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Organoleptic and proximate characteristics of parching sorghum genotypes in response to management of nitrogen

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Abstract
Experimental results on "Organoleptic and proximate characteristics of Parching Sorghum Genotypes in response to Management of Nitrogen" during *rabi* 2017 revealed that in respect of proximate analysis, the fodder from parching sorghum genotype Gulbhendi Local-1 reported significantly higher protein, non-reducing and total sugar content and the lowest reducing sugar (1.03%) and found significantly superior over the genotype Phule Madhur (1.12%). Good organoleptic parameters viz., aroma and taste than the genotype Gulbhendi Local-1. The genotype Phule Madhur reported free threshability over the genotype Gulbhendi Local-1. Similarly, the fodder from Gulbhendi Local-1 found superior over Phule madhur with respect to crude protein, crude fibre, Ether Extract and total ash. However, the genotype Phule Madhur found better in producing Nitrogen free extract. Among the nitrogen management treatments, application of 125 per cent RDN ha-1 through urea recorded higher non-reducing sugar, total sugar and protein content, and the lowest reducing sugar which were significantly superior over other nitrogen management treatments. However, proximate analysis such as aroma, taste and also the threshability were non significant. In respect of crude protein, ether extract, total ash and nitrogen free extract application of 125% RDN through urea also proved significantly superior over other nitrogen management treatments.

Keywords: Parching sorghum, fodder quality, organoleptic and proximate characters

Introduction
Sorghum has good nutritional composition similar to rice and wheat in some aspects. The grains contain high fibre and non-starchy polysaccharides and starch with some unique lipids, carbohydrates, fibre, calcium, phosphorus, iron, thiamine and niacin (Shobha *et al.,* 2008; Chavan *et al.,* 2009) [3]. Protein quality and essential amino acid profile of sorghum is better than many of the cereals and millets. Sorghum in general is rich source of fibre and B-complex vitamins (Gopalan *et al.,* 2000 and Patil *et al.,* 2010) [4, 2].

There is considerable variation in sorghum for levels of proteins, lysine, Forage is the cheapest source of animal feed. It supply desired amount of proteins, energy, minerals as well as vitamins to a large extents. Looking to the present quantitative and qualitative insufficiency of feeds, fodders and good quality forage seed in our country, less nutrients availability to the animals is obvious. Half of the total losses in livestock productivity are attributed to the inadequacy in supply of quality feed and fodder.

There is enormous demand for dry fodder, particularly during lean winter and summer seasons in the arid and semi-arid regions. Fodder (stover) demand is additionally linked to demand for milk and milk production. Sorghum fodder is the main roughage in the semi-arid regions of Tamil Nadu, Karnataka, Andhra Pradesh, Maharashtra, Gujarat and Rajasthan and the Bundelkhand region of Uttar Pradesh. It is estimated that sorghum fodder constitutes 20-45% of the total dry weight of feed of dairy animals during normal seasons and up to 60% during the lean summer and winter seasons.

Our vision is to transform subsistence farming of sorghum into a globally competitive one through cost-efficient and environmentally production technology, value-addition and marketing to meet significant food, feed, fodder, fuel (bio-energy) requirements of the country (Tonapi, 2014).

Materials and Methods

Field study investigation entitled, **"**Organoleptic and proximate characteristics of Parching Sorghum Genotypes in response to Management of Nitrogen" was conducted at Department of Agronomy, Dr. Panjabrao Deshmukh Krishi Vidyapeeth, Akola during *rabi* season of 2017-18.The soil of the experiment plot was clay loam in texture with pH 8.3 indicating alkaline reaction. The experiment was laid out in factorial randomized block design and three replications. The treatments comprises of two parching sorghum genotypes viz., G_1-Phule Madhur, G_2-Gulbhendi Local-1 and four nitrogen management treatments viz., 125% RDN ha^{-1} through urea (100 kg N ha^{-1}), -100% RDN ha^{-1} through urea (80 kg N ha^{-1}), 50% RDN ha^{-1} through urea + 50% RDN ha^{-1} through vermicompost and 100% RDN ha^{-1} through vermicompost.

The soil was clay loam in texture, moderate in organic carbon, available nitrogen, available phosphorus and fairly rich in available potash. The climate of the area is semi-arid characterized. Maximum temperature varies from 32.7 to 41.1 °C and minimum temperature from 14 to 20 °C during the growing period. Average relative humidity in the *rabi* season was ranged from 27 to 82% in morning hours and from 7 to 26% in evening hours. Rate of evaporation was higher during 8th to 13th MW than normal. It was lower during 1st MW than normal. Whereas the rainfall was received 7th, 10th and 11th meteorological weeks with one rainy day in 10th meteorological week.

Result and discussion

Reducing sugar, non-reducing sugar, total sugar and protein of parching sorghum as influenced by different treatments

The data pertaining to per cent reducing sugar, non-reducing sugar, total sugar and protein of parching sorghum as influenced by different treatments are presented in Table 1.

Effect of genotypes

From the data presented in Table 1, it was revealed that the effect of genotypes on per cent reducing, non-reducing and total sugar and protein was found to be significant. The parching sorghum genotype Gulbhendi Local-1 recorded lowest reducing sugar content and found significantly superior over the genotype Phule Madhur. The parching sorghum genotype Phule Madhur recorded highest non-reducing sugar, total sugar content as well as protein content and found significantly superior over the genotype Gulbhendi Local-1. This might be due to the character of the particular genotype.

Table 1: Per cent reducing, Non-reducing, Total sugar and Protein of parching sorghum as influenced by various treatments

Treatments	Reducing sugar (%)	Non-reducing sugar (%)	Total sugar (%)	Protein (%)
Factor A - Genotypes				
G_1-Phule Madhur	1.12	11.86	12.99	11.06
G_2-Gulbhendi Local-1	1.03	8.21	9.23	10.64
SE(m)+	0.03	0.20	0.20	0.06
CD at 5%	0.09	0.60	0.61	0.19
Factor B- Nitrogen management				
N_1-125% RDN ha^{-1} through urea	1.31	11.12	12.44	11.75
N_2-100% RDN ha^{-1} through urea	1.00	9.30	10.31	10.49
N_3-50% RDN ha^{-1}+50% RDN ha^{-1} as Vc	1.14	10.89	12.03	10.83
N_4-100% RDN ha^{-1} through Vc	0.84	8.82	9.66	10.30
SE(m) +	0.04	0.28	0.29	0.08
CD at 5%	0.12	0.85	0.87	0.27

Effect of nitrogen management

The data presented in Table 1, revealed that different nitrogen management treatments showed significant effect on per cent reducing, non-reducing, total sugar and protein content of parching sorghum. Application of 125% RDN ha^{-1} through urea recorded higher non- reducing content, total sugar content and protein content found significantly superior over the application of 100 per cent RDN ha^{-1} through vermicompost and 100 per cent RDN ha^{-1} through urea, respectively but at par with 50 per cent RDN ha^{-1} through urea + 50 per cent RDN ha^{-1} through vermicompost. Application of 100% RDN ha^{-1} through vermicompost recorded lower reducing sugar and found significantly superior over all other nitrogen management treatments. This might be due to the readily availability of nitrogen and other nutrients throughout the growth period up to the harvesting.

Organoleptic parameter regarding parching sorghum as influenced by various treatments

The data pertaining to organoleptic parameters viz., aroma, taste and threshability as influenced by different treatments are calculated by the rating scale given below and are presented in Table 2.

Rating Scale

Aroma	1	Good	2	Fair	3	No aroma
Taste	1	Very sweet	2	Medium sweet	3	Slightly sweet
Threshability	1	Free	1.5	Medium	2	Hard

Effect of genotype

Among the genotype Phule madhur was good in aroma with very sweet taste than the genotype Gulbhendi Local-1.Threshability of the genotype Phule madhur was found free than the genotype Gulbhendi Local-1. This might be due to influence of genotypes. The results are in conformity with Shide *et al.* (2016).

Effect of nitrogen management

Aroma and taste were not influenced by the different nitrogen management treatment. Threshability was not influenced by the different nitrogen management treatment.

Table 2: Organoleptic parameter regarding parching sorghum as influenced by various treatments

Treatment	Aroma	Taste	Thresh ability
G_1N_1	1	1	1
G_1N_2	1	1	1
G_1N_3	1	1	1
G_1N_4	1	1	1
G_2N_1	1	1	1.5
G_2N_2	1	1	1.5
G_2N_3	1	1	1.5
G_2N_4	1	1	1.5

Crude protein, Crude fibre, Ether extract, Total ash and Nitrogen free extract of parching sorghum fodder as influenced by various treatments

The data pertaining to per cent Crude Protein, Crude Fibre, Ether Extract, Total Ash and NFE of parching sorghum fodder as influenced by various treatments are presented in Table 3.

Effect of genotypes

The parching sorghum genotype Gulbhendi Local-1 found superior over Phule madhur genotype with respect to per cent crude protein, crude fibre, Ether Extract and total ash. However, with Nitrogen free extract of parching sorghum genotype Phule madhur found superior over Gulbhendi Local-1 genotype (Table 3).

Effect of nitrogen management

Significantly higher crude protein, ether extract, total ash and nitrogen free extract was observed with application of 125% RDN through urea as compared to application of 100% RDN ha^{-1} through urea, 50% RDN ha^{-1} through urea + 50% RDN ha^{-1} as Vc and 100% RDN ha^{-1} through vermicompost. However, application of 125% RDN through urea recorded significantly higher crude fibre over the other nitrogen management treatments. This might may be due to Increase in crude protein content of fodder sorghum may definitely, be due to the fact that nitrogen often plays a great role in the synthesis of protein. Increase in crude protein content (%) of fodder sorghum with increase in nitrogen levels have been reported by Muhammad *et. al.* (2011) [5], Shiva Dhar *et al.* (2003), Sudesh Kumar and Sharma (2002) [10] and Bhilare *et.al.* (2002). which confirms the results obtained in present investigation.

Table 3: Crude protein, Crude fibre, Ether extract, Total ash and Nitrogen free extract of parching sorghum fodder as influenced by various treatments

Treatment	Crude Protein %	Crude Fibre %	Ether Extract %	Total Ash %	NFE %
Genotypes					
G_1-Phule Madhur	8.11	29.03	1.62	8.12	53.12
G_2-Gulbhendi Local-1	8.29	29.14	1.71	8.21	52.70
SE(m)+	0.03	0.19	0.02	0.01	0.12
CD at 5%	0.10	0.56	0.08	0.04	0.35
Nitrogen management					
N_1-125% RDN ha^{-1} through urea	8.33	28.16	1.71	8.21	53.60
N_2-100% RDN ha^{-1} through urea	8.24	28.51	1.68	8.17	53.50
N_3-50% RDN ha^{-1}+50% RDN ha^{-1} as Vc	8.16	29.48	1.66	8.15	52.57
N_4-100% RDN ha^{-1} through Vc	8.07	30.18	1.63	8.12	51.99
SE(m) +	0.05	0.26	0.04	0.02	0.16
CD at 5%	0.14	0.80	0.11	0.05	0.50
Interaction					
SE(m) +	0.07	0.37	0.05	0.02	0.23
CD at 5%	NS	NS	NS	NS	NS

Conclusion

In respect of quality parameters viz protein content, per cent of reducing sugar, non-reducing sugar and total sugar genotype Phule Madhur was found significantly superior over the genotype Gulbhendi Local-1. Both the genotypes of parching sorghum had good aroma and taste. The genotype Phule Madhur was found free in threshability over the genotype Gulbhendi Local-1. Among the nitrogen management treatments application of 125 per cent RDN ha^{-1} through urea exhibited good quality parameters.

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