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Productivity and profitability as influenced by integrated nutrient management in Foxtail millet (*Setaria italica* L.) under rainfed ecosystem

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Abstract
The field experiment entitled Productivity and profitability as influenced by integrated nutrient management in Foxtail millet (*Setaria italica* L.) was conducted at Organic Farming Research Institute, University of Agricultural Sciences, Raichur during *kharif*, 2023 under rainfed ecosystem. The experiment was laid out on deep black soil in randomized complete block design with four treatments *viz*., T_1: 100% RDN through 1/3 of Compost + Vermicompost + GLM + Foliar spray of 3% Panchagavya at 30 and 45 days after sowing, T_2: 50% RDN through Compost + Vermicompost + GLM + 3% Panchagavya foliar sprayat at 30 and 45 days after sowing and 50% through RDN through chemical fertilizer, T_3: 100% through RDF through chemical fertilizer and T4: 100% through Recommended package of practice with recommended FYM replicated five times. The nitrogrn rrecommended to the crop foxtail millet is 44 kg/ha^{-1}. The nutrient composition of organic manures of Compost (0.8, 0.5 and 1.6% NPK), Vermicompost (1.6, 0.8 and 2.0% NPK) and Gliricidia (2.4, 0.1 and 1.8% NPK, respectively). The foxtail variety used for the sowing in the experiment was HN-46 developed by UAS, Raichur and it is most suitable for both rainfed and irrigated condition. The experimental results revealed that application of 100% N through Compost + Vermicompost + GLM + 3% Panchagavya foliar spray recorded higher growth parameters, yield attributes, grain yield and monetary returns compared to integrated nutrient management in foxtail millet under rainfed ecosystem.

Keywords: Foxtail millet, productivity, compost, vermicompost, Gliricidia and profitability

Introduction
Foxtail millet (*Setaria italica* L.), is regarded as one of the oldest cultivated millets and is believed to be native to southern Asia. India has an area of 72.6 thousand hectares with 50.2 thousand tonnes production and a productivity of 691 kg ha^{-1} (Anon., 2019) [1]. In India, foxtail millet is mainly cultivated in the states like Andhra Pradesh, Karnataka and Tamil Nadu. The nutritional value of foxtail millet is highly appreciated as 100 g of foxtail millet grain contains 8 g of fiber, 12.3 g of protein, 60.9 g of carbohydrates, 4.3 g of fat, 31 mg of calcium, 2.8 mg of iron, 290 mg of phosphorus, 3.3 g of vitamins, 3.3 g of minerals and 323-350 Kcal of food energy (Vanithasri *et al.*, 2012) [2]. Besides, small millets are considered functional foods containing bioactive ingredients useful to combat chronic diseases (Banerjee and Maitra, 2020) [3].

Because foxtail millet is grown on marginal soils with fewer inputs and potential yields have not yet been reached, its yield level is unstable under rainfed circumstances (Hariprasanna, 2016) [4]. The crop responds very well to organics because it has low nutrient requirements and the yield decline is primarily caused by low soil fertility. Under organic systems, this can be maintained sustainably by increasing soil microbial activity, which is a key component in recycling nutrients and making them available for plant uptake for crop growth and development. As a crop that grows quickly, resists drought, and tolerates pests, foxtail millet promotes resilient agro-ecosystems and crop diversification, making it an environmentally responsible and sustainable option for farmers dealing with climate change and advancing food security in general. Furthermore, newer types of foxtail millet react favorably to additional nutrients, and sustainable production depends on effective nutrient management. Keeping all these points, the

present investigation was carried out to study the Productivity and profitability as influenced by integrated nutrient management in Foxtail millet (*Setaria italica* L.) under rainfed ecosystem.

Materials and Methods

The experiment entitled Productivity and profitability as influenced by integrated nutrient management in Foxtail millet (*Setaria italica* L.) under rainfed ecosystem was conducted to study the influence of different sources of organic manures on the growth and yield of foxtail millet during the *kharif*, 2023 under rainfed condition at organic farming research institute, University of Agricultural Sciences, Raichur, which is situated between 16° 12' North latitude and 77° 20' East longitude with an altitude of 389 meters above the mean sea level and it falls within the North Eastern Dry Zone (Zone 2) of Karnataka.

The experiment was laid out on deep black soil in randomized complete block design with four treatments and five replications. The treatment consisted of application of 100% RDN through 1/3 of Compost + Vermicompost + GLM + Foliar spray of 3% Panchagavya at 30 and 45 days after sowing (T1), 50% RDN through Compost + Vermicompost + GLM + Foliar spray of 3% Panchagavya at 30 and 45 days after sowing and 50% through RDN through chemical fertilizer (T2), 100% through RDF through chemical fertilizer (T3) and 100% through Recommended package of practice with recommended FYM (T4). The nutrient composition of compost.

Results and Discussion

Effect of different nutrient management practices on yield parameters

The result on growth parameters *viz*., plant height, productive tillers and panicle length were significantly influenced by various organic nutrient sources under the present study (Table 2). The highest plant height (160 cm), number of productive tillers (153 No. m^2) and panicle length (21.5) were registered under the treatment T_1 (Compost + Vermicompost + GLM + 3% Panchagavya foliar spray at 30 and 45 days after sowing) which was statistically comparable with T_4 (100% through Recommended package of practice with recommended FYM), Various organic nutrient sources treatment failed to project a significant influence on the test weight of foxtail millet (Table 1), similar behavioural trend was displayed in respect of yield attributes and yield (grain yield and straw yield) as that of growth parameters under organic nutrient source treatment. The treatment T_1 recorded the highest grain yield (933 kg ha^{-1}) and straw yield (3093 kg ha^{-1}) were associated with practice T_4 (Table 2). In application of Compost + Vermicompost + GLM + Foliar spray of 3% Panchagavya at 30 and 45 days after sowing due to Panchagavya's high nitrogen content and narrow C:N ratio would have allowed for the synthesis of protein, which is necessary for the creation of protoplasm, which causes cell division and expansion and ultimately stimulates growth. Furthermore, Panchagavya includes many growth-promoting compounds, including as IAA, GA3 and cytokinins, which may have contributed to the improved growth of plants. These results are in conformity with Priya and Satyamoorthi (2019) [5], who reported that among the various organic sources bio-gas slurry + 3% Panchagavya spray found to be the good source of nutrients for foxtail millet growth.

Effect of different nutrient management practices on yield parameters

All the yield attributes *viz*., productive tillers, panicle length, number of grains/ear and test weight are positively influenced by application of 100 per cent N through as Compost + Vermicompost + GLM + 3% Panchagavya Foliar spray at 30 and 45 days after sowing. Increased productive tillers in Compost + Vermicompost + GLM + 3% Panchagavya Foliar spray (T1). Better tillering may have been the outcome of improved nutrient availability and greater availability of all macro and micronutrients. Ear length and grain count may have grown as a result of improved nutrition availability and absorption. suggested that the gradual transformation and mineralization of organics would likely result in a steady and continuous supply of N throughout the crop growth period, filling the grains with photosynthesis. The solubilization of water-insoluble P compounds by organic acids released during organic matter decomposition may have been a major factor in ensuring superior yield attributes by organics. Combination of different organic manures along with mulching increased growth and productivity of foxtail millet which was observed by Upendranaik *et al.* (2018) [6]. Application of jeevamrutha + mulching + IFS compost + vermicompost + panchagavya resulted in significantly more grain yield of foxtail millet over control at Raichur, Karnataka, was noticed by Rafi *et al.* (2012) [7]. Rafi and Charyulu (2016) [8] reported that inoculation of *Azospirillum sp*. and phosphate solubilizing bacterium (PSB) individually and combined inoculation improved the yield of foxtail millet. Ramesh *et al.*, 2019 [9] studied at Andhra Pradesh and revealed that application of 125% RDN + FYM @ 5.0 t ha^{-1} recorded the highest grain yield of 2701 and 2709 kg ha^{-1} during the first and second years of study respectively, which was significantly superior to the other nitrogen levels tried, followed by 125% RDN. The lowest grain yield was observed with no nitrogen application.

Effect of organic sources on economics

Application of 100 per cent N through as Compost + Vermicompost + GLM + 3% Panchagavya Foliar spray at 30 and 45 days after sowing (T1) recorded significantly higher gross return (Rs. 37315 ha^{-1}), net returns (Rs. 20758 ha^{-1}) and B:C (2.25) compared to integrated nutrient management and it was at par with Inorganic and RDF treatments. Significantly lower gross return (Rs. 24630 ha^{-1}), net returns (Rs. 9640 ha^{-1}) and B:C (1.64) was registered with application of integrated nutrient management. Whereas, Kumaran and Parasuraman (2019) [10] reported that integrated nutrient management increased grain yield of foxtail millet at Tiruvannamalai district of Tamil Nadu and combined application of farmyard manure, recommended dose of fertilizer and foliar application of 3% Panchagavya at 20 days after sowing gave the maximum grain yield. A combined application of 75% RDN through Urea + 25% N through PM + Azospirillum seed inoculation gave maximum grain yield, higher net return and maximum B:C (2.59) at Prayagraj, Uttar Pradesh in sandy loam soil (Selectstar Marwein *et al.*, 2019) [11].

Table 1: Yield attributes and yield as influenced by various organic sources in foxtail millet

Treatments	Plant height (cm)	Panicle length (cm)	Productive tillers /m^2	Test weight (gm)	Grain yield (kg ha^{-1})	Straw yield (kg ha^{-1})
T1: Organic (100% N)	160	21.5	153	3.2	933	3093
T2: Integrated (50:50)	153	20.5	144	3.1	616	2391
T3: Inorganic (RDF)	153	19.4	139	3.1	764	2387
T4: RDF+FYM	157	21.3	147	3.2	884	2630
S.Em. +	2.0	0.8	3.3	0.07	67	148
CD @ 5%	6.1	2.6	10	NS	211	458

Table 2: Yield and economics as influenced by various organic sources in foxtail millet

Treatments	Grain yield (kg ha^{-1})	COC	GR (Rs. ha^{-1})	NR (Rs. ha^{-1})	B:C
T_1: Organic (100% N)	933	16557	37315	20758	2.25
T_2: Integrated (50:50)	616	14990	24630	9640	1.64
T_3: Inorganic (RDF)	764	13421	30556	17135	2.28
T_4: RDF+FYM	884	15433	35370	19937	2.29
S.Em. +	68.6	-	2744	2744	0.18
CD @ 5%	211.4	-	8454	8454	0.55

Conclusion

Application of 100% N through Compost + Vermicompost + GLM + 3% Panchagavya foliar spray at 30 and 45 DAS recorded the higher growth parameters, yield attributes, grain yield and monetary returns compared to integrated nutrient management in foxtail millet. Hence from the experimental results it can be concluded that application of Compost + Vermicompost + GLM + 3% Panchagavya foliar spray at 30 and 45 days after sowing can be recommended as an effective nutrient management practice for foxtail millet production under rainfed ecosystem.

References

1. Anonymous. Directorate of Economics and Statistics, Department of Agriculture, Cooperation and Farmers Welfare, Ministry of Agriculture and Farmers Welfare, Government of India; 2019.
2. Vanithasri J, Kanchana S, Hemalatha G, Vanniarajan C, Sahul Hameed M. Role of millets and its importance in new millennium. Int J Food Sci Technol. 2012;2(1):35-47.
3. Banerjee P, Maitra S. The role of small millets as functional food to combat malnutrition in developing countries. Indian J Nat Sci. 2020;10(60):20412-7.
4. Hariprasanna K. Foxtail millet—nutritional importance and cultivation aspects. Indian Farming. 2016;65(12):25-9.
5. Priya G, Satyamoorthi. Influence of organic manures on the growth and yield of foxtail millet (*Setaria italica* L.). Chem Sci Rev Lett. 2019;8(29):114-7.
6. Upendranaik P, Rao S, Desai BK, Krishnamurty D, Yadahalli VG. Effect of different sources of organic manures on growth and yield of foxtail millet (*Setaria italica* L.) under integrated organic farming system. Adv Res. 2018;13(2):1-6.
7. Rafi MM, Varalakshmi T, Charyulu PBBN. Influence of Azospirillum and PSB inoculation on growth and yield of foxtail millet. J Microbiol Biotech Res. 2012;2(4):558-65.
8. Rafi MM, Charyulu PBBN. Synergistic effect of Azospirillum and PSB inoculation on growth and yield of foxtail millet. Int J Plant Anim Environ Sci. 2016;6(1):138-47.
9. Ramesh G, Pulla Rao, Prasad PVN, Prasad PRK. Effect of integrated nutrient management on growth, yield and economics of foxtail millet. J Pharmacogn Phytochem. 2019;8(4):3115-7.
10. Kumaran G, Parasuraman P. Effect of enriched FYM and panchagavya spray on foxtail millet (*Setaria italica* L.) under rainfed condition. Int J Chem Stud. 2019;7(2):2121-3.
11. Marwein BS, Singh R, Chhetri P. Effect of integrated nitrogen management on yield and economics of foxtail millet genotypes. Int J Curr Microbiol Appl Sci. 2019;8(8):2543-6.