

Effect of organic manures and inorganic fertilizer levels on the production of transplanted rice (*Oryza sativa* L.)

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SUMMARY

A field experiment was conducted during the rainy season of 2005 and 2006 at Kanpur, Uttar Pradesh, to study the effect of organic manures and inorganic fertility levels on the productivity of rice (*Oryza sativa* L.) crop. Green manuring of *dhaincha* gave significantly higher grain yield (53.45 and 41.30 q/ha), followed by FYM (46.44 and 36.49 q/ha) in 2005 and 2006, respectively over no organic manure (35.11 and 33.37 q/ha). Highest fertility level of $N_{180} P_{90} K_{90}$ recorded significantly maximum grain yield (56.48 and 49.60 q/ha). The interaction between organics and inorganics was found significant during both years where combined application of green manure + $N_{180} P_{90} K_{90}$ produced significantly higher grain yield (73.14 and 59.60 q/ha) than all other combinations during two years of study. Significantly higher NPK contents in grain and straw were recorded with green manure application followed by with FYM, while due to inorganic fertility levels it was unaffected. Total nutrient uptake (NPK kg/ha) was significantly influenced with green manure, FYM and higher fertility levels during both years.

Key words : Rice, Organic manures, Inorganic fertilizers, Yield, Nutrient content, Nutrient uptake.

Nutrient management is one of the major factors to attain higher sustainable production of rice, particularly in North India where rice is generally grown in sequence with wheat or other cereal crop. Modgal *et al.* (1995) are of the view that sustainability in rice production can be assured through integrated use of organics and inorganics. This study was, therefore, undertaken to determine the effect of organic manures with different levels of inorganic fertilizers on rice crop productivity in central part of Uttar Pradesh at Kanpur.

MATERIALS AND METHODS

A field experiment was conducted during rainy seasons of 2005 and 2006 at Oilseeds Research Farm, C.S. Azad University of Agriculture and Technology, Kanpur. The soil was sandy loam, low in organic carbon (0.42%), medium in available P (16.35 kg/ha) and available K (154.6 kg/ha) with soil pH of 7.6. Treatments consisted 3 organic manures, *viz.*, no organic, *dhaincha* green manuring *in situ* and FYM @ 10 tonnes/ha and 4 levels of inorganic fertilizers, *viz.*, no fertilizer, $N_{60} P_{30} K_{30}$, $N_{120} P_{60} K_{60}$ and $N_{180} P_{90} K_{90}$. All the 12 treatment combinations were tried in randomized block design with 3 replications. Sources of N, P, K used were urea, single super phosphate and muriate of potash, respectively. Half of N, whole of P and K were applied at the time of puddling. Rest half N was applied in 2 equal splits, each at tillering and panicle initiation stages. Rice variety NDR-359 was used for experimental purpose and transplanted at 20 x 10 cm distance using 2 seedlings/hill in 3rd week

of July. During the initial stage of seedlings establishment, a thin layer of water was maintained in the experimental field and thereafter, the water was raised to 5-7 cm up to dough stage of the crop. Weeds were removed at 20 and 40 days after transplanting. Nitrogen, phosphorus and potassium contents in grain and straw samples were determined by micro-kjeldahl, Vanadomolybdate yellow colour and flame photometer methods, respectively (Jackson, 1973). Total N, P, K uptake in crop produce were estimated by multiplying grain and straw yields with per cent content of NPK in respective treatments. The crop received 324.6 and 162.2 mm rains in whole life cycle during the years 2005 and 2006, respectively.

RESULTS AND DISCUSSION

Green manure of *dhaincha* recorded significantly higher number of panicles/m² than other manurial treatments (Table 1). Treatment of FYM also resulted significantly higher number of panicles than no organic manure during first year only. Likewise, the 100 per cent fertility level ($N_{120} P_{60} K_{60}$) recorded significantly higher number of panicles/m² over the lower levels but further increase in fertility could not increase the panicles/m² significantly. Improved tillering and great survival of tillers under these treatments might be due to continuous but controlled supply of nutrients throughout the crop growth period (Dwivedi and Thakur, 2000). Grain weight/panicle was significantly higher due to green manure and FYM over control. Increasing fertility levels increased grain weight/panicle up to $N_{180} P_{90} K_{90}$ but it was significant

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