



ISSN (E): 2277- 7695

ISSN (P): 2349-8242

NAAS Rating: 5.23

TPI 2022; 11(4): 834-836

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[www.thepharmajournal.com](http://www.thepharmajournal.com)

Received: 18-02-2022

Accepted: 25-03-2022

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## Effect of cutting and nutrient management on yield and quality of summer fodder sorghum under north Gujarat condition

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### Abstract

An experiment was conducted during summer season of the year 2020 at Agronomy Instructional Farm, C. P. College of Agriculture, Sardarkrushinagar Dantiwada Agricultural University, Sardarkrushinagar to study the Effect of cutting and nutrient management on yield and quality of summer fodder sorghum under north Gujarat condition. Nine treatment combinations comprising three levels of cutting management and three levels of nutrient management were evaluated in randomized block design with factorial concept with three replications. Three cutting of forage sorghum registered significantly higher green and dry forage yield with highest total nutrient uptake. 125% RDF registered significantly higher crude protein content, N content and nutrients uptake in all cuts, whereas, crude fiber content was registered significantly higher with 75% RDF.

**Keywords:** Cutting and nutrient management, forage sorghum, loamy sand, nutrient content, quality and uptake

### Introduction

Among the cereals, forage sorghum is generally grown during *kharif* and summer seasons on almost all types of soils. Cultivation of forage sorghum during summer season is one of the most important components in a crop system because of its stable productivity and more nutritive values. It is popular as a dual-purpose crop, and is mainly grown as fodder during summer and *kharif* seasons as a single as well as multi-cut crop. Cutting management is one of the most important practices. The time of cutting intervals and cutting frequency are also very important agronomic practices for multi-cut forage crops. Sorghum being a cereal has got the tremendous capacity for regeneration and having potential to be cultivated as multi-cut crop, if harvested at proper stage of growth. The multi-cut varieties have higher nutritive value than single cut under the same set of management which mitigates the problem of time and again field preparation and reseeded. Nitrogen and phosphorus nutrient play a vital role in maximizing the forage yield as majority of Indian soils are low in nitrogen and phosphorus. Nitrogen application increase crude protein and metabolize energy, besides improving succulency and palatability of forage crops. It improves the quality by increasing the protein content of fodder crops. By keeping this views in mind present field trial is conducted to evaluate the effect of cutting and nutrient management on yield and quality of forage sorghum.

### Material and Methods

The field experiment was conducted at Agronomy Instructional Farm, Department of Agronomy, Chimanbhai Patel College of agriculture, Sardarkrushinagar Dantiwada Agricultural University, Sardarkrushinagar. The total 9 treatments *viz.*, T<sub>1</sub>: Single cut at maturity (105 DAS) + 125% RDF, T<sub>2</sub>: Single cut at maturity + 100% RDF, T<sub>3</sub>: Single cut at maturity + 75% RDF, T<sub>4</sub>: Two cuts (60 DAS + 45 days after 1<sup>st</sup> cutting) + 125% RDF, T<sub>5</sub>: Two cuts (60 DAS + 45 days after 1<sup>st</sup> cutting) + 100% RDF, T<sub>6</sub>: Two cuts (60 DAS + 45 days after 1<sup>st</sup> cutting) + 75% RDF, T<sub>7</sub>: Three cuts (60 DAS + 45 days after 1<sup>st</sup> cutting + 45 days after 2<sup>nd</sup> cutting) + 125% RDF, T<sub>8</sub>: Three cuts (60 DAS + 45 days after 1<sup>st</sup> cutting + 45 days after 2<sup>nd</sup> cutting) + 100% RDF, T<sub>9</sub>: Three cuts (60 DAS + 45 days after 1<sup>st</sup> cutting + 45 days after 2<sup>nd</sup> cutting) + 75% RDF were carried out in Randomized Block Design with factorial concept (FRBD) with three replications by using forage sorghum variety CoFS29.

The soil of experimental field was loamy sand in texture, slightly alkaline in nature, low in organic carbon, available Zn and Cu; medium in available nitrogen, available P<sub>2</sub>O<sub>5</sub>, available S, Fe and Mn and high in available K<sub>2</sub>O.

## Results and Discussion

### Effect of cutting management

Data presented in the table 1, revealed that significantly higher total green forage yield (655.7 q/ha) and total dry forage yield (131.4 q/ha) were recorded with three cuts (60 DAS + 45 days after 1<sup>st</sup> cutting + 45 days after 2<sup>nd</sup> cutting) while significantly lower total green forage yield (400.6 q/ha) and total dry forage yield (80.1 q/ha) were registered with single cut at 105 DAS but cutting management did not exert its significant effect on crude protein content, crude fiber content and nutrients content at 60 DAS. Significantly higher total N, P and K uptake by forage sorghum (154.69 kg/ha, 23.16 kg/ha, 153.43 kg/ha, respectively, table 2) was registered with three cuts (60 DAS + 45 days after 1<sup>st</sup> cutting + 45 days after 2<sup>nd</sup> cutting) while significantly lower total N, P and K uptake (120.07 kg/ha, 18.90 kg/ha, 99.23 kg/ha, respectively) was registered with single cut at 105 DAS. The result was due to higher number of cuts which resulted into more total biomass production and dry matter accumulation as compared to single and two cut crop. Manjanagouda *et al.* (2017) [2] and Ram, (2018) [5] reported similar type of results.

### Effect of nutrient management

Application of 125% RDF recorded significantly higher green forage yield of sorghum (569.8 q/ha) and dry forage yield (124.9 q/ha) which were at par with 100% RDF (515.4 q/ha). Significantly lower green forage yield (473.5 q/ha) and dry forage yield (86.9 q/ha) of sorghum was recorded with 75% RDF and crude protein content (8.62%). The significantly lower crude protein content (7.89%) was recorded with application of 75% RDF. The increase in crude protein percentage with increase in fertility levels is mainly due to

increase in leaf: stem ratio, protein was positively correlated with leaf: stem ratio which ultimately increase crude protein percentage. The results are in accordance with the findings of Singh *et al.* (2017) [6] and Meena *et al.* (2018) [3]. Crude fiber content was significantly higher (31%) with application of 75% RDF (60:30:00 NPK, kg/ha). The significantly lower crude fiber content (25.65%) was recorded with application of 125% RDF (100:50:00 NPK, kg/ha). The decrease in crude fiber content was due to the application of nitrogen had depressing effect on crude fiber content because it resulted in increased leaf weight and wider leaf: stem ratio, which might had decreased the crude fiber content in sorghum. The results are in accordance with the findings of Almodares *et al.* (2009) [1]. Significantly higher N and P content (1.38% and 0.230% respectively) was recorded with application of 125% RDF, but phosphorus content was at par (0.223%) with 100% RDF. The significantly lower N and P content (1.26% and 0.217%) was recorded with application of 75% RDF. Where as, K content was not significantly influenced at different levels of nutrient management. The increase in nitrogen content with increasing fertility levels was due to high response of sorghum to nitrogen application. The increase in phosphorus content with increasing fertility levels was due to application of nitrogen which increase the absorption of other elements due to complementary action. The results are in accordance with the findings of Meena *et al.* (2018) [3]. Application of 125% RDF recorded significantly higher total N, P and K uptake (164.47 kg/ha, 25.24 kg/ha and 149.08 kg/ha, respectively). Significantly lower total N, P and K uptake (105.68 kg/ha, 16.14 kg/ha and 102.48 kg/ha, respectively) was recorded with 75% RDF. The result was due to that accumulation of nutrients are dependent on their concentration at cellular level and dry matter production. Thus, increasing fertility levels ultimately led to higher accumulation of nutrients by plant parts along with total uptake by crop. It is in accordance with the findings of Yadav *et al.* (2016) [7] and Meena *et al.* (2017) [4].

**Table 1:** Effect of cutting and nutrient management on total green and dry forage yield, crude protein content, crude fiber content, N, P and K content of forage sorghum

Treatments	Total green forage yield (q/ha)	Total dry Forage yield (q/ha)	Nutrient content at 60 DAS (%)			Crude protein content (%)	Crude fiber content (%)
			N	P	K		
<b>Cutting management</b>							
C <sub>1</sub> : Single cut at maturity (105 DAS)	400.6	80.1	1.30	0.225	1.178	8.14	28.10
C <sub>2</sub> : Two cuts (60 DAS + 45 days after 1 <sup>st</sup> cutting)	502.2	101.8	1.32	0.223	1.181	8.27	28.03
C <sub>3</sub> : Three cuts (60 DAS + 45 days after 1 <sup>st</sup> cutting + 45 days after 2 <sup>nd</sup> cutting)	655.7	131.4	1.33	0.222	1.179	8.30	27.95
S.Em. ±	19.31	4.85	0.02	0.003	0.01	0.10	0.29
C.D. at 5%	57.89	14.55	NS	NS	NS	NS	NS
<b>Nutrient management</b>							
N <sub>1</sub> : 125% RDF	569.8	124.9	1.38	0.230	1.189	8.62	25.65
N <sub>2</sub> : 100% RDF	515.4	101.4	1.31	0.222	1.184	8.20	27.44
N <sub>3</sub> : 75% RDF	473.5	86.9	1.26	0.217	1.163	7.89	31.00
S.Em. ±	19.31	4.85	0.02	0.003	0.01	0.10	0.29
C.D. at 5%	57.89	14.6	0.05	0.01	NS	0.31	0.87
Interaction (C×N)	NS	NS	NS	NS	NS	NS	NS
C.V.%	11.15	13.95	3.76	3.47	3.32	3.47	3.32

**Table 2:** Effect of cutting and nutrient management on total nutrient uptake at each cut of forage sorghum

Treatments	Total N uptake(kg/ha)	Total P uptake(kg/ha)	Total K uptake(kg/ha)
<b>A. Cutting management</b>			
C <sub>1</sub> : Single cut at maturity (105 DAS)	120.1	18.9	99.2
C <sub>2</sub> : Two cuts (60 DAS + 45 days after 1 <sup>st</sup> cutting)	123.5	19.2	119.4
C <sub>3</sub> : Three cuts (60 DAS + 45 days after 1 <sup>st</sup> cutting + 45 days after 2 <sup>nd</sup> cutting)	154.7	23.2	153.4
S.Em. ±	5.69	0.94	5.66
C.D. at 5%	17.01	2.81	16.9
<b>B. Nutrient management</b>			
N <sub>1</sub> : 125% RDF	164.5	25.2	149.1
N <sub>2</sub> : 100% RDF	128.1	19.9	120.5
N <sub>3</sub> : 75% RDF	105.7	16.1	102.5
S.Em. ±	5.69	0.94	5.66
C.D. at 5%	17.01	2.81	16.9
Interaction (C×N)	NS	NS	NS
C.V.%	12.85	13.78	13.69

### Conclusion

In light of results obtained from the present investigation, it could be concluded that for getting higher forage yield, nutrient uptake and better quality of forage sorghum, three cutting of crop should be done at 60, 105 and 150 DAS and fertilized the crop with RDF (80:40:00 N, P<sub>2</sub>O<sub>5</sub>, K<sub>2</sub>O kg/ha).

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