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INTEGRATION OF ORGANIC AND INORGANIC NUTRIENT SOURCES IN TRANSPLANTED LOWLAND RICE

An efficient nutrient supply system for modern rice varieties requires a judicious mix of organic and inorganic nutrient sources for the maximum expression of their genetic yield potential. The decline of soil health due to intensive monoculture and steep hike in fertilizer prices further warrant the integration of different manurial sources for sustained rice productivity. The present study was undertaken in this context to formulate a suitable integrated nutrient management schedule for rice.

The experiment was conducted at the Regional Agricultural Research Station, Pattambi for three winter seasons from 1988-89 to 1990-91. There were six treatments with four replications and the design adopted was RBD. The treatments were : (1) Control; (2) Recommended NPK schedule (70:35:35 kg ha $^{-1}$); (3) Green leaves 10 t ha^{-1} + 50% N and 100% P and K of recommended schedule (35:35:35 kg ha $^{-1}$); (4) Green leaves 10 t ha $^{-1}$ + 25% N and 100% P and K of recommended schedule (17.5:35:35 kg ha^{-1}); (5) Farm yard manure (FYM) 10 t ha $^{-1}$ + 50% N and 100% P and K of recommended schedule (35:35:35 kg ha^{-1}) and (6) FYM 10 t ha $^{-1}$ + 25% N and 100% P and K of recommended schedule (17.5:35:35 kg ha^{-1}).

The soil was Fluentic Dystropepts and conies under sandy loam textural class. The soil contained 1.2%. organic carbon, 14.6 kg ha^{-1} of available P_2O_5 and 160 kg ha^{-1} of available K_2O.

Green leaves (0.76% N) and FYM (0.62% N) were incorporated two weeks before transplanting and were allowed to decompose well at the time of planting. The test variety was Jyothi and the spacing adopted was 15 x 10 cm. Application of fertilizers and other cultural practices were done uniformly in the recommended manner (KAU, 1986). Apart from the grain and straw yield, important biometric and yield characters were also recorded at the time of harvest and are presented in Table 1.

The treatment which received 50 per cent of the recommended N dose but supplemented by the application of 10 t ha^{-1} of green leaves recorded the highest grain yield. It was however comparable with the treatment which received 50 per cent of the recommended N dose supplemented by the application of 10 t ha^{-1} of FYM and also the treatment receiving 100 per cent of the recommended N dose (70 kg ha^{-1}) as mineral fertilizer alone. Reducing the N dose to 25 per cent but supplemented by either green leaves or FYM did not decrease the yield in comparison to the treatment receiving 100 per cent of the N dose. But it is observed that the lowering of N dose from 50 per cent to 25 per cent at the same levels of FYM application (10 t ha $^{-1}$) resulted in considerable yield reduction. But this trend in yield reduction was not noticed in the case of treatments receiving the application of green leaves at the same level. Increased grain yield even under a reduced fertilizer dosage testified the improvement in the agronomic efficiency of applied nutrients by the integration of organic and inorganic nutrient sources and it corroborates the findings of Patil *et al.* (1991). The study thus clearly brought out the possibility for bringing down the fertilizer N requirement of rice by 50 per cent provided the organic base of the soil is strengthened by the addition of 10 t ha^{-1} of green leaves or FYM.

Substituting 50 per cent fertilizer N requirement either by 10 t ha^{-1} of green leaves or FYM did not adversely affect straw yield. Reduction of mineral N dose to 25 per cent led to substantial yield decrease even when substituted by 10 t ha $^{-1}$ of FYM but not when substituted by 10 t ha $^{-1}$ of green leaves.

Integrated nutrient application resulted in favoured vegetative growth as evidenced from the data on plant height and tiller density. Reduction of mineral N supply to even 25% did not adversely affect crop growth when combined with the application of 10 t ha^{-1} of green leaves (but not with FYM).

Table 1. Effect of organic and inorganic nutrient sources on grain and straw yield and biometric and yield attributes of rice (pooled mean of three years)

Treatments	Plant height (cm)	Tiller density per m^2	Panicle density per m^2	Panicle weight (g)	Filled grains no./ panicle	Filled grains (%)	1000 grain weight (g)	Grain yield (kg ha^{-1})	Straw yield (kg ha^{-1})
Control	62.7	405	339	1.98	66.9	72.6	27.5	2298	2528
100% N	63.4	454	384	2.11	70.2	78.4	27.6	3196	3363
GL + 50% N	66.1	473	393	2.09	73.1	81.0	27.4	3443	3381
GL + 25% N	65.3	473	404	1.99	68.0	77.0	28.0	3166	3512
FYM + 50% N	65.3	435	375	2.21	76.9	80.7	27.4	3172	3124
FYM + 25% N	65.3	401	337	2.17	73.7	84.4	28.2	2926	2867
CD(0.05)	2.3	53	45	0.20	7.3	4.1	NS	326	364
CV (%)	4.2	14.5	14.4	11.2	10.3	5.2	3.6	12.8	13.9

GL=Green leaves; FYM=Farm yard manure

Yield characters developed better under a nutrient supply system involving both organic and inorganic sources. This is more pronounced in the manurial schedules involving 50 per cent N supply as chemical fertilizer and the remaining nutrient need of the crop met from the organic manure sources. Apart from the improvement in efficiency of applied mineral nutrients, organic manures ensure a steady supply of essential plant nutrients including secondary and micronutrients throughout the growth period (Nambiar and Abrol, 1989).

The influence of organic manures on balanced crop growth during the vegetative phase and efficient development of yield processes during the reproductive phase enables the modern varieties to exploit the genetic yield potential to the fullest extent.

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