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Effect of Organic Manures on Growth and Yield Attributes of Finger Millet

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ABSTRACT: An experiment was conducted during the 2022 Kharif season at the College Agronomy Farm, B.A. College of Agriculture, Anand Agricultural University, Anand. The soil of the experimental plot was identified as loamy sand, exhibiting good drainage with a pH of 7.79. Soil analysis indicated low levels of available nitrogen (210 kg/ha), while organic carbon (0.73%), available phosphorus (31 kg/ha), and available potash (280 kg/ha) were at medium levels. Ten treatments were evaluated, incorporating various components such as Farmyard manure, Vermicompost, Jeevamrit, Vermiwash, and Bio-NP Consortium in different combinations and compositions, employing a randomized block design with four replications. The application of 25% N through FYM + 50% N through Vermicompost + Bio-NP Consortium significantly enhanced plant height to 101.52 cm and 112.52 cm at 60 DATP and at harvest, respectively. It also resulted in an increased effective number of tillers per meter row length (25.25), length of finger (9.75 cm), number of fingers per ear head (8.05), grain yield (3032 kg/ha), and straw yield (5862 kg/ha). Moreover, higher net profit and BCR in finger millet were observed with this application method (T6). These research findings can assist growers in achieving better and more sustainable finger millet production, thereby enhancing its acceptability among end-users due to its organic cultivation. Additionally, it can aid producers in obtaining better prices and contribute to the economic upliftment of farmers.

Keywords: Organic Manures, Finger millet, Farm yard manure, Vermicompost, *Jeevamrit*, Vermiwash, Bio-NP Consortium, Nitrogen.

INTRODUCTION

The global food system confronts multifaceted challenges, encompassing issues like hunger, malnutrition, diet-related diseases, the imperative to feed a growing global population with healthy food, the climate crisis, and the depletion of natural resources. Recognizing the tremendous potential of millets as an affordable and nutritious food source, IYM 2023 offers an opportunity to spotlight their benefits for better production, nutrition, environment, and overall well-being. Millets can play a pivotal role in global food systems, benefiting smallholder farmers, nutrition, and the environment. India, boasting a diverse range of millets, is a key contributor, with these grains now labeled as "Nutria-cereals" due to their high nutrient content. Millets, resilient in adverse climates, require fewer external inputs compared to major grains like rice, wheat, and maize, making them a valuable staple for both food and fodder.

Finger millet (*Eleusine coracana* (L.) Gaertn), distinguished by its high productivity and rapid nutrient provision, stands out among millets. Native to India, it is locally known as Ragi or Bavto, named after its seed head resembling human fingers. Finger millet surpasses rice, maize, and sorghum in fat, protein, and mineral content, earning it the term "biologically complete" for its protein profile. In India, it constitutes nearly 85% of the total production of minor millets, primarily cultivated in states like Karnataka, Tamil Nadu, Andhra Pradesh, Orissa, Jharkhand, Uttaranchal, and Gujarat. With an output of 2.61 million tons and an average productivity of 1489 kg/ha, finger millet remains a significant crop.

The agricultural landscape faces a recent challenge in the scarcity of organic manure due to declining cattle numbers and the transformation of agricultural wastes into valuable byproducts. To address this, it becomes imperative to explore effective organic manurial sources utilizing on-farm available organic substrates. Integrating Vermicompost, Panchagavya, Jeevamrita, Beejamruta, Vermiwash, Mycorrhizae culture, and neem cake/neem seed extractants in organic farming becomes essential. Vermicompost, rich in nutrients like nitrates, exchangeable phosphorus, soluble potassium, calcium, and magnesium, provides easily absorbable forms for crops. Vermiwash, a liquid Vermicompost extract, contains micro and macronutrients, plant growth hormones, enzymes, and vitamins, promoting plant growth and productivity. *Jeevamrit*, an organic liquid manure with beneficial bacteria, serves as a source of nitrogen, phosphorus, potassium, and natural carbon. The application of a bacterial consortium with various beneficial characteristics and microbial metabolites presents a simple, affordable, and sustainable approach to enhance the productivity, quality, and yield of finger millet. In conclusion, these organic farming techniques prove effective for optimizing the quality and output of finger millet.

MATERIALS AND METHODS

The investigation took place during the *Kharif* season of the year 2022 at Plot Number 10, located at the College Agronomy Farm of B. A. College of Agriculture, Anand Agricultural University, Anand, Gujarat. Meteorological parameters were recorded by the meteorological observatory of Anand Agricultural University during the same *Kharif* season in 2022. The observations suggested that the weather conditions were conducive to the normal growth of finger millet crops. The experimental site exhibited an even topography with a moderate slope and efficient drainage. The soil in the area, locally known as "*Goradu*" soil, is characteristic of the region and falls under the order *inceptisols*, featuring a loamy sand texture. For the experiment, the finger millet variety chosen was Gujarat Nagali 8, and the treatments included Farm yard manure and Vermicompost as manure.

Table 1:Nitrogen content of various organic sources:

Organic sources	Nitrogen content (%)
FYM	0.69
Vermicompost	1.58

Initial analysis of soil: Prior to crop planting, a composite soil sample was extracted from the experimental plot, delving to a depth of 15cm. Subsequently, this sample underwent analysis to ascertain the soil's physical and chemical attributes, with additional details available in Table 2.

Table 2:Physico-chemical properties of the soil (0-15cm) of experimental field.

Particulars	Values at soil depth 0-15 cm	Method of analysis employed
A. Physical properties		
Coarse sand (%)	0.55	International Pipette Method (Piper, 1966)
Fine sand (%)	83.28	
Silt (%)	10.23	
Clay (%)	5.14	
Textural class	Loamy sand	
B. Physico-chemical properties		
Soil pH (1:2.5) (Soil: Water)	7.79	Potentiometric method (Jackson, 1973)
EC (dS/m) (1:2.5, Soil: Water at 25 ^{0}C)	0.21	Conductometric method (Jackson, 1973)
C. Chemical properties		
Organic carbon (%)	0.73	Wet oxidation method (Walkley and Black 1934)
Available N (kg/ha)	210	Alkaline $KMnO_4$ method (Subbiah and Asija 1956)
Available P_2O_5 (kg/ha)	31	Olsen’s method (Spectrophotometric) (Olsen *et al*., 1954)
Available K_2O (kg/ha)	280	Flame photometric method (Jackson, 1973)

This study aimed to assess the impact of organic manures on the growth and yield attributes of finger millet through various treatments in a field experiment. The treatments included T_1: Absolute control, T_2: 100% nitrogen (N) through Farm Yard Manure (FYM), T_3: 100% N through Vermicompost, T_4: 50% N through FYM + 50% N through Vermicompost, T_5: 25% N through FYM + 50% N through Vermicompost + Jeevamrit, T_6: 25% N through FYM + 50% N through Vermicompost + Bio-NP Consortium, T_7: 25% N through FYM + 50% N through Vermicompost + Vermiwash, T_8: 50% N through FYM + 25% N through Vermicompost + Jeevamrit, T_9: 50% N through FYM + 25% N through Vermicompost + Bio-NP Consortium, T_{10}: 50% N through FYM + 25% N through Vermicompost + Vermiwash. *Jeevamrit* and Vermiwash were sprayed at 30 and 60 days after transplanting (DATP), respectively. The Bio-NP Consortium was applied at 1 L/ha near the plant base at 30 and 60 DATP through drenching. The recommended nitrogen dose was applied as per the treatment through organic manure on a nitrogen equivalent basis. Farm Yard Manure was incorporated ten days before transplanting, while Vermicompost was applied in furrow during transplanting. *Jeevamrit* was diluted in water (25 liters in 375 liters) and sprayed at 30 DATP, and (50 liters in 500 liters) sprayed at 60 DATP. Vermiwash (10%) was sprayed at 30 and 60 DATP, and

Bio-NP Consortium was applied in 1-liter increments at 30 and 60 DATP through drenching.

RESULTS AND DISCUSSION

Effect of treatments on growth & yield attributes. Table 3 illustrates the notable impact of different treatments on the growth and yield attributes of finger millet. The plant population per meter row length at the initial stage and at harvest did not show significant variations among the various organic treatments.

The presented data clearly indicates a progressive increase in the plant height of finger millet as the crop ages. Height displayed vigorous growth up to 60 days of crop development, after which it gradually slowed down until harvest. No significant differences were noted in plant height at 30 days after transplanting (DATP). Treatment T6 exhibited the highest plant height (101.52 cm) at 60 DATP, statistically comparable to treatments T_5 and T_7. At harvest, Treatment T_6 resulted in a significantly taller plant height of 112.52 cm, on par with treatments T_5, T_7, and T_9. The observed increase in plant height under Treatment T_6 could be attributed to the combination of various organic sources providing essential nutrients for plant growth and development. The rapid mineralization of Vermicompost, particularly in supplying readily available nitrogen, likely played a significant role in promoting plant growth. The results are in conformity with the findings of Thimmaiah *et al*. (2016); Pradhan *et al*. (2018); Aparna *et al*. (2019); Patel *et al*. (2021a).

Among the various treatments, Treatment T_6 showed a significantly higher number of effective tillers per meter row length (25.25), remaining on par with Treatments T_5, T_7, and T_9. The establishment of an optimal crop geometry contributes to effective tillering, playing a crucial role in canopy development and efficient resource utilization, ultimately influencing grain yield. Treatment T_6 exhibited an increased count of effective tillers per meter row length. This enhancement can be attributed to the readily available nitrogen supply from organic fertilizer sources, coupled with the mineralization process of Vermicompost, leading to improved crop nutrition and creating a favorable soil environment. These findings align with the research conducted by Saunshi *et al*. (2014); Thimmaiah *et al*. (2016); Aparna *et al*. (2019).

Table 3: Effect of different treatments on growth.

Treatments	Plant Population/m^2		Plant height (cm)			Effective number of tillers per meter row length	Number of fingers per ear head	Length of finger (cm)
	At initial	After harvest	At 30 DATP	At 60 DATP	At harvest			
T_1	10.00	9.50	52.57	74.41	81.91	16.25	6.31	5.93
T_2	10.25	10.25	58.39	81.88	90.96	19.75	7.30	7.00
T_3	11.00	10.00	59.66	85.74	95.57	21.75	7.63	7.60
T_4	10.50	9.75	58.58	83.93	93.73	21.50	7.28	7.53
T_5	11.00	10.75	57.06	96.77	107.27	24.50	7.93	8.98
T_6	10.75	10.25	57.39	101.52	112.52	25.25	8.05	9.75
T_7	10.75	10.00	56.13	98.35	108.85	24.75	7.90	9.43
T_8	11.00	10.75	54.86	87.69	97.69	22.00	7.30	7.65
T_9	10.75	10.25	54.91	91.03	104.68	23.75	7.85	8.88
T_{10}	11.00	10.50	55.73	90.45	100.45	22.25	7.28	8.13
S. Em.±	0.38	0.33	2.01	3.24	3.89	1.02	0.23	0.34
C.D.(P=0.05)	NS	NS	NS	9.41	11.29	2.97	0.67	0.99
C. V.(%)	7.01	6.40	7.12	7.27	7.83	9.22	6.17	8.45

Number of fingers per ear head was recorded higher under treatment T_6 which was statistically at par with treatments T_5, T_7, T_9 and T_3. The results are in conformity with the findings of Mahapatra (2017); Prashanth *et al*. (2019).

Determining the grain yield of finger millet crop relies on the length of the fingers, which is a crucial factor contributing to the overall yield. A longer finger length often corresponds to a higher number of grains per ear head, resulting in an increased grain yield.

The data presented in Table 3 proves that the length of fingers was significantly influenced by various treatments. Treatment T_6 recorded significantly higher finger length (9.75 cm). However, it was at par with T_7, T_5 and T_9.The increase in the length of fingers observed under treatment T_6 can be attributed to the nitrogen content, which stimulates meristematic and physiological activities that support increased photosynthetic rates. This can be possible due to the production of sufficient photosynthates that are subsequently transported to various sinks, leading to an increase in length of fingers.

Table 4: Effect of different treatments on yield and its attributes.

Treatments	Grain yield (kg/ha)	Straw yield (kg/ha)	Harvest index (%)	Test weight (g)
T_1	1809	4048	30.91	2.18
T_2	2331	4403	34.68	2.41
T_3	2758	4792	36.55	2.46
T_4	2507	4684	34.92	2.44
T_5	2734	5463	33.34	2.61
T_6	3032	5862	34.03	2.76
T_7	2865	5647	33.74	2.65
T_8	2665	4893	35.27	2.49
T_9	2696	5290	33.87	2.54
T_{10}	2671	4932	35.20	2.50
S. Em.±	118	219	1.17	0.09
C.D.(P=0.05)	342	634	NS	0.25
C. V. (%)	9.04	8.73	6.83	6.92

Data presented in Table 4 shows noteworthy variations in grain yield (kg/ha), straw yield (kg/ha), harvest index (%) and test weight (g) resulting from distinct nitrogen management treatments.

Grain yield (3032 kg/ha) was recorded significantly higher under treatment T_6 which was statistically equivalent to that of treatment T_7, T_3, T_5 and T_9. As results the overall effect of application of organic manures and liquid organic fertilizer supplied nitrogen in balanced quantity enabled finger millet plants to assimilate sufficient photosynthetic products. With increased dry matter and photosynthetic products, coupled with efficient translocation, plant produced higher ears with increased test weight and ultimately higher grain yield. Thus, from all the measurable sources evaluated in the present study it is proved that and results were in close concurrence with Chaudhari *et al*. (2011); Shivakumar *et al*. (2011); Dhanpal and Verma (2013); Pavankumar *et al*. (2016); Hatti *et al*. (2017), Ullasa *et al*. (2017); Upenranaik *et al*. (2018); Naveena *et al*. (2019); Prashanth *et al*. (2019); Kaur (2021).

Significantly higher straw yield was obtained under treatment T_6 which was at par with treatmentsT_5, T_7& T_9. The adequate nitrogen supply from FYM and Vermicompost, combined with the presence of the bio-fertilizer, enhanced the photosynthetic activity and increased biomass production. Consequently, this led to a higher straw yield. These results were in close agreement with Govindappa *et al*. (2009); Chaudhari *et al*. (2011); Dhanpal and Verma (2013); Hatti *et al*. (2017); Ullasa *et al*. (2017); Aparna *et al*. (2019); Chowdary *et al*. (2019); Harika *et al*. (2019); Naveena *et al*. (2019) ; Prashanth *et al*. (2019).

Based on the information presented in Table 4 indicated that the various treatments did not have any significant impact on the harvest index of finger millet.

Table: 5 Effect of various treatment on finger millet grain protein and nutritional quality.

Treatment	Protein content (%)	N (%)	P (%)	K (%)	Ca (%)	Mg (%)	S (%)	Fe (ppm)	Mn (ppm)	Zn (ppm)
T_1	5.45	0.872	0.273	0.555	0.445	0.205	0.514	31.18	24.04	9.29
T_2	5.50	0.881	0.275	0.558	0.448	0.203	0.596	31.23	24.48	9.39
T_3	5.57	0.892	0.277	0.570	0.450	0.223	0.608	31.73	25.19	9.45
T_4	5.55	0.889	0.278	0.564	0.447	0.213	0.599	31.53	24.96	9.43
T_5	6.14	0.983	0.280	0.582	0.452	0.213	0.643	32.68	25.50	9.59
T_6	6.41	1.026	0.282	0.576	0.454	0.215	0.682	33.58	27.55	10.15
T_7	6.25	1.000	0.281	0.578	0.450	0.213	0.647	33.18	27.04	9.79
T_8	5.69	0.910	0.279	0.572	0.454	0.215	0.610	31.78	25.20	9.49
T_9	5.85	0.936	0.280	0.574	0.451	0.220	0.624	32.49	25.48	9.54
T_{10}	5.75	0.920	0.279	0.573	0.454	0.213	0.618	31.99	25.46	9.53
S. Em.±	0.12	0.019	0.004	0.007	0.005	0.006	0.015	0.71	0.86	0.20
C.D.(P=0.05)	0.34	0.055	NS	NS	NS	NS	0.043	NS	NS	NS
C. V. (%)	4.07	4.071	2.709	2.473	2.315	5.366	4.852	4.40	6.73	4.25

As per the data shown in Table 4 test weight was recorded significantly higher (2.76 g) under treatment T_6, which was remained at par with treatments T_5, T_7 & T_9. The potential explanation for the increase in test weight could be the availability of an ample amount of nitrogen through organic sources and the use of liquid organic fertilizers enhanced productive efficiency by facilitating concurrent photosynthesis and efficient translocation of assimilates from source to sink during the grain filling stage. This ultimately led to a higher 1000 grain weight. Additionally, liquid organic fertilizers helped to increased availability of nutrients from organic sources, resulting in the production of a greater number of grains, which was reflected in the test weight. The results corroborate those achieved by Mahapatra (2017) ; Prashanth *et al*. (2019).

Effect of treatments on grain quality parameter: Data presented in Table 5 shows variations in grain Protein content (%), Nitrogen, Phosphorus, Potassium, Calcium, Magnesium, Sulphur, Iron, Manganese and Zinc resulting from distinct nitrogen management treatments.

Protein content of finger millet grain was significantly affected by different treatments. Maximum protein content was recorded under treatment T_6 however; it was statistically at par with treatment T_5 & T_7. Combination of FYM, Vermicompost and Bio NP consortium enhances the photosynthetic activity of the plant, facilitating efficient production of organic compounds required for protein synthesis. Additionally, the presence of sufficient nitrogen, which is a fundamental component of protein, aids in the easy translocation and supply of nitrogen to the growing plant parts. These findings corroborate the observations of Mane *et al*. (2019).

Treatment T6 (25% N through FYM + 50% N through Vermicompost + Bio-NP Consortium) yielded a notably higher nitrogen content (1.026%). The incorporation of liquid manure played a role in expediting the mineralization process of farm yard manure (FYM). This accelerated mineralization made nitrogen readily available for the plants, and it is plausible that some of this nitrogen was transported from the source (*e.g*., roots) to the sink (*e.g*., developing seeds). These results were in accordance with those achieved by Negi (2017).

The content of P, K, Ca, Mg, Fe, Mn, and Zn in finger millet grain remained unaffected by the diverse nutrient management treatments. These results suggest that the use of various organic fertilizers facilitates the availability of various micro and secondary nutrient elements, balancing the plant's needs, yet not leading to an increase in their content in the grain.

Treatment T6 (25% N through FYM + 50% N through Vermicompost + Bio-NP Consortium) showed a significantly higher sulfur content (0.648%) in the finger millet grain, comparable to treatments T5 and T7.

CONCLUSIONS

According to the findings of the present study, the application of 25% N through FYM + 50% N through Vermicompost and Bio-NP Consortium, as well as 25% N through FYM + 50% N through Vermicompost + Vermiwash or 25% N through FYM + 50% N through Vermicompost + *Jeevamrit*, and 50% N through FYM + 25% N through Vermicompost + Bio-NP Consortium, resulted in increased yield and improved quality. However, higher net realization was achieved with 25% N through FYM + 50% N through Vermicompost and Bio-NP Consortium, 25% N through FYM + 50% N through Vermicompost + Vermiwash, and 50% N through FYM + 25% N through Vermicompost and Bio-NP Consortium. The maximum benefit-cost ratio was observed under the application of 25% N through FYM + 50% N through Vermicompost and Bio-NP Consortium.

FUTURE SCOPE

The future of farming may see a shift towards these organic and bio-nutrient management strategies, fostering a more sustainable and environmentally friendly approach to crop cultivation. Farmers could potentially witness increased net realization by adopting these practices, encouraging a broader adoption of organic and bio-based fertilizers. As we move forward, the agricultural community might embrace these findings to strike a balance between maximizing yield, ensuring crop quality, and maintaining economic viability, ultimately contributing to a more resilient and sustainable agricultural landscape.

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REFERENCES

Agricultural Statistics as a Glance (2017). Government of India, Ministry of Agriculture and Farmers Welfare Department of Agriculture, Cooperation and Farmers Welfare, Directorate of Economics and Statistics www.agricoop.nic.in

Aparna, K., Rekha, K. B., Vani, K. P., and Prakash, T. R. (2019). Growth and yield of finger millet as influenced by crop residue composting. *Journal of Pharmacognosy and Phytochemistry*, *8*(4), 1108-1111.

Chaudhari, P. P., Patel, D. A., Virdia, H. M., and Patel, B. M. (2011). Nutrient management in finger millet (*Eleusine coracana* (L.) Gaertn) on hilly area of south Gujarat *Green farming*, *2*(6), 658-660.

Chowdary, K. A., and Patra, B. C. (2019). Effect of micronutrient application with different sources of NPK on growth and yield of finger millet crop in red laterite zone. *Journal of Agricultural Science and Technology*, (9) 403-416.

Dhanpal, G. N., and Verma, S. K. (2013). Effect of long term FYM application with fertilizer on productivity of finger millet. *Bio infole - A Quarterly Journal of Life Science*, *10*, 507-509.

Govindappa, M., Vishwanath, A. P., Harsha, K. N., Thimmegowda, P., andJnanesh, A. C. (2009). Response of finger millet (*Eleusine coracana* (L.) Gaertn) to organic and inorganic sources of nutrients under rainfed condition, *Journal of Crop and Weed*, *5*(1), 291-293.

Hatti, V., Ramachandrappa, B. K., Mudalagiriyappa, Sathish, A., and Thimmegowda, M. N. (2017). Soil properties and productivity of rainfed finger millet under conservation tillage and nutrient management in eastern dry zone of Karnataka. *Journal of Environmental Biology*, *39*, 612-624.9

Jackson, M. L. (1973). *Soil chemical analysis*. Prentice Hall India Pvt. Ltd., New Delhi, 183-192.

Kaur, P. (2021). Optimization of *jeevamrit* doses and application time for enhancing productivity of wheat under natural farming system. *Journal of Pharmacognosy and Phytochemistry*, *10*(1), 405-408.

Mane, M. J., Mahadkar, U. V., Sagavekar, V. V., Jagtap, D. N., and Dhekale, J. S. (2019). Economics of finger millet (*Eleusine Coracana* (L.) Gaertn) as influenced by land situations, various planting geometry and levels of fertilizer under lateritic soil of Konkan region. *International Journal of Chemical Studies*, *7*(6), 838-847.

Mahapatra, S., S. (2017). *Nutrient management through organics for sustained productivity of finger millet* (*Eleusine coracana* (L.) Gaertn.). M.Sc. (Ag.) Thesis, Acharya N.G. Ranga Agricultural University Andhra Pradesh.

Naveena, M., Sujith G. M., and Devakumar, N. (2019). Growth and yield of finger millet (*Eleusine coracana* (L.) Gaertn) as influenced by liquid organic manures. *International Journal of Advanced Biological Research*, *9*(2), 157-160.

Negi, M. S. (2017). *Integrated nutrient management in rainfed finger millet* (*Eleusine coracana* (L.) Gaertn.). M.Sc. (Ag.) Thesis, G.B Pant University of Agriculture and Technology, Pantnagar, Uttarakhand.

Olsen, S. R., Cole, C. V., Watanabe, F. S., and Dean, L. A. (1954). Estimation of available phosphorus in soil by extraction by sodium bi-carbonate. *United States Department of Agriculture*, 937.

Patel, H. H., Shroff, J. C., and Shah, S. N. (2021a). Effect of nitrogen management on yield and quality of finger millet (*Eleusine coracana* (L.) Gaertn). *International Journal of Farm Sciences*, *11*(3), 17-20.

Pavankumar, G., Ramachandrappa, B. K., Thimmegowda, M. N., and Mudaligiriyappa, L. (2016). Influence of rotation, use of organic and inorganic sources of nutrients on yield, nutrient uptake and economics of finger millet. *Ecology, Environment and Conservation*, *22*, 39-46.

Piper, C. S. (1966). Soil and Plant Analysis. The University of Adelade, Academic press, New York, Australia.

Pradhan, A., Sao, A., and Nag, S. K. (2018). Sustainable nutrient management in aerobic finger millet (*Eleusine coracana* (L.) Gaertn) under Rainfed Agriculture. *Journal of Experimental Agriculture International, 22* (6) 1-5.

Prashanth, D. V., Krishnamurthy, D. V., Naveen, L., Anandkumar, B. R., Harsha S., and Savitha, M. (2019). Long term effect of integrated nutrient management on growth and yield of finger millet (*Eleusine coracana* (L.) Gaertn) in eastern dry zone of Karnataka, India. *International Journal of Current Microbiology and Applied Science, 8*, 2362-2367.

Saunshi, S., Reddy, V., Mallikarjun, K., and Rawal, R. (2014). Influence of enriched bio-digester liquid manure on growth and yield of finger millet. *The bioscan*, *9*(2), 613-616.

Shivakumar, B. C., Girish, A. C., Gowda, B., Kumar, G. V., Gowda, A. M., andThimmegowda, M. N. (2011). Influence of pongamia, mahua and neem cakes on finger millet productivity and soil fertility. *Journal of Applied and Natural Science*, *3*(2), 274-276.

Subbiah, B. V., and Asija, G. L. (1956). A rapid procedure for the estimation of available nitrogen in soil. *Current Science*, *25*, 259-260.

Thimmaiah, M., Dineshkumar, M., Nandish, M. S., and Veeranna, H. K. (2016). Effect of integrated nutrient management on growth, yield and economics of rainfed finger millet (*Eleusine coracana* (L.) Gaertn). *Green Farming*, *7*, 875-879.

Ullasa, M., Pradeep, S., Shrikantha, C. D., and Sridhara, S. (2017). Effect of different organic nutrient management practices on growth, yield and economics of finger millet (*Eleusine coracana* (L.)). *International Journal of Farm Sciences*, *7*(2), 10-14.

Walkley, A., and Black, I. A. (1934). An examination of methods for determining organic carbon and nitrogen in soils. *Journal of Agricultural Science*, *25*, 589-609.

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