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# Enhancing finger millet productivity through sustainable nutrient management practices for transplanted finger millet

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**Abstract**
Growing awareness of the adverse effects associated with excessive dependence on chemical fertilizers has underscored the need for more sustainable nutrient management practices. Approaches that combine reduced levels of inorganic fertilizers with organic nutrient sources are increasingly emphasized for their role in protecting soil health and minimizing environmental impacts. In this context, enriched organic compost has gained importance as an efficient alternative to conventional organic manures, owing to its lower application requirement, improved nutrient availability, and greater economic efficiency. Hence, a field trial was conducted at the Experimental Farm, Annamalai University, during the cropping period from May to August 2025, to evaluate the effect of integrated nutrient management practices on transplanted finger millet. The Phase II field experiment was laid out in a Randomized block design (RBD) with three replications. From the results of the field experiment, adoption of 75% RDN + 25% N through Enriched poultry manure compost @ 500 kg $ha^{-1}$ + Seaweed granules @ 25 kg $ha^{-1}$+ MN mixture @ 12.5 kg $ha^{-1}$($T_9$) triggered maximum plant height (108.53cm), leaf area index (4.16), dry matter production (6958.36 kg $ha^{-1}$), number of productive tillers $m^{-2}$(129.27), number of fingers earhead$^{-1}$ (12.97), length of earhead (12.02cm), grain yield (3936.08 kg $ha^{-1}$) and straw yield (8186.31kg $ha^{-1}$), during the cropping period of May- August 2025. The lowest values were recorded under the control ($T_1$) for all attributes. This study illustrates that cultivation of finger millet by adopting 75% RDN + 25% N through Enriched poultry manure compost @ 500 kg $ha^{-1}$ + Seaweed granules @ 25 kg $ha^{-1}$+ MN mixture @ 12.5 kg $ha^{-1}$($T_9$) was found to be an economically and agronomically sound practice that would increase productivity and profitability.

**Keywords:** Finger millet, integrated nutrient management, enriched compost, growth characters, yield

## 1. Introduction
Finger millet (*Eleusine coracana* L. Gaertn.), popularly known as ragi or African millet, is the most widely cultivated small millet worldwide. It constitutes a major staple food in the hilly tracts of the Indian subcontinent and accounts for nearly 85% of India's total minor millet production (Kaur *et al.*, 2024) [5]. India continues to dominate global finger millet production, with cultivation largely confined to states such as Karnataka, Tamil Nadu, Uttarakhand, Maharashtra, and Odisha. Recent estimates indicate that the crop is grown on approximately 11-12 lakh hectares, producing about 19-20 lakh tonnes with an average productivity of 1.6-1.7 t $ha^{-1}$ (DES, 2023; ICAR-IIMR, 2024) [1, 3].

Finger millet is valued for its exceptional nutritional composition, including high levels of protein, dietary fibre, essential minerals, and calcium. Its ability to release glucose gradually makes it particularly suitable for diabetic and nutritionally vulnerable populations (Senthamil *et al.*, 2021; Sanjay Kumar *et al.*, 2024) [12, 11]. However, productivity gains in finger millet have slowed in recent years, primarily due to declining soil fertility and inadequate nutrient management. Although traditionally cultivated under low-input conditions, achieving higher yields necessitates the adoption of improved cultivars alongside efficient nutrient management strategies (Prabhakar *et al.*, 2023) [8].

The increasing dependence on chemical fertilizers, despite their yield-enhancing role, has raised concerns related to escalating input costs, environmental degradation, and deterioration of soil

health (Pahalvi *et al.*,2021) [6]. As a result, integrated nutrient management approaches that combine organic and inorganic sources have been advocated to sustain soil productivity and crop performance over the long term. Organic amendments, including enriched farmyard manure, composted pressmud, poultry manure, seaweed-based biostimulants, humic acid, and essential micronutrients, have been reported to improve soil properties, enhance nutrient availability, and increase crop productivity (Sharma *et al.*, 2022) [13].

In view of these considerations, the present investigation was undertaken to assess the effectiveness of integrated nutrient management practices in improving the productivity of transplanted finger millet.

## 2. Materials and Methods

A field trial was conducted during the cropping period of January-May 2024, at the experimental farm, Annamalai University, Annamalai Nagar, Tamil Nadu, India. The experimental farm is geographically situated at 11°24′ N latitude, 79°44′ E longitude and at an altitude of + 5.79m above the mean sea level. The fertility status of the soil was categorized as low in available N, medium in available $P_2O_5$ and high in available $K_2O$ with a clay loam texture. The experiment consists of twelve treatments *viz*., $T_1$- Absolute control, $T_2$- 100% RDF (60:30:30 kg $ha^{-1}$), $T_3$- 75% RDN + 25% N through Enriched poultry manure compost @ 500 kg $ha^{-1}$, $T_4$- 75% RDN + 25% N through Enriched pressmud compost @ 750 kg $ha^{-1}$, $T_5$-75% RDN + 25% N through Enriched poultry manure compost @ 500 kg $ha^{-1}$ + Seaweed granules @ 25 kg $ha^{-1}$, $T_6$- 75% RDN + 25% N through Enriched poultry manure compost @ 500 kg $ha^{-1}$ + Humic acid granules @ 25 kg $ha^{-1}$, $T_7$- 75% RDN + 25% N through Enriched pressmud compost @ 750 kg $ha^{-1}$ + Seaweed granules @ 25 kg $ha^{-1}$, $T_8$- 75% RDN + 25% N through Enriched pressmud compost @ 750 kg $ha^{-1}$ + Humic acid granules @ 25 kg $ha^{-1}$, $T_9$- 75% RDN + 25% N through Enriched poultry manure compost @ 500 kg $ha^{-1}$ + Seaweed granules @ 25 kg $ha^{-1}$+ MN mixture @ 12.5 kg $ha^{-1}$, $T_{10}$- 75% RDN + 25% N through Enriched poultry manure compost @ 500 kg $ha^{-1}$ + Humic acid granules @ 25 kg $ha^{-1}$ + MN mixture @ 12.5 kg $ha^{-1}$, $T_{11}$- 75% RDN + 25% N through Enriched pressmud compost @ 750 kg $ha^{-1}$ + Seaweed granules @ 25 kg $ha^{-1}$ + MN mixture @ 12.5 kg $ha^{-1}$ and $T_{12}$- 75% RDN + 25% N through Enriched pressmud compost @ 750 kg $ha^{-1}$ + Humic acid granules @ 25 kg $ha^{-1}$+ MN mixture @ 12.5 kg $ha^{-1}$. Enriched compost was prepared using the following procedure. Enriched poultry manure compost was prepared by mixing single super phosphate @ 187.5 kg $ha^{-1}$, biofertilizers 10 kg of Azospirillum and 10 kg of Phosphobacteria were thoroughly blended with 500 kg of poultry manure on a dry weight basis and formed into heap like structure, and it was maintained under shaded conditions with 60% moisture. The same procedure was followed in preparation of enriched pressmud compost (Sangeetha *et al.*, 2013) [10]. After two months, enriched compost was ready, and it was applied to the respective plots as per the treatment schedule before transplanting. The nutrient content of above said enriched organic compost is furnished in Table 1, and the experimental details carried out are given in Table 2. The variety ATL-1 was used for the study. Eighteen days old healthy seedlings were transplanted @ 2 seedlings $hill^{-1}$ with a spacing of 30 × 30 cm.

**Table 1:** Nutrient content of enriched organic manure

| Nutrient content | Nitrogen (%) | Phosphorus (%) | Potassium (%) |
|---|---|---|---|
| Enriched Pressmud Compost | 1.93 | 7.38 | 1.89 |
| Enriched Poultry Manure | 2.72 | 7.54 | 2.03 |

**Table 2:** Experimental details

| Particulars | Description |
|---|---|
| Parentage | TNAU 900 × Co (Ra)14 Pedigree breeding |
| Duration (days) | 110-120 |
| Date of sowing | 03.05.2025 |
| Date of transplanting | 20.05.2025 |
| Date of harvesting | 20.08.2025 |

### 2.1 Biometric Observation

From each net plot area, five plants were chosen at random and tagged for biometric observation at various growth phases of the crop. Plant height, dry matter production, number of productive tillers $m^{-2}$, number of fingers $earhead^{-1}$, earhead length, grain yield and straw yield were recorded under the harvest stage. Leaf area index was recorded under the flowering stage. Harvesting of earheads was done in each plot separately. The grains were cleaned, dried, and their dry weight was recorded at a 14 per cent moisture level, and the straw yield was also recorded. The data on each character were evaluated throughout this investigation was statistically analyzed as suggested by Panse and Sukhatme. To make the statistical inferences, the critical differences were calculated at a 0.05 probability level.

## 3. Results and Discussion

### 3.1 Effect of integrated nutrient management practices on growth attributes (Table 3)

Among the treatments studied, the application of 75% recommended dose of nitrogen (RDN) along with 25% nitrogen supplied through enriched poultry manure compost @ 500 kg $ha^{-1}$ in combination with seaweed granules @ 25 kg $ha^{-1}$ and a micronutrient mixture @ 12.5 kg $ha^{-1}$ ($T_9$) resulted in significantly higher plant height(108.53cm), leaf area index (4.16), and dry matter accumulation (6958.36 kg $ha^{-1}$) compared to the remaining treatments. The enhanced growth response can be ascribed to the complementary action of enriched poultry manure, which ensured a sustained and balanced supply of nutrients; seaweed granules, which functioned as biostimulants by stimulating root development, nutrient absorption, and stress resilience; and micronutrient supplementation, which supported essential physiological and metabolic processes. Such improvements in growth and developmental traits of finger millet under integrated nutrient management and biostimulant application have been consistently reported in earlier studies (Yadav *et al.*, 2025) [15]. The lowest values were recorded under the absolute control ($T_1$).

**Table 3:** Effect of integrated nutrient management practices on growth attributes

| Treatments | Plant height (cm) | LAI | DMP (kg ha$^{-1}$) |
|---|---|---|---|
| $T_1$- Absolute control | 72.10 | 1.67 | 2687.67 |
| $T_2$- 100% RDF (60:30:30 kg ha$^{-1}$) | 87.34 | 2.46 | 4990.07 |
| $T_3$- 75% RDN + 25% N through Enriched poultry manure compost @ 500 kg ha$^{-1}$ | 96.97 | 2.86 | 5959.50 |
| $T_4$- 75% RDN + 25% N through Enriched pressmud compost @ 750 kg ha$^{-1}$ | 95.22 | 2.63 | 5808.00 |
| $T_5$-75% RDN + 25% N through Enriched poultry manure compost @ 500 kg ha$^{-1}$ + Seaweed granules @ 25 kg ha$^{-1}$, | 101.65 | 3.36 | 6355.40 |
| $T_6$- 75% RDN + 25% N through Enriched poultry manure compost @ 500 kg ha$^{-1}$ + Humic acid granules @ 25 kg ha$^{-1}$ | 100.97 | 3.31 | 6304.10 |
| $T_7$- 75% RDN + 25% N through Enriched pressmud compost @ 750 kg ha$^{-1}$ + Seaweed granules @ 25 kg ha$^{-1}$ | 99.23 | 3.11 | 6153.90 |
| $T_8$- 75% RDN + 25% N through Enriched pressmud compost @ 750 kg ha$^{-1}$ + Humic acid granules @ 25 kg ha$^{-1}$ | 98.69 | 3.06 | 6110.90 |
| $T_9$- 75% RDN + 25% N through Enriched poultry manure compost @ 500 kg ha$^{-1}$ + Seaweed granules @ 25 kg ha$^{-1}$+ MN mixture @ 12.5 kg ha$^{-1}$ | 108.53 | 4.16 | 6958.36 |
| $T_{10}$- 75% RDN + 25% N through Enriched poultry manure compost @ 500 kg ha$^{-1}$ + Humic acid granules @ 25 kg ha$^{-1}$ + MN mixture @ 12.5 kg ha$^{-1}$ | 106.82 | 3.96 | 6807.16 |
| $T_{11}$- 75% RDN + 25% N through Enriched pressmud compost @ 750 kg ha$^{-1}$ + Seaweed granules @ 25 kg ha$^{-1}$ + MN mixture @ 12.5 kg ha$^{-1}$ | 105.10 | 3.76 | 6655.93 |
| $T_{12}$- 75% RDN + 25% N through Enriched pressmud compost @ 750 kg ha$^{-1}$ + Humic acid granules @ 25 kg ha$^{-1}$+ MN mixture @ 12.5 kg ha$^{-1}$ | 103.39 | 3.56 | 6505.70 |
| S.Ed. | 0.817 | 0.086 | 72.126 |
| C.D (P=0.05) | 1.695 | 0.180 | 149.591 |

### 3.2 Effect of integrated nutrient management practices on yield attributes and yield

Among the treatments evaluated, the application of 75% recommended dose of nitrogen (RDN) along with 25% nitrogen supplied through enriched poultry manure compost @ 500 kg ha$^{-1}$, in combination with seaweed granules @ 25 kg ha$^{-1}$ and a micronutrient mixture @ 12.5 kg ha$^{-1}$ ($T_9$), recorded the highest values for number of productive tillers (129.27), number of fingers earhead$^{-1}$(12.02), earhead length(12.97cm), as well as grain (3936.08 kg ha$^{-1}$) and straw yield (8186 kg ha$^{-1}$)compared to the other treatments. The observed enhancement in yield attributes and productivity may be attributed to the synergistic effects of sustained and balanced nutrient availability from enriched organic sources and improved micronutrient supply during reproductive stages, which favour better earhead formation and grain filling, as reported earlier by (Rani *et al.,* 2023 and Jawahar *et al.,* 2025) [9, 4]. In addition, the bio-stimulatory action of seaweed granules in enhancing photosynthetic efficiency, metabolic activity, and stress tolerance further contributed to improved reproductive performance and assimilate partitioning (Gautam *et al.,* 2025) [2]. The slow and continuous release of primary nutrients from enriched poultry manure, coupled with enhanced physiological functioning and efficient translocation of assimilates to sink organs, resulted in increased biomass production, improved grain filling, and a higher harvest index under integrated nutrient management systems, which is in agreement with the findings of Sureshkannan *et al.,* (2025) [14].

**Table 4:** Effect of integrated nutrient management practices on yield attributes and yield.

| Treatments | No. of. productive tillers(m$^{-2}$) | Earhead length (cm) | No. of fingers earhead$^{-1}$ | Grain yield (kg ha$^{-1}$) | Straw yield (Kg ha$^{-1}$) |
|---|---|---|---|---|---|
| $T_1$- Absolute control | 47.13 | 4.67 | 3.50 | 1061.72 | 3165.97 |
| $T_2$- 100% RDF (60:30:30 kg ha$^{-1}$) | 81.12 | 6.45 | 5.02 | 2547.70 | 5870.67 |
| $T_3$- 75% RDN + 25% N through Enriched poultry manure compost @ 500 kg ha$^{-1}$ | 106.75 | 9.49 | 8.69 | 3186.35 | 7154.78 |
| $T_4$- 75% RDN + 25% N through Enriched pressmud compost @ 750 kg ha$^{-1}$ | 103.44 | 9.11 | 8.08 | 3077.85 | 7009.46 |
| $T_5$-75% RDN + 25% N through Enriched poultry manure compost @ 500 kg ha$^{-1}$ + Seaweed granules @ 25 kg ha$^{-1}$, | 116.03 | 10.52 | 10.53 | 3495.02 | 7585.59 |
| $T_6$- 75% RDN + 25% N through Enriched poultry manure compost @ 500 kg ha$^{-1}$ + Humic acid granules @ 25 kg ha$^{-1}$ | 114.49 | 10.40 | 10.22 | 3440.82 | 7502.29 |
| $T_7$- 75% RDN + 25% N through Enriched pressmud compost @ 750 kg ha$^{-1}$ + Seaweed granules @ 25 kg ha$^{-1}$ | 111.18 | 10.02 | 9.61 | 3331.49 | 7356.09 |
| $T_8$- 75% RDN + 25% N through Enriched pressmud compost @ 750 kg ha$^{-1}$ + Humic acid granules @ 25 kg ha$^{-1}$ | 110.06 | 9.89 | 9.30 | 3295.02 | 7304.5 |
| $T_9$- 75% RDN + 25% N through Enriched poultry manure compost @ 500 kg ha$^{-1}$ + Seaweed granules @ 25 kg ha$^{-1}$+ MN mixture @ 12.5 kg ha$^{-1}$ | 129.27 | 12.02 | 12.97 | 3936.08 | 8186.31 |
| $T_{10}$- 75% RDN + 25% N through Enriched poultry manure compost @ 500 kg ha$^{-1}$ + Humic acid granules @ 25 kg ha$^{-1}$ + MN mixture @ 12.5 kg ha$^{-1}$ | 125.96 | 11.65 | 12.36 | 3825.02 | 8037.22 |
| $T_{11}$- 75% RDN + 25% N through Enriched pressmud compost @ 750 kg ha$^{-1}$ + Seaweed granules @ 25 kg ha$^{-1}$ + MN mixture @ 12.5 kg ha$^{-1}$ | 122.65 | 11.28 | 11.75 | 3714.77 | 7885.75 |
| $T_{12}$- 75% RDN + 25% N through Enriched pressmud compost @ 750 kg ha$^{-1}$ + Humic acid granules @ 25 kg ha$^{-1}$+ MN mixture @ 12.5 kg ha$^{-1}$ | 119.34 | 10.90 | 11.14 | 3603.37 | 7736.3 |
| S.Ed. | 1.581 | 0.174 | 0.281 | 52.034 | 69.370 |
| C.D (P=0.05) | 3.299 | 0.364 | 0.582 | 107.92 | 143.87 |

## 4. Conclusion

The results of the field study showed that adoption of 75% RDN + 25% N through Enriched poultry manure compost @ 500 kg ha$^{-1}$ + Seaweed granules @ 25 kg ha$^{-1}$+ MN mixture @ 12.5 kg ha$^{-1}$ was found to be the best performing agronomic management strategy for performing higher growth and yield of transplanted finger millet under irrigated conditions.

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**Competing Interests**
Authors have declared that no competing interests exist.

**References**
1. Directorate of Economics and Statistics. Agricultural statistics at a glance 2023. Ministry of Agriculture and Farmers Welfare, Government of India; 2023.
2. Gautam A, Singh R, Verma SK. Response of finger millet to seaweed-based biostimulants and integrated nutrient management under rainfed conditions. Agric Res. 2025;14(1):85-94.
3. ICAR-Indian Institute of Millets Research. Vision 2050: ICAR-Indian Institute of Millets Research. ICAR-IIMR, Hyderabad; 2024.
4. Jawahar S, Ramesh T, Balasubramanian P. Influence of organic amendments and nutrient integration on reproductive traits and test weight of millets under field conditions. J Plant Nutr. 2025;48(4):612-621.
5. Kaur R, Singh J, Kumar S. Status, challenges and opportunities of small millets production in India. Indian J Agric Sci. 2024;94(3):245-252.
6. Pahalvi HN, Rafiya L, Rashid S, Nisar B, Kamili AN. Chemical fertilizers and their impact on soil health. Microbiota Biofertilizers. 2021;2:1-20.
7. Panse VG, Sukhatme PV. Statistical methods for agricultural workers (Revised by PV Sukhatme & VN Amble). Indian Council of Agricultural Research; 1989.
8. Prabhakar M, Reddy SR, Rani PL. Productivity enhancement in finger millet through improved varieties and nutrient management practices. J Cereal Res. 2023;15(2):85-92.
9. Rani S, Kumar V, Sheela M. Effect of integrated nutrient management on yield attributes and productivity of finger millet (*Eleusine coracana* L.). J Cereal Res. 2023;15(3):210-216.
10. Sangeetha SP, Balakrishnan A, Devasenapathy P. Influence of organic manures on yield and quality of rice (*Oryza sativa* L.) and blackgram (*Vigna mungo* L.) in rice-blackgram cropping system. Am J Plant Sci. 2013;4:1151-1157.
11. Sanjay Kumar R, Balasubramanian P, Ramesh T. Nutritional and health benefits of finger millet (*Eleusine coracana* L.). J Food Sci Nutr. 2024;12(1):45-53.
12. Senthamil S, Muthukumar P, Mahendran PP. Nutritional quality and health benefits of finger millet. Int J Chem Stud. 2021;9(1):234-239.
13. Sharma A, Singh H, Kumar R. Integrated nutrient management for sustainable soil health and crop productivity: A review. J Soil Sci Plant Nutr. 2022;22(4):4105-4123.
14. Sureshkannan V, Mahendran PP, Senthilkumar S. Yield efficiency and nutrient use dynamics of finger millet under integrated organic and inorganic nutrient management. Int J Plant Prod. 2025;19(2):175-186.
15. Yadav S, Reddy DR, Kumar V. Integrated nutrient management and biostimulant application for improving growth, physiology and yield of finger millet (*Eleusine coracana* L.). J Plant Nutr. 2025;48(3):412-425.