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**Effectiveness of integrated nutrient management in  
transplanted rice (*Oryza sativa*) for sustainable  
agriculture**

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**Abstract**

Chemical fertilizers became popular throughout the World. They were associated with instantaneous increased in the crop yield, thereby increasing the profit to the farmers. But in recent years notable environmental damage is observed because of their continuous field application and overuse. Water and soil pollution, loss of micro-organisms and beneficial insects and overall reduction in soil fertility are some of the ill effects of chemical fertilizers. Durg District of the Chhattisgarh is a major rice growing District situated in agro climatic zone of Chhattisgarh plains. Average rainfall of the Durg district is 1200-1300 mm. The experiment was conducted at Village-Batang, Durg district of the Chhattisgarh. It was concluded that application of Integrated Nutrient Management in Transplanted rice produce 26 tillers per plant and 44.5q/ha yield as compared to farmer's field, which produced 24 tillers/plant, produced 43.5q/ha positively it was almost similar. Hence it could be recommended that Integrated Nutrient Management being essential component and play vital role in maintaining long term soil fertility and sustainability and also reducing overuse of chemical fertilizers.

**Keywords:** INM, FYM, Bio-fertilizer, Sustainability

**Introduction**

The district Durg situated in agro climatic zone of Chhattisgarh plains. Integrated Nutrient Management applied in the agricultural field as a replacement to our conventional fertilizers. Conventional fertilizers contain compost, household wastes and green manure. Those are not as effective as chemical fertilizers. So, farmers often try to use chemical fertilizers in the field for crop development. But obviously the chemical fertilizers are not environment friendly. They are responsible for water, air and soil pollution. Agriculture is counted as the chief economic occupation of the state. In Chhattisgarh, according to government estimate, net sown area of the state is 4.828 million hectares and the gross sown area is 5.788 million hectares. About 80% population of the state is rural and the main livelihood of the village is agriculture and agriculture based small industries

Under INM organic manure have the capacity to fulfill nutrient demands of the crops adequately and promotes the activity of macro and micro flora in the soil (Sharma 2005). To get more and more yield, farmers tend to use excess and heavy doses of fertilizers but on other hand they are neglecting the soil health deterioration and cost of cultivation due to lack of knowledge about fertilizer application and soil reactions. Hence a study was proposed to reduce dose of chemical fertilizer and increasing fertility status of soil.

**Material and Methods**

The investigation was conducted at five farmers field to assess the integrated nutrient management in transplanted rice during *kharif* season 2017 to study the effectiveness of integrated nutrient management in transplanted rice at Village Batang District-Durg Chhattisgarh India, Same experiment was conducted also at Dist-Dhamtari of Chhattisgarh in earlier 2014-15 and 15-16. The treatment were T<sub>1</sub>(FP) control, without use of organic manure or biofertilizer and imbalance use of fertilizer, T<sub>2</sub>(Recommended Practice) application of 75%

N:P:K(GRD) + 25% FYM (5t/ha). The soil was light texture *Inceptisol* in this experiments, five treatment are their replicated with a plot size 0.4 ha. each. FYM were incorporated in the soil 15 days prior to transplanting. The seed were treated with Azotobacter and Phosphorus Solubilizing Bacteria each 5g/kg seed. T<sub>1</sub> (FP) includes imbalance fertilizer application without seed treatment. After transplanting water are maintained a depth of 2cm up to one week before harvest. The field was drained one week before harvest. The experiment were received uniform plant protection and cultural management practiced through the period of crop growth in all replication. Intercultural operations were done whenever necessary. At maturity the crop was harvested, grain and straw yields were recorded at 14% moisture content.

**Table 1:** Analysis of Integrated Nutrient Management in Yield of Rice (Average data of five farmers)

Treatments	Yield (q/ha)	% Change in Yield	% Change in Parameter (No. of grain/panicle)	% Change in parameter
T <sub>1</sub> (control)	43.5	2.2	108	3.7
T <sub>2</sub> 75% N:P:K(GRD) + 25% FYM (5t/ha)	44.5		112	

GRD-General Recommended Dose, FYM-Farm Yard Manure

**Table 2:** Analysis of Integrated Nutrient Management in Growth and Grain parameters of Rice (Average data of five farmers)

Treatments	No. of tillers /Plant	% Change in No. of tillers	Test weight (g)	% Change in Test weight
T <sub>1</sub>	18.6	6.4	20.96	2.7
T <sub>2</sub>	19.8		21.54	

### Economics

Economic analysis was done to understand relative profitability of different organic inputs by analyzing cost of production, gross return net return and B/C ratio table -3 among the both treatments highest cost of cultivation

(Rs.31187.00) recorded in (T<sub>1</sub>) control at Farmer practice. The lowest cost of cultivation recorded with as T<sub>2</sub> plot (Rs.30312.50). The cost of cultivation varied among the treatments.

**Table 3:** Effect of Integrated Nutrient Management on economics of Rice (Average of five farmers)

Treatments	Cost of cultivation(Rs./ha)	Gross return(Rs./ha)	Net return(Rs./ha)	B/C Ratio
T <sub>1</sub>	31187.00	67860.00	36672.30	2.1
T <sub>2</sub>	30312.50	69420.00	39107.50	2.2

B/C ratio = Benefit/ production Cost

### Conclusion

Integrated use of fertilizer and manure can be an efficient practice for higher crop yields without degradation of soil fertility, Overall, in this experiment is playing one of the important role in motivation the farmers for adoption of integrated nutrient management techniques. The results obtained from this study indicate that application of organic manure along with chemical fertilizers increased growth and yield of rice as well as reducing the cost of cultivation and enhancing the soil fertility, compared to application of imbalanced and chemical fertilizers alone. The technology suitable for enhancing the productivity of rice and sustainability of soil, work done under the On Farm Trail (OFT) technology programme by KVKs.

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### Result and Discussion

Integrated Nutrient Management influenced significantly the root parameters and nutrient uptake, tillers production yield attributes and yields between the treatments. The data collected from field were analyzed and the result of the study in respect of table (1) the percent increase in yield, table (2) percent increase in growth and test weight and table(3) benefit cost ratio are summarized below. Result shows that T<sub>2</sub> is having higher yield as compared to T<sub>1</sub>, there is non significant relationship between two variables. Production was almost same but the cost of cultivation was different by using integrated nutrient management techniques. Almost similar result have been reported earlier in 2014-16 at Dhamtari District. This also save the fertilizer as well as soil fertility status could be maintained due to judicious use of fertilizers.

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