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Effect of different organic sources on growth, productivity and quality of *kharif* parching sorghum

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Abstract

A field experiment entitled “Effect of different organic sources of nutrients on Productivity, Profitability and Quality of *Kharif* Parching sorghum” was conducted at the farm of Sorghum Research Unit, Dr. PDKV, Akola during *kharif* season 2023-24 on clay loam soil. The experiment was laid out in randomized block design with six treatments and four replications to study the effect of different organic sources on growth characters, yield attributes, quality and economics of sorghum crop. The study on Parching Sorghum revealed that RDF 80:40:40 NPK Kg ha⁻¹ significantly highest growth characters, yield attributes, and quality of parching sorghum crop parameters were recorded in recommended dose of N through VC + *Azospirillum* + PSB (ON₄).

Keywords: Organic sources, growth, parching sorghum

Introduction

Sorghum [*Sorghum bicolor* (L.) Moench]. The tender jowar grain in English is called Parching Sorghum, also known by different names such as sheetani (Kannada), hurda (Marathi) and ponk (Gujarati) is one of the most important cereal food crops grown in India. India contributes about 16% of the world's sorghum production. It is the fourth most important cereal crop in the country. The total area dedicated to Jowar cultivation in India is approximately 4,076.26 thousand hectares, yielding a total production of 4,737.47 thousand tonnes. This substantial output plays a vital role in bolstering the country's food security.

Maharashtra stands out as the foremost state in terms of both area and production, with 1,740.22 thousand hectares under cultivation and an impressive yield of 1,775.62 thousand tonnes. This success can be attributed to the state's favorable agro-climatic conditions and well-established agricultural practices. Following Maharashtra, Karnataka also plays a significant role in Jowar cultivation, with 808.00 thousand hectares cultivated and a production of 942.78 thousand tonnes. In contrast, states such as Bihar and Kerala contribute minimally, with areas of only 0.75 and 0.97 thousand hectares, respectively, indicating opportunities for growth and development in Jowar farming in these regions.

Productivity levels of Jowar vary considerably across different states and seasons. Madhya Pradesh leads in productivity during the Kharif season, achieving 2,872 kg/ha, while states like Haryana and Tamil Nadu report lower productivity figures. This disparity highlights the influence of various factors, including soil health, irrigation infrastructure, and farming techniques, on crop yields. Overall, the data underscores the essential role of Jowar within India's agricultural sector, pointing to the necessity for targeted policies and support mechanisms aimed at enhancing productivity and sustainability in Jowar cultivation, especially in regions that are currently underperforming. This analysis not only enriches the understanding of Jowar's agricultural dynamics but also lays the groundwork for future research focused on improving crop yields and ensuring food security in India.

In some ways, the nutritional makeup of sorghum is comparable to that of rice and wheat. The grains have a high fibre content, non-starchy polysaccharides, and starch with certain special properties. The amounts of proteins, lysine, fats, carbs, fibre, calcium, phosphorus, iron,

thiamine, and niacin in sorghum vary greatly (Shobha *et al.*, 2008; Chavan *et al.*, 2009) ^[10, 2]. Sorghum's essential amino acid composition and protein quality surpass those of many grains and millets. Fiber and B-complex vitamins can be found in abundance in sorghum (Gopalan *et al.*, 2000 and Patil *et al.*, 2010) ^[6, 8]. In addition to containing a suitable amount of carbohydrates (72%), proteins (11.6%), and fat (1.9%), sorghum is also rich in fibre and minerals. The main ingredient in the grain is starch. Albumin globulin (15%), prolamin (26%), and glutelin (44%), comprise the protein in sorghum. The dough is not sticky enough to roll with a chapatti roller since sorghum does not contain gluten. A suitable energy source for those with gluten allergies is sorghum flour, which is gluten free. White sorghum has very little quantities of phytic acid and flavanols (Chavan *et al.*, 2010) ^[3]. In Maharashtra sorghum is grown in *kharif* season in vidarbha and some part of marathwada and grown in *Rabi* season in western Maharashtra and Marathwada region.

Vermicompost, farmyard manure (FYM), and biogas slurry are valuable organic soil amendments that enhance soil fertility and crop productivity. Vermicompost provides readily available macro- and micronutrients, beneficial microbes, and growth hormones, improving seed germination and yield while enhancing soil structure. FYM supplies slow-release nutrients,

boosts soil organic matter, and encourages beneficial microbial activity, contributing to long-term soil fertility and erosion control. Biogas slurry offers a nutrient-rich and pathogen-free option that enhances soil microbial populations and organic carbon content. Together, these inputs promote sustainable agriculture by improving nutrient availability, soil health, and crop resilience, reducing reliance on chemical fertilizers.

Materials and Methods

The experiment was laid out in Randomized Block Designed with six treatments and four replications. The treatment consists of different sources of organic nutrients like viz. Biogas slurry, Farm Yard Manure and Vermicompost and biofertilizers (*Azospirillum* and Phosphate Solubilizing Bacteria) were applied as per treatments and the soil of the experiment plot was clayey in texture, slightly alkaline in nature (pH 7.80), having low organic carbon content (0.56), low in available nitrogen 192 and phosphorus (21.30), marginally high in available potassium (349) and also low in zinc content (0.59). And the Gross plot size: 4.50 m x 5.10 m and Net plot size: 2.70 m x 4.50 m with Variety: PDKV Kartiki and seed rate 7.5 to 10 kg ha⁻¹ and ensure uniform population.

Result and Discussion

Table 1: Growth and yield attributes of parching sorghum as influenced by different organic sources of nutrients

Tr. No.	Treatments	Plant height (cm) at harvest	Functional leaves at harvest	Grain hurda yield (kg ha ⁻¹)	Green fodder Yield (kg ha ⁻¹)
ON ₁	Control	143.91	7	1872	7075
ON ₂	RDN through BGS + <i>Azospirillum</i> + PSB (seed treatment)	161.30	9	29123	12050
ON ₃	RDN through FYM+ <i>Azospirillum</i> + PSB (seed treatment)	167.86	9	3049	12550
ON ₄	RDN through VC + <i>Azospirillum</i> + PSB (seed treatment)	176.94	10	3521	14575
ON ₅	RDN through FYM + VC (50:50%) + <i>Azospirillum</i> + PSB (seed treatment)	172.17	9	3395	14000
ON ₆	RDN through FYM + BGS (50:50%) + <i>Azospirillum</i> + PSB (seed treatment)	169.68	9	3269	13875
	S.E(m) ±	1.29	0.32	143.51	525.06
	C.D. at 5%	3.89	0.95	432.23	1581.38
	GM	165	9	3003	12354

The table presents the effects of various organic nutrient management treatments on plant height, functional leaves, grain hurda yield, and green fodder yield. The control treatment (ON₁) recorded the lowest plant height (143.91 cm), functional leaves (7.10), grain hurda yield (1,872 kg/ha), and green fodder yield (7,075 kg/ha). In contrast, treatments that incorporated organic sources showed significant improvements across all parameters. The application of RDN through biogas slurry (ON₂) resulted in a plant height of 161.30 cm, 9 functional leaves, and the highest grain hurda yield of 29,123 kg/ha, along with a green fodder yield of 12,050 kg/ha. Similarly, the treatment using FYM (ON₃) produced 167.86 cm plant height, 9.50 functional leaves, 3,049 kg/ha of grain hurda, and 12,550 kg/ha of green fodder. Among the treatments, vermicompost (ON₄) performed best in terms of plant height (176.94 cm) and functional leaves (10.25), with corresponding yields of 3,521 kg/ha for grain hurda and 14,575 kg/ha for green fodder. The combination of FYM and vermicompost (ON₅) also yielded promising results, with a plant height of 172.17 cm, 9.75 functional leaves, 3,395 kg/ha of grain hurda, and 14,000 kg/ha of green fodder. Similarly, the FYM and biogas slurry combination (ON₆) recorded 169.68 cm plant height, 9.25 functional leaves, and grain hurda and green fodder

yields of 3,269 kg/ha and 13,875 kg/ha, respectively. Statistical analysis revealed that the standard error for plant height, functional leaves, grain hurda yield, and green fodder yield were 1.29, 0.32, 143.51, and 525.06, respectively. At a 5% significance level, differences greater than 3.89 cm for plant height, 0.95 for functional leaves, 432.23 kg/ha for grain hurda yield, and 1,581.38 kg/ha for green fodder yield were considered statistically significant. The grand mean values across treatments were 165 cm for plant height, 9.14 for functional leaves, 3,003 kg/ha for grain hurda, and 12,354 kg/ha for green fodder.

From the data presented in table 1, it was revealed that Plant height, Functional leaves, Number of panicles m⁻², and Number of grains panicle⁻¹ was recorded significantly the highest in recommended dose of N through VC + *Azospirillum* + PSB (ON₄). This might be due to vermicompost compromises of macronutrient, micronutrient and moisture content for crop growth. These results are in conformity with findings of Chaudhari *et al.* (2007) and Singh *et al.* (2017) ^[12]. Ramachandrappa *et al.* (2012) ^[9], Ashoka *et al.* (2009) ^[1], Girija *et al.* (2016) ^[5] and Nilima *et al.* (2019) ^[7].

Treatment ON₄ was found to be significantly superior over the rest of treatments. Significantly the lowest green fodder yield

was recorded in control (ON₁). This might be due to increased availability of higher nitrogen along with its uptake by plant during crop growth period. Slow release of nitrogen might have

provided nitrogen during all phases resulting in better fodder yield. These results are in conformity with findings of Shinde *et al.* (2017) ^[11] and Yadav *et al.* (2017) ^[13].

Table 2: Days to 50% flowering and days to soft dough stage of parching sorghum as influenced by organic sources of nutrients

Tr. No.	Treatments	Days to 50% Flowering	Days to soft dough stage
ON ₁	Control	63	85.25
ON ₂	RDN through BGS+ <i>Azospirillum</i> + PSB (seed treatment)	62	84.50
ON ₃	RDN through FYM+ <i>Azospirillum</i> + PSB (seed treatment)	62	85.08
ON ₄	RDN through VC + <i>Azospirillum</i> + PSB (seed treatment)	60	83.50
ON ₅	RDN through FYM + VC (50:50%) + <i>Azospirillum</i> + PSB (seed treatment)	60	83.63
ON ₆	RDN through FYM + BGS (50:50%) + <i>Azospirillum</i> + PSB (seed treatment)	61	84.03
	S.E (m) = ±	0.83	0.57
	C.D. at 5%	2.49	1.71
	GM	61.17	84.33

Days to 50% flowering

The less number of days to 50% flowering was recorded in recommended dose of N through VC + *Azospirillum* + PSB (ON₄) and application of recommended dose of N through FYM + VC (50:50%) + *Azospirillum* + PSB (ON₅) followed by recommended dose of N through FYM + BGS (50:50%) + *Azospirillum* + PSB (ON₆) recommended dose of N through FYM + *Azospirillum* + PSB (ON₃) and recommended dose of N through + BGS + *Azospirillum* + PSB (ON₂). Higher days to 50% flowering was recorded in control (ON₁). The organic fertilizer along with FYM, vermicompost and biogas slurry induced 50% flowering earlier than other treatment. This might be due to adequate supply of nutrient help in hastening the reproductive growth of plant. These results are in conformity with findings of Wanjari and Deshmukh (2007).

Days to soft dough stage

Lower days for soft dough stage was recorded in recommended dose of N through VC + *Azospirillum* + PSB (ON₄) followed by application of recommended dose of N through FYM + VC (50:50%) + *Azospirillum* + PSB (ON₅), recommended dose of N through FYM + BGS (50:50%) + *Azospirillum* + PSB (ON₆), recommended dose of N through BGS + *Azospirillum* + PSB (ON₂) and recommended dose of N through FYM+ *Azospirillum* + PSB (ON₃). Higher days for soft dough was recorded in control (ON₁).

Organoleptic parameters

Grain shape, grain texture, grain colour, aroma and taste of parching sorghum as influenced by different organic sources of nutrients



Tr. No.	Treatments	Grain shape	Grain texture	Grain colour	Aroma	Taste
ON ₁	Control	Flat Round	Hard	Faint green	1	1
ON ₂	RDN through BGS + <i>Azospirillum</i> + PSB (seed treatment)	Flat Round	Medium	Faint green	1	1
ON ₃	RDN through FYM + <i>Azospirillum</i> + PSB (seed treatment)	Flat Round	Medium	Medium green	2	1
ON ₄	RDN through VC + <i>Azospirillum</i> + PSB (seed treatment)	Flat Round	Soft	Medium green	2	2
ON ₅	RDN through FYM + VC (50:50%) + <i>Azospirillum</i> + PSB (seed treatment)	Flat Round	Soft	Dark green	2	2
ON ₆	RDN through FYM + BGS (50:50%) + <i>Azospirillum</i> + PSB (seed treatment)	Flat Round	Soft	Medium green	2	2

Aroma	1	Fair	2	Good	3	Excellent
Taste	1	Sweet	2	Sweeter	3	Sweetest

Quality parameters

Various quality parameter like grain colour (Dark green, medium green, faint green), grain shape (round, oval, wrinkle), grain texture (soft, medium, hard) aroma and taste play an important role in determining the nutritive quality of parching

sorghum. Data on these constituents of parching sorghum as influenced by different organic sources of nutrients and the aroma and taste was comparatively best in recommended dose of N through VC + *Azospirillum* + PSB (ON₄), recommended dose of N through FYM + VC (50:50%) + *Azospirillum* + PSB (ON₅),

recommended dose of N through FYM + BGS (50:50%) + *Azospirillum* + PSB (ON₆). This might be due to this treatment consist of vermicompost and it compromises of some hormones like auxin, gibberellin, micronutrients and it improves the microbial activity of soil that enhances the aroma and taste of parching sorghum.

Conclusion

Based on this investigation, it was indicated that the growth growth characters, yield attributes and quality of Parching sorghum crop parameters were recorded significantly highest in recommended dose of N through VC + *Azospirillum* + PSB (ON₄) Sole and integrated application of FYM and vermicompost played a vital role in improving growth, yield and quality parameters of parching sorghum. Similarly, BGS has also found to be beneficial in improving soil properties. Hence an application of FYM, VC and BGS is to be advocated as a source of nutrients to parching sorghum grown in *kharif* season.

References

1. Ashoka P, Anand SR, Smith R. Effect of macro and micronutrients with organic on growth, quality, yield and economic of baby corn in Tungabhadra Command area. Crop Res. 2009;37(1,2,3):15-8.
2. Chavan UD, Patil JV, Shinde MS. Nutritional and roti quality of sorghum genotypes. Indones J Agric Sci. 2009;10:80-7.
3. Chavan UD, Patil JV. Grain sorghum processing. In: IBDC Publishers; 2010. p. 67-72.
4. Choudhary VS, Singh V, Kumar S. NPK content and uptake of wheat crop as affected by integrated nutrient management. Crop Res. 2007;33(1,2,3):39-40.
5. Girija P, Vijaya T. Plant growth promotional effect of different combinations of vermicompost, PSB and Rhizobium on sorghum. World J Pharm Pharm Sci. 2016;5(6):1537-51.
6. Gopalan C, Sastry BV, Balasubramanyam SC. Nutritive value of Indian foods. Hyderabad: National Institute of Nutrition, I.C.M.R.; 2000. p. 23.
7. Nilima I, Agotiya VK. Equation of States and Charmonium Suppression in Heavy-Ion Collisions. Adv High Energy Phys. 2019;2019(1):9574136.
8. Patil PB, Sajjanar GM, Biradar BD, Patil HB, Devarnavadi SB. Technology of hurda production by microwave oven. J Dairying Foods Home Sci. 2010;29:232-6.
9. Ramachandrappa MB, Nanjappa HV. Moisture conservation practices and nutrient management on growth and yield of rabi sorghum in the vertisols of peninsular India. Agric Sci. 2012;3(4):222-7.
10. Shobha V, Kasturiba B, Naik RK, Yenagi N. Nutritive value and quality characteristics of sorghum genotypes. Karnataka J Agric Sci. 2008;20:586-8.
11. Shinde NK, Nemade S, Ghorade RB, Mohod NB. Effect of integrated nutrient management on yield and quality of parching sorghum varieties. Int J Curr Microbiol Appl Sci. 2017;6(12):4268-72.
12. Singh V, Patra A. Effect of FYM and manganese on yield and uptake of nutrients by wheat. Ann Plant Soil Res. 2016;19(4):381-4.
13. Yadav R, Pathak GS. Determinants of consumers' green purchase behavior in a developing nation: Applying and extending the theory of planned behavior. Ecol Econ. 2017;134:114-22.
14. Wanjari SS, Deshmukh JP. Integrated nutrient management for Kharif sorghum. PKV Res J. 2007;31(2).