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## Evaluation of improved integrated nutrient management technologies in rice under rainfed condition on farmer's field

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### Abstract

Field experiment was conducted at farmer's field belonging to Patan and Panagar block of Jabalpur district, MP during 2014 and 2015 under rainfed condition. Results reveal that height (70.8 cm.) and tillers/hill (9.5 /hill) significantly increased (61.5 cm.) and (8.3/hill) over farmers practice. The effective tillers and grains/panicle also increased under improved integrated nutrient management practice. The grain and straw yields of 468 and 910 kg/ha were recorded under improved practice over (340 and 764 kg/ ha) recorded under farmers practice, respectively. The treatment of improved practice fetched an additional income of Rs. 29350/ha with B: C ratio of 1.85.

**Keywords:** Management technologies, integrated nutrient, farmer's field

### Introduction

Rice-Wheat cropping system in India has attended great significance in terms of area, production and productivity. Both crops of system are exhaustive with respect to fertility resulted in decline of soil health. The excessive application of chemical fertilizers and pesticides are also causing environmental hazards. It is therefore, need to develop a technology which maximize productivity minimize input cost and environmental pollution. In this context, integration of chemical fertilizers and vermin compost with microbial inoculation assume greater significance. The integrated system would be within the approach of farmers. Keeping the above points in view, present study was under taken to evaluate the integrated nutrient management practices under rainfed condition on the farmers' fields.

### Materials and Methods

On farm trials were conducted at ten farmers' fields during Kharif seasons in Jabalpur district covering two blocks namely Patan and Panagar under rainfed condition. Soil samples of each farmers fields were collected before start of study and analyzed. The analysis of soil had pH, 7.1- 7.4, organic carbon 0.48 – 0.53% available phosphorus 9.2 13.5 kg ha<sup>-1</sup> and 280-310 kg/ha potassium. Trials were laid out in a randomized block design considering each farmers as replication. Treatments comprised of two nutrient management technologies (Integrated nutrient management technique and existing farmers Practice). Improved integrated nutrient management practice consisted of fertilizers 80:40:30 kg NPK ha<sup>-1</sup> BGA @ 12 Kg ha<sup>-1</sup>. PSB 10 Kg ha<sup>-1</sup> as soil application along with vermicompost @ 100 kg ha<sup>-1</sup> and 5 kg/ha<sup>-1</sup> BGA was incorporated in the field 7 days after transplanting whereas PSB was mixed with vermicompost 15 days before application and incorporate in the field just before transplanting. The nitrogen @ 40 kg ha<sup>-1</sup> and full dose of phosphorus potassium and zink were applied as basal and remaining dose of nitrogen was top dressed in standing crop in to equal splits at an interval of 30 days. The 14 days old seedlings of variety Pusa suganda 5 were used for transplanting under SRI system. On the other hand, under farmers practice, 2 bags of DAP was used as basal dose and 2 bag (100 kg/ha) of Urea was top dressed in standing crop in two equal splits. Crop was transplanted with the traditional transplanting system (one month old seedling planted 2-3 seedlings per hill). Data pertaining to yield attributes and yield were recorded and nutrients use efficiency as well as economics were compiled.

## Results and Discussion

### Effect of Improved integrated nutrient management on growth and yield

Integrated nutrient management practices (NPK + BGA+ PSB with vermicompost + Zn) increased the plant height number of tillers/hill significantly. The increase being 15.1 and 14.5 percent over traditional practice followed by farmers, respectively (Pooled data of two years).

The effective tillers/hill grains/ panicle as well as in the weight were also increased in improved Integrated nutrient management practice. The increase in these yield attributes of rice crop was significantly superior over farmers practice. Similar synergism of integrated nutrients in rice was reported

by Vyas et al (1990) [5]. The increase in tillers/ hill were 116.6 percent whereas grains per panicle and test weight were increased 14.39 and 2.49 percent over farmers practice. As a result increase in grain and straw yields (37.6 and 22.5%) owing to integrated nutrient management were also significant in pooled data as compared to farmers practice. Since the effective tillers per hill, grains/panicle as well as test weight were higher with integrated nutrient management and found significant which confirmed its superiority over farmers practice of nutrient management. Results of present study are in confirmation with those of Sujatha *et. al* (2008) who reported the importance of nutrient integration in maize crop.

**Table 1:** Mean growth, yield attributes, and yield of rice (Data pooled over 2015 and 2016)

Treatment	Parameters			
	Plant height (cm.)	SEm±	CD (P=0.05)	% increase over farmers practice
Integrated Nutrient Management Practice	70.8	2.40	7.2	15.1
Farmers practice	61.5			
<b>Number of tillers/hill</b>				
Integrated Nutrient Management Practice	9.5	0.33	1.01	14.5
Farmers practice	8.3			
<b>Effective tillers/hill</b>				
Integrated Nutrient Management Practice	18.2	1.06	5.3	
Farmers practice	8.4			
<b>Number of grains/panicle</b>				
Integrated Nutrient Management Practice	62.8	2.1	6.4	14.4
Farmers practice	54.9			
<b>Test weight (g.)</b>				
Integrated Nutrient Management Practice	24.31	0.11	0.34	
Farmers practice	23.72			
<b>Rice grains yield (kg/ ha.)</b>				
Integrated Nutrient Management Practice	468	20.3	61.2	37.6
Farmers practice	340			
<b>Straw yield of (kg ha.)</b>				
Integrated Nutrient Management Practice	910	34.5	104.5	
Farmers practice	764			
<b>Harvest Index (%)</b>				
Integrated Nutrient Management Practice	33.33	0.55	1.69	
Farmers practice	30.79			

**Table 2:** Cost cultivation, GMR, NMR and B:C ratio as affected by integrated nutrient management practices

Treatment	Cost of cultivation (Rs/ ha)	Gross returns (Rs/ ha)	Net returns (Rs./ ha)	B:C ratio
Integrated nutrient management practices	45650	140400	84750	1.85
Farmers practice	43600	102000	55400	1.27
<b>Input cost (Rs/ ha)</b>				
Integrated nutrient management practices	6650			
Farmers practice	4600			
<b>Additional cost (Rs/ ha)</b>				
Integrated nutrition management practice	2050			
<b>Additional income (Rs/ ha)</b>				
Integrated nutrition management practice	29350			

### Economics

The cost of cultivation under integrated nutrient management was higher (Rs. 45650/ha) as compared to (Rs. 463600/ha) farmers practice (Table 2) Hence, integrated nutrient management practice required Rs. 2050/ha an addition input cost. As regards to the gross returns was is also higher under integrated nutrient management (Rs. 140400/ha) over (Rs. 102000/ha) farmers practice. The integrated nutrient management practice fetched net monetary returns of Rs. 84750/ha with BC ratio of 1.85. Thus, improved practice gave an additional income of Rs. 29350/ha.

### Conclusion

On the basis of two years study it is concluded that the improved practice of nutrient management consisted of fertilizers 80:40:30 kg NPK ha-1, BGA @ 12 Kg ha-1. PSB 10 Kg ha-1 as soil application along with vermicompost @ 100 kg ha-1 and Zn @ 5 kg/ha-1 not only increased the yields (grain and straw both) but also fetched an additional income of Rs. 29350/ha with benefit cost ratio of 1.85 over farmers practice.

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