55.12
CSV 20	87.52	1.56	5.48	29.65	1.65	7.11	56.10	55.20
CSV 23	87.44	1.74	6.13	29.95	1.67	7.25	55.01	55.02
S. Em±	0.74	0.02	0.04	0.17	0.01	0.02	0.17	0.02
C. D. (P=0.05)	2.11	0.05	0.11	0.47	0.02	0.07	0.49	0.05
Fertility levels								
50% RDF	76.06	1.61	5.88	29.04	1.64	7.10	56.35	55.15
75% RDF	82.78	1.66	5.93	29.72	1.66	7.18	55.51	55.09
100% RDF	88.97	1.73	6.03	30.38	1.69	7.24	54.67	55.05
125% RDF	97.62	1.82	6.13	31.06	1.71	7.31	53.79	54.99
S. Em±	0.61	0.01	0.03	0.14	0.01	0.02	0.14	0.01
C. D. (P=0.05)	1.73	0.04	0.09	0.39	0.02	0.05	0.40	0.04

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 single-cut forage sorghum genotypes and fertility levels on production of quality parameters (q/ha)

Treatments	CP	CF	EE	MA	NFE	TDN
Genotypes						
SPH 1752	14.0	70.5	3.9	16.0	120.3	123.3
CSH 13	12.7	63.4	3.4	14.9	109.0	112.2
PC 1080	10.5	49.5	2.8	12.6	98.3	95.6
SPV 2185	11.6	59.1	3.3	14.2	109.0	108.7
CSV 20	9.3	50.4	2.8	12.1	94.8	93.5
CSV 23	12.3	60.3	3.4	14.6	110.3	110.5
S. Em±	0.30	1.59	0.08	0.36	2.55	2.62
C. D. (P=0.05)	0.86	4.51	0.23	1.03	7.25	7.47
Fertility levels						
50% RDF	10.1	49.8	2.8	12.2	96.2	94.3
75% RDF	11.2	55.8	3.1	13.5	103.8	103.2
100% RDF	12.1	61.0	3.4	14.5	109.4	110.3
125% RDF	13.6	68.8	3.8	16.1	118.4	121.3
S. Em±	0.25	1.29	0.06	0.29	2.08	2.14
C. D. (P=0.05)	0.70	3.68	0.18	0.84	5.92	6.10

Abbreviation details are given in Table 1.

by 10.2, 13.8, 20.7, 33.3 and 50.5 per cent, CF by 11.2, 16.9, 19.3, 42.4 and 39.9 per cent, EE by 14.7, 14.7, 18.2, 39.3 and 39.3 per cent, MA by 7.4, 9.6, 12.7, 27.0 and 32.2 per cent, NFE by 10.4, 9.1, 10.4, 22.4 and 26.9 per cent and TDN by 10.0, 11.6, 13.4, 29.0 and 31.9 per cent over genotypes CSH 13, CSV 23, SPV 2185, PC 1080 and CSV 20, respectively. Further genotypes CSH 13 and CSV 23 were at par with respect to production of CP, CF, EE, MA, NFE and TDN. While production of these parameters were lowest in genotypes PC 1080 and CSV 20. Similar findings were also noted by Singh *et al.* (2014) and Satpal *et al.* (2015). Data further reflect that fertility levels had significant influence on content and production of quality parameters. The crop fertilized with 125 per cent RDF recorded highest chlorophyll content in leaves and HCN content in green fodder which was significantly higher over application of 50, 75 and 100 per cent RDF. Application of higher fertility level *i.e.* 125 per cent recommended dose of fertilizer recorded highest concentration of CP, CF, EE and MA in dry fodder as compared to application of 100, 75 and 50 per cent RDF. While NFE and TDN concentration in dry fodder was highest when crop was fertilized with 50 per cent RDF. The improvement in CP under the influence of 125 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 125 per cent RDF recorded maximum CP, CF, EE, MA, NFE and TDN yield which were significantly higher over 50, 75 and 100 per cent RDF. Thus when compared to 100, 75 and 50 per cent RDF, application of 125 per cent RDF increased accumulation of CP by 12.4, 21.4 and 34.7 per cent, CF by 12.8, 23.3 and 38.2 per cent, EE by 11.8, 22.6 and 35.7 per cent, MA by 11.0, 19.3 and 32.0 per cent, NFE by 8.2, 14.1 and 23.1 per cent and TDN by 10.0, 17.6 and 28.6 per cent, respectively. Meena *et al*. (2012), Dhakar *et al*. (2014) and Kumar and Chaplot (2015) also reported the similar findings.

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