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Effect of integrated nutrient management on yield and phosphorus availability of aromatic rice (*Oryza sativa* L.) in inceptisol of eastern U. P.

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ABSTRACT : Field experiment for quality rice production of scented rice variety Pusa Basmati and NDR- Lalmati was conducted on Students Instructional Farm, Narendra Deva university of Agriculture and Technology, Narendra Nagar, Faizabad during *Kharif* season of 2013 and 2014. The treatment were included inorganic and organic combinations viz., T₁: RDF NPK (100:50:50) × V₁, T₂: RDF NPK + 5 tons FYM/ha × V₁, T₃: 75 per cent RDF NPK+25 per cent N with FYM × V₁, T₄: 75 per cent RDF NPK+25 per cent N with green manure × V₁, T₅: 50 per cent RDF +25 per cent FYM- N+25 per cent GM-N × V₁, T₆: 20 tons FYM/ha × V₁, T₇: RDF NPK (100:50:50) × V₂, T₈: RDF NPK + 5 tons FYM/ha × V₂, T₉: 75 per cent RDF NPK+25 per cent N with FYM × V₂, T₁₀: 75 per cent RDF NPK+25 per cent N with green manure × V₂, T₁₁: 50 per cent RDF +25 per cent FYM- N+25 per cent GM-N × V₂, T₁₂: 20 tons FYM/ha × V₂. The treatments were replicated thrice in Factorial Randomized Block Design. The variety Pusa Basmati recorded higher grain and straw yield as compared to NDR-Lalmati in both year of investigation. Maximum grain and straw yield of aromatic rice was recorded under integrated nutrient management of 100 per cent NPK + 5 t FYM followed by treatment T₁ and T₄ in both the years of investigation.

KEY WORDS : Aromatic rice, Integrated nutrient management, Organic fertilizer, Inorganic fertilizers

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Rice (*Oryza sativa* L.) is the most important staple food crop in the World. It is the rich source of energy and contains reasonable amount of protein (6-10%), carbohydrate (70-80%), mineral (1.2-2.0 %) and vitamin (Riboflavin, Thiamine, Niacin and Vitamin E). India alone produces nearly one fourth (22%) of the total rice in the world. Globally, it rank 1st in respect of area (45.35 ha) and second (106.54 million tons) in production (Anonymous,

2014). Uttar Pradesh is second largest rice growing state after West Bengal in the country where rice is grown in 5.69 million ha area with the production and productivity of 11.80 million tones and 2060 kg ha⁻¹, respectively.

RESEARCH PROCEDURE

The field experiment was conducted on Students

Instructional Farm, Narendra Deva university of Agriculture and Technology, Narendra Nagar (Kumarganj), Faizabad during *Kharif* season of 2013 and 2014. The soil of the experimental field was alluvial, partially reclaimed sodic soil with pH 8.1, organic carbon 0.35 per cent, available N 140.36 kg/ha, available P 16.82 kg/ha, available K 250.20 kg/ha. There were six treatment combination (Table 1) replicated three times in factorial RBD. Scented rice Pusa basmati and NDR- Lalmati were grown as the test crop. The recommended 100 per cent dose *i.e.* 100 kg N, 50 kg P and 50 kg K ha⁻¹ for both crops. After taking the bundle weight of the harvested produce of each net plot, the grains were separated by manual threshing. The grains, thus, obtained were air-dried to maintain 12 per cent moisture and grain yield was recorded from each net plot. Available phosphorus was extracted by 0.5 M NaHCO₃ (pH-8.5) as per procedure of Olson's and determined by calorimetrically by molybdo-phosphoric blue colour method as described by Jackson (1973). Grain yield of each net plot was recorded in kg plot⁻¹ and finally expressed in q ha⁻¹. Straw yield was obtained by subtracting the seed yield from total biological produce from each plot.

RESEARCH ANALYSIS AND REASONING

The findings of the present study as well as relevant discussion have been presented under following heads :

Yield (q ha⁻¹) :

The data pertaining to grain and straw yield as affected by varieties and different nutrients INM have been presented in Table 1. The variety Pusa basmati registered significantly higher grain yield over NDR-Lalmati in both the years of investigation. The maximum grain and straw yield were recorded with the treatment T₂, followed by T₁ and T₄. The minimum grain and straw yield were recorded in T₆ in both the year of investigation. Interaction among varieties and different nutrient INM was found non-significant. These results corroborate with the findings of Solanki and Giri (2010).

Available phosphorus (kg ha⁻¹) :

The data pertaining to available phosphorus in soil have been presented in Table 1. As the variety is concern non-significant difference in available phosphorus has been observed in both the years of investigation. The maximum available phosphorus in soil was recorded with the treatment T₂ (19.61, 20.50), followed by T₁ (18.36,

Table 1: Effect of integrated nutrient management on grain yield, straw yield and available phosphorus in soil of aromatic rice

Treatments	Grain yield (q/ha)		Straw yield(q/ha)		Available P in soil (kg/ha)	
	2013	2014	2013	2014	2013	2014
Varieties						
Pusa Basmati	33.02	33.77	48.80	49.69	18.14	18.52
NDR-Lalmati	29.34	30.09	42.75	43.80	17.91	18.27
S.E.±	0.59	0.62	0.91	0.92	0.15	0.15
C.D. (P=0.05)	1.73	1.82	2.68	2.70	0.45	0.43
INM						
T ₁ - RDF NPK (100:50:50)	33.35	34.10	49.35	50.55	18.36	19.36
T ₂ - RDF NPK + 5 tons FYM/ha	36.21	36.96	52.92	54.12	19.61	20.50
T ₃ - 75% RDF NPK+25%N with FYM	32.21	32.96	47.53	48.23	17.96	18.40
T ₄ - 75% RDF NPK+25%N with GM	32.72	33.48	48.58	49.06	17.94	18.13
T ₅ - 50% RDF NPK+25% FYM-N+25% GM-N	28.33	29.08	41.46	42.52	17.51	18.14
T ₆ - 20 tons FYM/ha	24.25	25.00	34.80	36.00	16.76	17.05
S.E.±	1.02	1.07	1.58	1.59	0.26	0.26
C.D. (P=0.05)	2.99	3.15	4.64	4.68	0.77	0.75

19.36) and T₄ (191.84, 193.45). The minimum available phosphorus in soil was recorded in T₆ (16.76, 17.05) in both the years of investigation, respectively. Similar work related to the present topic was also conducted by Acharya and Mondal (2010); Aruna and Mohammad (2005); Gill and Walia (2013); Murali and Setty (2004); Ranjan *et al.* (2006); Sujatha *et al.* (2014). Tripathi *et al.* (2013) and Tripathi *et al.* (2005).

Conclusion :

Integrated nutrient management as well as organic manure applied treatment generally improved soil health and availability of NPK after harvest. INM treatment T₂ where 100 per cent RDF-NPK were supplemented with 5t FYM registered maximum growth, yield and nutrient (NPK Zn and Fe) content and uptake followed by T₁ (100% RDF-NPK) and T₄ (75% RDF-NPK + 25% GM-N). Whereas minimum growth, yield and nutrient uptake were recorded by T₆ (20t FYM).

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