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Response of rice varieties to integrated nutrient management practices on growth, yield attributes and yields of rice under system of rice intensification

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Abstract
A field experiment was conducted during *kharif* 2010 at Directorate of Rice Research Farm, Rajendranagar Hyderabad. Three varieties (Vasumathi, Tulasi, and RP-BIO-226) and six nutrient management practices (Control, 100% vermicompost, 75% vermicopost+ 25% RDF, 50% vermicopost+ 50% RDF, 25% vermicompost+75% RDF and 100% RDF) were evaluated in split plot design with three replications.
Variety RP-BIO-226 performed better in terms of growth and yield components resulting in significantly higher grain yield (4536 kg/ha) over Tulasi (4138 kg/ha) and Vasumathi (3248 kg/ha). Nutrient uptake was also significantly greater with RP-BIO-226 than Tulasi and Vasumathi. Among the different nutrient management practices treatment 50% organic manure (Vermicompost) + 50% Rdf recorded significantly higher grain yield (5010 kg/ ha) over the all the treatments.

Keywords: varieties, growth, nutrient management practices, yield, yield attributes

Introduction
India is primarily an agrarian country. Contribution of agriculture to nation's GDP came down to 18% over the years for various reasons. Still 60% of people depend on agriculture for their livelihood. Rice is the stable and number one staple food crop occupying 42% of acreage and contributing 44% (Menon, 2002) of cereal food grain production in India. In India rice is grown over an area of 44 m ha with a total production being 99 MT and productivity of 2214 kg/ha (CMIE, 2009) [3]. In Andhra Pradesh, the area under rice is 4 m ha with 14 MT of production and the productivity being 3248 kg/ha. The projected target of 100 million tonnes by 2010 (Mishra, 2004) may not be a daunting task unless productivity is enhanced to strengthen the food security act of India.
One of the approaches to increase per hectare yield is by selecting suitable varieties combining them with good crop husbandry practices especially nutrient management. System of rice intensification (SRI) is a system approach to enhance rice productivity with less external inputs which gained momentum in India in recent past. Integrated nutrient management is one of the ways for sustainable rice production in India. Fertilizer application is the major input through which the productivity can be increased by exploiting the varietal potential, since the cost of inputs of major nutrients through chemical fertilizers is increasing and the inherent fertility of soil has to be increased to make the soil more sustainable, the use of organic manure in manorial schedules is suggested. Hence, integrated nutrient management is more emphasized, not only to boost the production but also to preserve the ecosystem.

Materials and Methods
A field experiment was conducted at directorate of rice research farm, Rajendranagar, Hyderabad during the Kharif season of 2010. The soil of the experimental site was vertsols in texture with low nitrogen, high phosphorous and potassium with alkaline reaction. The experiment was laid out in a split plot design replicated thrice with three varieties and 6 nutrient management practices

Sub- plot treatments: 6
- Control (No fertilizer)
- 100% organic manure (Vermicompost)
- 25% RDF through inorganic fertilizer+75% organic manure (Vermicompost)
- 50% RDF through inorganic fertilizer+50% organic manure (Vermicompost)

- 75% RDF through inorganic fertilizer+25% organic manure (Vermicompost)
- 100% RDF through inorganic fertilizer

RDF = Recommended dose of fertilizer (100:60:40) kg/ha NP and Transplanted by adopting 25 x 25 cm spacing vermicompost 5t/ ha (100% organic) used as organic manure was applied as per the treatments after field layout and incorporate urea, ssp, murate of potash used as chemical fertilizers.

Results and Discussion

When varieties were compared Vasumathi recorded (86 cm) highest plant height over RP-BIO-226 (78 cm) As whole in all the three varieties, the growth parameters (plant height, dry matter production) progressively increased from transplanting to harvest.

Maximum number of tillers (m^{-2}) were recorded at maximum tillering stage with RP-BIO-226 (305) and Vasumathi (221). The increase in tiller number was 38% and 24% by RP-BIO-226 over the varieties Vasumathi and Tulasi respectively. At tillering stage 19% more dry matter production recorded by RP-BIO-226, over Vasumathi. Similarly at panicle initiation stage and at harvest RP-BIO-226 recorded 22 and 40% higher dry matter production over variety Vasumathi. Likewise variety RP-BIO-226 recorded 28% and 51% higher panicles over variety Vasumathi and Tulasi respectively. These findings are in line with those of Avilkumar *et al*. (2006) [1].

Higher dry matter production observed with RP-BIO-226 resulted in higher N, P K uptake compared to that of Vasumathi. This shows that RP-BIO-226 more efficient in extracting nutrients from soil. Furthermore, RP-BIO-226 accumulated greater amount of nutrients in grain compared to Vasumathi and Tulasi owing to higher grain yield over other varieties.

Similarly filled grains per panicle were 7 and 24.6% higher with RP-BIO-226 over Tulasi and Vasumathi. The grain yield with RP-BIO-226 was 9.6 and 39.6 % higher over Tulasi and Vasumathi varieties.

Panicles m^{-2}, number of filled grains $panicle^{-1}$ are the yield Components in rice which influence yield potential to a significant level. Since these yield components Panicles m^{-2} and number of filled grains $panicle^{-1}$ were RP-BIO-226. This had positively significant effect in obtaining higher grain yield. Similarly RP-BIO-226 recorded 27% and 40% higher straw yields over variety Tulasi and Vasumathi.

Increased dose of inorganic fertilizers (100% RDF) application resulted in 24% more height (90.6 cm) over control (70.6 cm). Similarly 58% more tillers were recorded by the treatment 50% vermicompost + 50% RDF over control. Application of 50% vermicompost with 50% RDF besides ensuring adequate nutrient supply might have energized soil microbial activity resulting in production of some growth promoting substances, which in turn could have helped in maintaining more tiller number and better growth parameter.

Inclusion of organic sources decreased soil density and slowed down the release of chemical N and its conversion to nitrates, thus reducing the leaching losses of nitrogen, better availability and uptake of nutrients which ultimately enhanced the total tiller number. These results are in conformation with those of Dobberman (2003) [4], Bharathy (2005) [2], who also reported beneficial effect of integrated use of inorganic (50% RDF) and organic (vermicompost) source on dry matter production at all growth stages of crop over the rest of the treatments. The treatment 50% RDF + 50% vermicompost enhanced the dry matter production by 36.7 and 71% at tillering stage and at harvest compared to control treatment. This enhancement of dry matter production of treatment was a mere of 8% compared to 100% RDF. In the present study nutrient management practices had pronounced positive influence on yield attributes like panicles m^{-2} and filled grains $panicle^{-1}$. Significantly higher number of panicles (236) and filled grains $panicle^{-1}$ (203) was observed with treatment 50% RDF + 50% vermicompost compared to other integrated nutrient management practices which was followed by 100% vermicompost, 25% vermicompost+ 75% RDF

Table 1: Plant height (cm) at different stages as influenced by varieties and INM practices in rice

Treatment	Tillering stage	Panicle initiation stage	Harvest
Main-plots (varieties -V)			
Vasumathi	56.0	77.2	86.0
Tulasi	51.2	72.0	78
RP-BIO-226	51.3	71.0	77.6
SEm ±	1.0	0.8	1.5
CD(P=0.05)	2.6	2.4	4.0
Sub-plots (INM practices-N)			
Control	38.1	65.2	72.6
100% vermicompost	50.0	66.7	75.0
50% vermicompost + 50% RDF	52.5	69.7	78.3
75% vermicompost + 25 % RDF	54.5	74.8	82.0
25% vermicompost + 75% RDF	57.4	75.5	85.5
100% RDF	64.6	77.5	90.6
SE m ±	1.1	1.0	1.3
CD (P = 0.05)	3.2	3.0	3.0
Interaction	N.S.		
V x N		N.S.	N.S.

Table 2: Number of tillers / m^2 at maximum tillering stage as influenced by varieties and INM practices in rice

Nutrient management practices	Varieties			
	Vasumathi	Tulasi	RP-Bio 226	Mean
Control	178	202	206	195
100% vermicompost	197	225	208	210
75% vermicompost + 25% RDF	224	242	316	261

50% vermicompost +5 0%RDF	253	295	382.	310
25% vermicompost + 75% RDF	233	250	354	279
100% RDF	242	263	366	290
Mean	221	246	305	

.	SE m±	CD (P=0.05)
Varieties (V)	6	18
Nutrient management practices (N)	6	18
N at same level V	11	33
V at same level N	11	33

Table 3: Number of panicles /m^2 as influenced by varieties and INM practices in rice

Nutrient management practices	Varieties			
	Vasumathi	Tulasi	RP-BIO-226	Mean
Control	163	170	212	182
100% vermicompost	166	192	245	200
75% vermicompost + 25% RDF	168	205	267	213
50% vermicompost +5 0%RDF	186	233	289	236
25% vermicompost + 75% RDF	173	212	277	221
100% RDF	183	214	283	227
Mean	173	204	262	

	SE m±	CD (P=0.05)
Varieties (V)	4	10
Nutrient management practices (N)	4	10
N at same level V	6	18
V at same level N	6	18

Table 4: Grain yield (kg/ha) as influenced by varieties and INM practices in rice

Nutrient management practices	Varieties			
	Vasumathi	Tulasi	RP-BIO-226	Mean
Control	2748	2920	3100	2922
100% vermicompost	2850	3200	3400	3150
75% vermicompost + 25% RDF	3130	3940	4500	3856
50% vermicompost +50%RDF	3800	5430	5800	5010
25% vermicompost + 75% RDF	3420	4360	5120	4300
100% RDF	3540	4980	5300	4606
Mean	3248	4138	4536	

	SE. m±	CD(P=0.05)
Varieties (V)	124	484
Nutrient management practices (N)	133	384
N at same level V	303	726
V at same level N	244	770

Higher growth parameters (plant height, dry matter production and tillers) and higher yield components (panicles m^{-2} and higher filled grains $panicle^{-1}$) ultimately resulted in highest grain yield and straw yield with the conjunctive use of 50% organic (vermicompost) + 50% RDF, which was followed by treatment 100% RDF and 25% vermicompost+ 75% RDF.

References

1. Avil Kumar K, Sreedhar Chauhan, Murthy KMD, Ramakrishna Goud E, Uma Reddy R. Performance of System of Rice Intensification (SRI) in Northern Telangana Zone of Andhra Pradesh. In: National Symposium on System of Rice Intensification (SRI) – Present Status and Future Prospects. 2006; 18:1.
2. Bharathy VE. Effect of FYM and rotary weeding on crop yield in the System of Rice Intensification. M.Sc. (Ag.) Thesis submitted to Acharya N.G. Ranga Agricultural University, Hyde, 2005.
3. CMIE. Centre for monitoring Indian Economy. Apple Heritage, Mumbai. 2009.
4. Dobermann A. A critical assessment of the System of Rice Intensification (SRI). Agricultural Systems. 2003; 79:261-281.
5. Yan Qingquan. The System of Rice Intensification and its use with hybrid rice varieties in China, In: Assessments of the System of Rice Intensification (SRI): Proceedings of an International conference held in Sanya, China, 2002; 4:109-111.