

Evaluation of soil properties in rice fields under two management practices under NICRA adopted village

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The National Innovation on Climate Resilient Agriculture (NICRA), initiated by the Indian Council of Agricultural Research (ICAR) in 2011, focuses on mitigating the impacts of climate change on Indian agriculture. This initiative seeks to strengthen agricultural resilience to climate variability and extreme weather events by emphasizing strategic research, innovative technology development, and farmer capacity-building. The program prioritizes the development of climate-resilient crop varieties, advanced water management strategies, soil health conservation and the promotion of sustainable farming practices. Additionally, NICRA advocates for resource conservation measures and equips farmers with climate risk advisories, facilitating adaptation efforts and safeguarding food security amidst evolving climate challenges.

Methodology

Two rice genotypes i.e. Sahbhagi and Sabourdeep were conventionally cultivated for over five years at one location i.e. Garhi (Poriyahat, Godda district, Jharkhand). Under the T₁ treatment (Recommended Dose of Fertilizer, RDF), the rice fields received NPK @ 120:60:60 kg ha⁻¹, whereas under the T₂ treatment (RDF + Additional Fertilizer), the fields were supplemented with NPK @ 120:60:60 kg ha⁻¹, along with ZnSO₄ @ 20–25 kg ha⁻¹, FeSO₄ @ 25–50 kg ha⁻¹, and Borax @ 1–2 kg ha⁻¹, applied through both basal and foliar applications. Soil samples were collected from the experimental fields after the harvest of the two rice genotypes grown during the wet (kharif) season of 2023 under both management practices. These samples were analyzed at GVT-Krishi Vigyan Kendra, Godda, Jharkhand, India. The analysis assessed the soil's physico-chemical properties (organic carbon, pH, and electrical conductivity) and nutrient status (mineralizable nitrogen, available P₂O₅, and available K₂O) using standard procedures. The statistical analysis of the collected data was conducted using a Split plot Design for the two treatments and two cultivars to evaluate differences between the management practices and cultivar. The analysis was performed using OPI-STAT software to ensure accurate interpretation of results.

Results

A detailed analysis of the data in Table 1 reveals that T₁ (5.71) exhibits a slightly lower pH compared to T₂ (6.08). Electrical conductivity (EC) values for both T₁ (0.360 dS/m) and T₂

(0.375 dS/m) are comparable, showing no significant variation. However, T₂ (0.61%) demonstrates a higher organic carbon (OC) content than T₁ (0.52%). Among the cultivars, Sahbhagi (5.78) shows a lower pH compared to Sabourdeep (6.01). Similarly, EC values for Sahbhagi (0.370 dS/m) and Sabourdeep (0.365 dS/m) are nearly identical. In terms of organic carbon, Sabourdeep (0.59%) surpasses Sahbhagi (0.54%). Overall, Treatment T₂ and the Sabourdeep cultivar contribute positively to soil quality by enhancing organic carbon levels and moderating pH. The significant differences in organic carbon for both treatments and cultivars underscore the importance of tailored nutrient management and cultivar selection to improve soil organic carbon. Meanwhile, the negligible variation in EC suggests stable salinity conditions regardless of treatment or cultivar.

An examination of the data in Table 2 reveals that T₁ (282.93 kg ha⁻¹) and T₂ (285.44 kg ha⁻¹) exhibit similar nitrogen levels, with no significant difference. However, T₂ (18.90 kg ha⁻¹) records a higher phosphorus content compared to T₁ (15.86 kg ha⁻¹) and significantly increases potassium availability (138.17 kg ha⁻¹) compared to T₁ (123.30 kg ha⁻¹). Among the cultivars, Sabourdeep (286.94 kg ha⁻¹) demonstrates higher nitrogen levels than Sahbhagi (281.43 kg ha⁻¹). In terms of phosphorus, Sabourdeep (17.79 kg ha⁻¹) slightly outperforms Sahbhagi (16.98 kg ha⁻¹). Both cultivars exhibit nearly identical potassium levels, with Sahbhagi (130.48 kg ha⁻¹) and Sabourdeep (130.99 kg ha⁻¹). While the treatments do not significantly impact available nitrogen, the consistently higher nitrogen levels in Sabourdeep suggest cultivar-specific influences on nitrogen uptake or retention. Similarly, Sabourdeep's superior phosphorus levels indicate a possible genetic advantage in phosphorus utilization. The significant increase in potassium availability with T₂ highlights its positive impact on potassium dynamics. Overall, T₂ enhances soil fertility by significantly improving phosphorus and potassium levels compared to T₁, with minimal effects on nitrogen. Sabourdeep emerges as the better cultivar for nutrient optimization due to its advantages in nitrogen and phosphorus availability.

Table 1: Physico-chemical properties of soil in rice fields at one location in district of Jharkhand

Treatment		Location: Garhi	
<i>Nutrient management</i>	pH	EC (ds/m)	Organic Carbon (%)
T1	5.71	0.360	0.52
T2	6.08	0.375	0.61
CD (P=0.05)	NS	NS	0.05
<i>Cultivar</i>			
Sahbhagi	5.78	0.370	0.54
Sabourdeep	6.01	0.365	0.59
CD (P=0.05)	0.11	NS	0.013

T1: Recommended Dose of Fertilizers (RDF), T2: RDF + Additional Fertilizer/Amendment

Table 2: Primary nutrient status in soil in rice fields at one location in same district of Jharkhand

Treatment	Location: Garhi		
	Ava. N (kg ha ⁻¹)	Ava. P ₂ O ₅ (kg ha ⁻¹)	Ava. K (kg ha ⁻¹)
T1	282.93	15.86	123.30
T2	285.44	18.90	138.17
CD (P=0.05)	NS	1.98	14.63
<i>Cultivar</i>			
Sahbhagi	281.43	16.98	130.48
Sabourdeep	286.94	17.79	130.99
CD (P=0.05)	5.26	0.36	NS

T1: Recommended Dose of Fertilizers (RDF), T2: RDF + Additional Fertilizer/Amendment

Conclusion

The analysis highlights the positive impacts of Treatment T₂ and the Sabourdeep cultivar on soil quality and nutrient availability. T₂ improves soil organic carbon, phosphorus, and potassium levels while maintaining stable pH and electrical conductivity. Sabourdeep demonstrates superior nitrogen and phosphorus availability and higher organic carbon compared to Sahbhagi. Together, T₂ and Sabourdeep enhance soil fertility and nutrient optimization, making them a promising combination for improved crop performance.

Reference

Bansode, S.M., Ankush, G.S., Mande, J.V. and Suradkar, D.D. 2013. Impact of SHG on socio-economic Development of Their members. Journal of Community Mobilization on Sustainable Development 8 (11): 117120.

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Conservational and Managerial Interventions for Natural Resource Management of Wetland Ecosystem of Kuttanad

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Rice continues to be the staple food for most of the Keralites despite the change in their lifestyle. The most important producer of rice in Kerala is Kuttanad, the rice bowl of Kerala. The wetlands in Kuttanad are geographically and climatically one of its kind and are submerged in water for most part of the year. The lowland has soil pH (3.5-5.5) and resultant problems like iron toxicity and low availability of other nutrients. These, along with change in climate has made cultivation of crops very difficult. The region is now more prone to recurrent, erratic rains and result in flood, water logging and crop loss. The region is also known for indiscriminate use of fertilizers and pesticides, further worsening the situation, polluting the soil and water bodies. Minor interventions in natural resource management along with a proper crop calendar and crop production strategies can bring resilience. In this