

Effect of agronomic management practices for maximizing rice (*Oryza sativa*) production under Vertisols

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Inbalanced use of nutrient in intensive cropping system declines the productivity level of the crops. The response of applied fertilizer is also deteriorating in the system. Therefore an experiment was conducted during the rainy season (*kharif*) 1991 at Raipur, to maximize the production of rice (*Oryza sativa* L.) and sustain the soil system with different agro-management practices.

A dwarf, high-yielding, medium-duration

rice variety 'Kranti' was used as test crop. The soil was clayey (34.7% clay) with organic carbon 0.53%, and it was low in available N (234 kg/ha), medium in available P (35 kg/ha) and high in available K (176 kg/ha), with pH 7.3. Ten treatments (Table 1) consisting of different agro-management practices were laid out in randomized block design with 4 replications.

Nitrogen was applied in 3 equal splits, as

Table 1. Effect of spacing, fertility, green-manure, Zn, drainage and growth-hormone on grain yield of rice

Treatment	Panicles/ m ²	Panicle weight (g)	Grain yield (tonnes/ ha)	Increase (%)	Soil-available N over initial at harvest (kg/ha)
T ₁ , S ₂₀ + N ₁₂₀ P ₈₀ K ₃₃ (I)	314	2.90	5.26		+3
T ₂ , S ₁₅ + N ₁₂₀ P ₈₀ K ₃₃ (I)	324	3.15	5.67	7.79	-1
T ₃ , S ₂₀ + N ₁₆₀ P ₁₀₇ K ₇₁ (I)	337	3.27	6.24	18.63	+3
T ₄ , S ₁₅ + N ₁₆₀ P ₁₀₇ K ₇₁ (I)	349	3.28	6.45	22.62	+7
T ₅ , S ₂₀ + N ₁₂₀ P ₈₀ K ₃₃ (I + GM)	329	2.98	5.69	8.17	+22
T ₆ , S ₂₀ + N ₁₂₀ P ₈₀ K ₃₃ (I) + Zn ₅	316	3.25	5.39	2.47	+24
T ₇ , S ₁₅ + N ₁₆₀ P ₁₀₇ K ₇₁ (I + GM) + Zn ₅	353	3.52	6.61	25.66	+22
T ₈ , S ₁₅ + N ₁₆₀ P ₁₀₇ K ₇₁ (I + GM) + Zn ₅ + D	351	3.38	6.49	23.38	+24
T ₉ , S ₁₅ + N ₁₆₀ P ₁₀₇ K ₇₁ (I + GM) + Zn ₅ + CK	341	3.26	6.28	19.39	+23
T ₁₀ , S ₁₅ + N ₁₆₀ P ₁₀₇ K ₇₁ (I + GM) + Zn ₅ + Tria	342	3.51	6.49	23.38	+22
CD (P = 0.05)	5	0.20	0.23		

S₂₀, 20 cm × 10 cm; S₁₅, 15 cm × 10 cm; N₁₂₀ P₈₀ K₃₃, 120, 80 and 53 kg N, P and K/ha; N₁₆₀ P₁₀₇ K₇₁, 160, 107 and 71 kg N, P and K/ha

I, Inorganic source; I + GM, inorganic + green-manure (10 tonnes/ha); Zn₅, 5 kg Zn/ha; D, drainage for 2 days at 45 days after transplanting; CK, cytokinin applied through Anand Vishal @ 500 ml/ha; Tria, tricontanol applied through Anand Kiran @ 500 ml/ha.

basal, at tillering and panicle-initiation stages, except where green-manure was added. N, P and K @ 48, 6 and 22 kg/ha was added through green-manure (sunhemp) and under green-manure-added treatments two-thirds N was incorporated in soil at final field preparation (including the quantity of N added through green-manure). The remaining one-third N was applied at panicle-initiation stage. Whole amounts of P and K were applied basal (including the quantity of P and K added through green-manure). Zinc was broadcast basal through zinc sulphate @ 25 kg/ha. The application of cytokinin was made through Anand Vishal (0.012% cytokinin) and triacontanol was sprayed through Anand Kiran containing 1 g m/litre acid alcohol and palmirate. These chemicals were sprayed at 25 days after transplanting @ 500 ml/ha using 500 litres of water.

The one-third increase in plant population by planting the crop at 15 cm × 10 cm (closer spacing) gave significantly higher grain yield of rice (7.79%) than that of planting at

20 cm × 10 cm (wider spacing). The effect of increased fertilizer level by one-third (N, P and K @ 160, 107 and 71 kg/ha respectively) than the normal (N, P and K @ 120, 80 and 53 kg/ha respectively) was more pronounced and increased the grain yield substantially by 18.63 and 22.62% with wider (T_3) and closer (T_4) spacings respectively (Table 1). The crop planted at closer spacing, fertilized with N, P and K @ 160, 107 and 71 kg/ha (inorganic source + green-manure) and Zn @ 5 kg/ha gave the maximum grain yield (6.61 tonnes/ha) of rice, which was on a par with T_4 , T_8 and T_{10} treatments. The management practices like drainage or application of triacontanol imposed along with T_7 showed no additional influence on grain yield of rice compared with T_7 treatment. The combined use of organic and inorganic sources of fertilizer was more beneficial to restore the available N status of the soil. The application of only inorganic fertilizer had either less positive effect on initial soil N status or it showed the negative trend.

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Evaluation of coated-urea fertilizer for nitrogen efficiency in rainfed lowland rice (*Oryza sativa*)

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A field trial was conducted during the wet season 1990 in randomized block design with 3 replications at Pusa under rainfed lowland conditions, to study the relative