



SHORT COMMUNICATION

EFFECT OF ORGANIC NITROGEN ON YIELD AND NUTRIENT COMPOSITION OF RICE (*ORYZA SATIVA* L.)

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SUMMARY

Field experiment was conducted to find the efficacy of substituting fertilizer N at different proportions (25%, 50% and 75% of total N) with organic N sources i.e., farm yard manure (FYM), green leaf manure (GLM), poultry manure and BGA on nutrient uptake (NPK) and yield of rice variety *Sarju 52*. In general the maximum uptake of the nutrients and grain yield were obtained with the application of 25% N through green manure + 75% through inorganic urea. GLM is more efficient than other organic sources at all the proportions of N.

Key words: Dry matter, integrated nutrient management, organic manure, yield

The sustainable productivity of rice is possible only when best nutrient practices are adopted. Cereal crops consume maximum quantities of major nutrients usually added through fertilizers. Judicious application of inorganic along with organic sources of nitrogen to crops and particularly to rice is one of the judicious management practices. The concept of integrated nutrient management seeks to sustain soil fertility through an integration of different available nutrient sources and their application methods that will produce maximum crop yield per unit input use (De Datta and Buresh 1989). Under such a condition there is need to explore the possibilities of using the expanding native sources of plant nutrients. The present study was done to evaluate the effect of integrated supply of nitrogen through substitution of fertilizer N with green manure, FYM, poultry manure and blue green algae on nutrient composition and yield of transplanted rice.

The field experiment was conducted at Agricultural Research Farm, Banaras Hindu University, Varanasi (U.P.). The experiment was laid out in a randomized block design with 12 different INM modules (including control) involving different levels of nitrogen viz. T₁-Control, T₂-100% N through fertilizer, T₃-25% N through FYM +75% N through fertilizer, T₄-50% N through FYM +50% N through fertilizer, T₅-75% N through farm yard manure (FYM) +25% N through fertilizer, T₆-25% N through green leaf manure (GLM) + 75% N through fertilizer, T₇-50% N through GLM + 50% N through fertilizer, T₈-75% N through GLM + 25% N through fertilizer, T₉-25% N through poultry manure (PM)+ 75% N through fertilizer, T₁₀-50% N through PM + 50% N through fertilizer, T₁₁-75% N through PM + 25% N through fertilizer, T₁₂-25% N through FYM + 50% N through fertilizer + BGA equivalent to 10 kg ha⁻¹. After proper field preparation, the required quantities of

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fertilizer nitrogen, phosphorus, and potassium were applied through urea, single super phosphate (SSP) and muriate of potash (MOP), respectively. The rice variety Sarju-52 (duration 120 days) was transplanted (25 days old seedling) in Ist week of August and harvest in Ist week of November. The recommended doses of N, P₂O₅ and K₂O (100% RDF) were 120, 60 and 60 kg ha⁻¹. The single super phosphate, muriate of potash and half the dose of chemical nitrogen (urea) was applied as basal and the remaining was applied in two equal splits at tillering and flowering stages. FYM, green leaf manure and poultry manure were taken as organic sources of nitrogen. The plant samples were collected at harvest and analyzed for total N, P and K by following modified micro-Kjeldhal, Vanado-molybdate and flame photometric methods, respectively (Tandon 1999). Statistical analysis of the data was carried out using standard analysis of variance (Gomez and Gomez 1984).

The inorganic fertilizer and their combination with FYM, green manure and poultry manure influenced the grain and straw yield of rice significantly over control (Table 1). Among the different organic N sources, the response of GLM was found to be the best. It is evident from the data that maximum TDW and yield of crop was

found under the treatment T₆ that received 25% N through green manure + 75% N through fertilizer while minimum in control. These results corroborate with the finding of Jana and Ghosh (1996). Misra and Prasad (2000) also reported that for sustained production in a rice-wheat cropping system, integrated nutrient management involving both organic manures residue⁻¹ and chemical fertilizer is essential. Since the availability of farmyard manure, poultry manure are decreasing due to increased mechanization, the generation of *in situ* organic residues, preferably a legume, is a better alternative.

The uptake of nitrogen and potassium by the crop was greatest with 75% N through fertilizers applied as inorganic and 25% N as organic sources. Highest nitrogen uptake by rice crop was obtained in treatment T₆, while minimum in control (T₁). The enhanced nitrogen uptake might be due to adequate availability of nutrient with application of organic N. The pattern of nitrogen uptake obtained here is similar to that reported by Mondal *et al.* (1994). Similarly Singh *et al.* (1994) and Jana and Ghosh (1996) also reported that integrated nutrient management with organic and inorganic source of fertilizers in a rice-rice crop sequence.

Table 1. Effect of integrated nutrient management practice on total dry matter, yield and total uptake of NPK in rice

Treatment	Dry matter accumulation (kg m ⁻²)	Yield (kg ha ⁻¹)	Total N uptake (kg ha ⁻¹)	Total P uptake (kg ha ⁻¹)	Total K uptake (kg ha ⁻¹)
T ₁	0.66	184.7	36.93	8.3	68.88
T ₂	1.25	471.7	104.44	20.79	130.13
T ₃	1.31	497.3	111.57	24.3	139.17
T ₄	1.27	473.3	109.57	24.53	138.27
T ₅	1.26	469.3	110.57	25.64	139.07
T ₆	1.35	513.7	117.74	27.14	144.72
T ₇	1.30	490.5	114.99	28.06	142.86
T ₈	1.28	476.7	113.94	28.26	143.07
T ₉	1.31	496.3	110.20	23.01	141.51
T ₁₀	1.26	470.3	107.77	23.82	142.96
T ₁₁	1.24	460.5	107.71	24.11	141.12
T ₁₂	1.30	489.3	113.32	24.14	138.38
SEd±	0.025	12.9	2.91	1.48	3.69
CD (P=0.05)	0.051	26.7	6.04	3.10	7.66

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Addition of N as various organic sources viz., green manure, farmyard manure and poultry manure in combination with inorganic fertilizer increased phosphorus uptake by the crop. This might be because of enhanced available phosphorus content of soil as well as improved soil physical conditions rendering native phosphorus available. The highest P uptake was found under the treatment T₈ that received 75 % N through GLM + 25 % inorganic fertilizers and minimum in control. Sreedevi and Thangamuthu (1991) reported the organic acids produced during decomposition of organic materials in flooded soil resulted in mineralizing the insoluble phosphate in to more soluble phosphorus and this might be the reason for greater phosphorus uptake with green manuring.

On the basis of results obtained in this experiment it could be concluded that the best proportion of organic and inorganic source was found to be 25 % GLM and 75 % inorganic fertilizer and 50 % N requirement could be substituted through GLM and 25 % through FYM or PM to save expenditure on fertilizers.

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