

Title: Optimization of Organic Nutrient Sources for Kharif Paddy Cultivation

Objectives: To identify a suitable and sustainable INM practice for enhancing rice productivity while maintaining soil health.



Introduction

Rice (*Oryza sativa* L.) is the most important staple food crop of India, contributing significantly to national food security. Continuous use of chemical fertilizers has led to soil health deterioration and environmental concerns. Integrated Nutrient Management (INM), involving the combined use of organic manures, biofertilizers, and inorganic fertilizers, is considered a sustainable approach to enhance crop productivity while maintaining soil fertility. Organic inputs such as farmyard manure (FYM), vermicompost, biocompost, and liquid organic formulations like Jeevamrut improve soil physical, chemical, and biological properties. Hence, the present investigation was undertaken to evaluate the effect of different INM treatments on growth, yield attributes, and yield of rice under Konkan agro-climatic conditions.

Experimental Details:

Crop	Rice	Treatments	8
Variety	Karjat-4	Spacing	20 X 15 cm
Season	Kharif	Plot Size	Gross plot: 3.30 X 3.00 m
Location	ARDF, Tansa Farm		Net plot: 3.15 X 2.80 m
Design	RBD	Transplanting Date	31/07/2024
Replications	3	RDF	100:50:50 kg NPK ha ⁻¹

Treatment Details:

Treat. No.	Treatment Details
T1	FYM @ 5 t/ha + Rhizobium + PSB @ 2 l/ha
T2	Biocompost @ 3 t/ha + Rhizobium + PSB @ 2 l/ha
T3	Vermicompost @ 2.5 t/ha + Rhizobium + PSB @ 2 l/ha
T4	FYM @ 2.5 t/ha + VC @ 1.25 t/ha
T5	FYM @ 2.5 t/ha + BC @ 1.25 t/ha
T6	FYM @ 2.5 t/ha + spray of 2 % Novel (2 spray at 30 and 45 DAS)
T7	FYM @ 2.5 t/ha + Jeevamrut (500 ltr/ha at 20 and 40 DAS)
T8	RDF through chemical fertilizers

Methodology

The field experiment was conducted at ARDF, Tansa Farm during the Kharif season of 2024. The soil of the experimental field was well-drained and suitable for rice cultivation. The experiment was laid out in a Randomized Block Design (RBD) with eight treatments and three replications. Rice variety **Karjat-4** was used for the study.

Seedlings were transplanted on **31 July 2024** at a spacing of **20 × 15 cm**. The gross plot size was **3.30 × 3.00 m**, while the net plot size was **3.15 × 2.80 m**. The recommended dose of fertilizer (RDF) for rice was **100:50:50 kg NPK ha⁻¹**.

The treatments consisted of different combinations of FYM, vermicompost, biocompost, biofertilizers (Rhizobium and PSB), liquid organic formulations, and chemical fertilizers. Jeevamrut was applied as soil drenching at 20 and 40 DAS, while Novel (2%) was applied as foliar spray at 30 and 45 DAS as per treatment schedule. Standard agronomic practices were followed uniformly for all treatments.

Observations were recorded on plant height, number of tillers per plant, number of panicles per plant, panicle length, number of seeds per panicle, test weight, grain yield, and straw yield. The data were statistically analyzed following standard procedures for RBD.

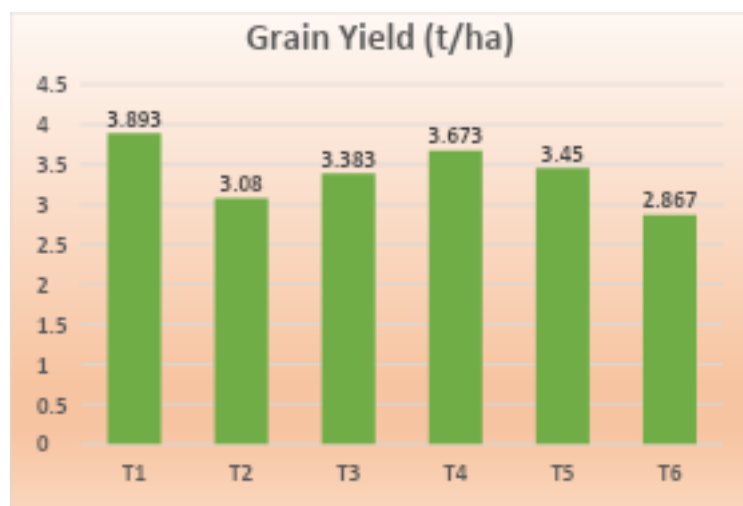
Layout



Results

The results revealed significant variation among treatments with respect to growth, yield attributes, and yield of rice. Among all treatments, T₁ (FYM @ 5 t ha⁻¹ + Rhizobium + PSB) recorded superior growth, registering the highest plant height (99.35 cm) and maximum number of tillers per plant (14.5), which was comparable with RDF (T₈). Yield-attributing characters such as number of panicles per plant, panicle length, number of seeds per panicle, and test weight were also significantly higher under T₁, indicating improved nutrient availability and efficient assimilate translocation. Consequently, T₁ produced the highest grain yield (3.89 t ha⁻¹) and straw yield (5.42 t ha⁻¹), followed by RDF. Treatments based mainly on liquid organic inputs recorded relatively lower performance. Overall, the integrated application of FYM and biofertilizers proved effective in achieving yields comparable to chemical fertilizers while promoting sustainable rice production and better soil health.

Graph:



Conclusion

The present study concluded that integrated nutrient management significantly improved growth, yield attributes, and yield of rice variety Karjat-4. Application of **FYM @ 5 t ha⁻¹ along with Rhizobium and PSB (T₁)** proved to be the most effective treatment, recording the highest grain and straw yields and performing on par with recommended chemical fertilizers. Therefore, integrated nutrient management practices can be effectively adopted for sustainable rice production under Kharif conditions, reducing dependency on chemical fertilizers while maintaining high productivity.