

EFFECT OF METHOD OF PLANTING AND NUTRIENT MANAGEMENT ON YIELD OF SHORT GRAIN AROMATIC RICE (*ORYZA SATIVA* L.)

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Abstract: The field experiment on “Effect of method of planting and nutrient management on yield of short grain aromatic rice (*Oryza sativa* L.)” was conducted during *kharif* seasons of 2017 at the Research Farm, IGKV, RMD College of Agriculture & Research Station Ambikapur, Surguja (Chhattisgarh). Treatments comprised of two method of planting viz., SRI and normal transplanting as main plot treatments, two nutrient management practices viz. RDF- 100% inorganic, RDF-150% through 50% inorganic + 50% organic as sub-plot and 5 varieties in sub-sub plot during *kharif* seasons in split-split plot design with three replications. The scented rice yields are stagnating or declining in post green revolution era mainly due to imbalance in fertilizer, soil degradation, type of cropping system practiced, lack of suitable rice genotypes and other agro-techniques. Partial substitution of chemical fertilizer with organic sources of nutrients is useful in different rice-based cropping systems. The use of excessive chemical fertilizer & pesticide are causing environmental hazard. It is therefore necessary to develop a suitable production system in this context proper selection of varieties, optimum density (spacing) per unit area and appropriate nutrient management are important for achieving higher yields. The Planting method in SRI practices the number of tiller was significantly higher than normal planting and non- significantly higher with plant height, length of panicle and 1000-grain weight, grain yield and biological yield. SRI planting method recorded higher net return and B: C ratio (Rs. 57869 ha⁻¹ and 1.54) lowest in normal planting (Rs. 53349 ha⁻¹ and 1.35). In case of nutrient management practices the application of 150% NPK of RDF (50% inorganic + 50% organic) the plant height and no. of grain per panicle were significantly higher than 100% NPK of RDF (100% inorganic) and non- significantly higher with total no. of tiller, effective tiller, length of panicle and 1000-grain weight, grain yield and biological yield. 100% NPK of RDF recorded higher net return and B: C ratio (Rs. 57201 ha⁻¹ and 1.55) than 150% NPK of RDF (Rs. 54018 ha⁻¹ and 1.35). The five varieties, Badshahbhog selection-1, Vishnubhog selection-1, Dubraj selection-1, Tarun bhog selection-1 and CG Sugandhit bhog selection-1 exhibited differences in growth, yield attribution and finally grain & economics. Rice variety vishnubhog selection-1 had significantly tallest plants while CG. sugandhit selection-1 had the shortest plants. The number of total tillers per m² and effective tillers per plant in CG.sugandhit selection-1 were significantly higher and at par with badshahbhog selection-1 and vishnubhog selection-1 but 1000-grain weight, panicle length were significantly higher under vishnubhog selection-1. In case of number of grains per panicle was higher under CG.sugandhit selection-1 over other varieties. Rice variety CG sugandhit bhog selection-1 recorded significantly higher grain (42.74 q ha⁻¹) and biological yield (123.04q ha⁻¹) over dubraj selection-1 (grain 32.42 ha⁻¹) and biological yield 100.07 ha⁻¹) but at par with vishnubhog selection-1(42.47 q ha⁻¹ and 124.73 q ha⁻¹), tarun bhog selection-1(37.91 q ha⁻¹ and 122.13 q ha⁻¹) and badshahbhog selection-1(37.0 q ha⁻¹ and 109.0 q ha⁻¹). CG sugandhit bhog selection-1 recorded higher net return and B:C ratio (Rs. 65323 ha⁻¹ and 1.71) lowest in dubraj selection-1 (Rs. 40947 ha⁻¹ and 1.41).

Keywords: Nutrient management, Aromatic rice, Grain

INTRODUCTION

Rice is the most consumed cereal grain in the world, especially for India. In Asian countries, rice is the main major staple crop covering about ninety per cent of rice grown in the world, with two countries, China and India, growing more than half of the total crop. The major portion of this rice area is devoted to the coarse and medium slender rice varieties. Chhattisgarh is very well known for its traditional short gain aromatic rice. However, very less area has been given to the production of fine and scented rice. Rice quality is considered from the viewpoint of milling quality, grain size, shape, appearance and cooking characteristics. Consumer judges the quality of rice mostly on its appearance, particularly the colour, size and shape and on its

elongation during cooking. On the other hand, millers and traders prefer a variety capable of giving high head rice recovery (Sharma, 2002).

The scented rice yields are stagnating or declining in post green revolution era mainly due to imbalance in fertilizer, soil degradation, type of cropping system practiced, lack of suitable rice genotypes and other agro-techniques. Partial substitution of chemical fertilizer with organic sources of nutrients is useful in different rice-based cropping systems. The use of excessive chemical fertilizer & pesticide are causing environmental hazard. It is therefore necessary to develop a suitable production system in this context proper selection of varieties, optimum density (spacing) per unit area and appropriate nutrient management are important for achieving higher yields. Hence, there is a need to identify suitable

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verity, planting geometry & standardize the conjunctive use of nutrients. A judicious combination of organic and inorganic fertilizer can maintain long term soil fertility and sustain higher productivity of crops. Farmyard manure (FYM) is being used as a major source of organic matter in field crops. Limited availability of this manure is, however, an important constraint in its use as a source of nutrients.

MATERIAL AND METHOD

The present investigation was carried out at College Research Farm of Indira Gandhi Krishi Vishwavidyalaya, RMD College of Agriculture and Research Station, Ambikapur (C.G.) India during the *kharif* season (July-November) 2015. The soil of experimental field was sandy loam in texture, acidic in reaction (pH 6.2), low in available nitrogen, phosphorus and medium in potassium. Treatments comprised of two method of planting viz., SRI and normal transplanting as main plot treatments, two nutrient management practices viz. RDF- 100% inorganic, RDF-150% through 50% inorganic + 50 % organic as sub-plot and 5 varieties Badshahbhog selection-1, Vishnubhog selection-1, Dubraj selection-1, Tarun bhog selection-1 and CG Sugandhit bhog selection-1 in sub-sub plot during *kharif* seasons in split-split plot design with three replications.

RESULT AND DISCUSSION

Method of planting

The Planting method in SRI practices the no. of tiller was significantly higher than normal planting and non- significantly higher with plant height, length of panicle and 1000-grain weight, grain yield and biological yield. SRI planting method recorded higher net return and B: C ratio (Rs. 57869/ha and 1.54) lowest in normal planting (Rs. 53349/ha and 1.35). The data further revealed that younger seedlings produced more effective tillers per hill and yield attributing characters than older seedlings. The similar finding was also reported by Singh, *et al.*, (2004) and Krishna and Biradarpatil, (2009).

Nutrient management

In case of nutrient management practices the application of 150% NPK of RDF (50% inorganic + 50% organic) the plant height and no. of grain per panicle were significantly higher than 100% NPK of RDF (100% inorganic) and non- significantly higher with total no. of tiller, effective tiller, length of panicle and 1000-grain weight, grain yield and biological yield. 100% NPK of RDF recorded higher net return and B:C ratio (Rs. 57201/ha and 1.55) than 150% NPK of RDF (Rs. 54018/ha and 1.35). The results are in agreement with the finding of Jha *et al.* (2004) and Sarawgi *et al.*, (2006). Similar results had also reported by Mhaskar *et al.* (2005). Therefore, it may concluded that integrated nutrient management improves the growth and yield of scanted rice as well as impairs the soil health with adequate nutrient balance after harvest of rice.

Varieties

The five varieties, Badshahbhog selection-1, Vishnubhog selection-1, Dubraj selection-1, Tarun bhog selection-1 and CG Sugandhit bhog selection-1 exhibited differences in growth, yield attribution and finally grain & economics. Rice variety vishnubhog selection-1 had significantly tallest plants while C.G. sugandhit selection-1 had the shortest plants. The number of total tillers/m² and effective tillers/plant in CG.sugandhit selection-1 were significantly higher and at par with badshahbhog selection-1 and vishnubhog selection-1 but 1000-grain weight, panicle length were significantly higher under vishnubhog selection-1. In case of number of grains/panicle was higher under CG.sugandhit selection-1 over other varieties.

Rice variety C.G. sugandhit bhog selection-1 recorded significantly higher grain (42.74 q/ha) and biological yield (123.04q/ha) over dubraj selection-1 (grain 32.42/ha) and biological yield 100.07/ha) but at par with vishnubhog selection-1(42.47 q/ha and 124.73 q/ha), tarun bhog selection-1(37.91 q/ha and 122.13 q/ha) and badshahbhog selection-1(37.0 q/ha and 109.0 q/ha). C.G. sugandhit bhog selection-1 recorded higher net return and B:C ratio (Rs. 65323/ha and 1.71) lowest in dubraj selection-1 (Rs. 40947/ha and 1.41).

Table 1. Growth and yield attributes as influenced by of method of planting and nutrient management on yield of short grain aromatic rice (*Oryza sativa* L.)

Treatment	Plant height (cm)	Tillers (m2)	No. of effective tillers/plant	Panicle length (cm)	No. of grain /panicle	1000-grain wt. (g)
Main plot-Method of planting						
M ₁ -SRI	151.02	249.17	14.0	27.14	141.37	14.67
M ₂ -Normal transplanting	139.87	255.50	7.12	25.33	140.17	14.52
SEm±	2.62	21.54	1.19	0.63	2.11	063
CD at 5%	NS	92.70	5.22	NS	NS	NS
Sub plot-Nutrient management						

N ₁ -RDF (100% inorganic)	142.03	251.70	10.44	26.05	139.00	14.58
N ₂ -150% RDF (50% inorganic + 50% organic.)	148.86	252.97	10.67	26.42	142.53	14.61
SEm±	0.82	4.68	0.20	0.29	0.52	0.22
CD at 5%	2.26	NS	NS	NS	1.54	NS
Sub-sub plot- Varieties						
V ₁ -Badshahbhog selection-1	149.78	296.0	11.64	27.51	141.17	15.94
V ₂ - Vishnubhog selection-1	173.45	257.50	10.47	29.48	131.00	16.20
V ₃ - Dubraj selection-1	154.07	192.08	8.16	27.01	109.50	11.51
V ₄ - Tarun bhog selection-1	152.86	237.33	10.61	22.75	147.58	14.42
V ₅ - CG Sugandhit bhog selection-1	97.05	288.75	12.11	24.41	174.58	14.91
SEm±	2.35	17.61	0.57	0.57	3.52	0.3
CD at 5%	6.80	35.88	1.66	1.75	11.21	1.0
CD at 5% A x B	3.19	18.26	0.78	1.31	2.18	0.095
CD at 5% A x C	NS	NS	NS	NS	NS	NS
CD at 5% B x C	NS	NS	NS	NS	NS	NS
CD at 5% A x B x C	NS	NS	NS	NS	NS	NS

Table 2. Yield and economics as influenced by of method of planting and nutrient management on yield of short grain aromatic rice (*Oryza sativa* L.)

Treatment	Yield (q/ha)			Harvest index (%)	Cost of cultivation (Rs./ha)	Net Income (Rs./ha)	B:C ratio
	Grain	Straw	Biological				
Main plot- Method of planting							
M ₁ -SRI	39.05	72.61	116.66	33.55	37500	57869	1.54
M ₂ -Narmal transplanting	37.96	71.98	114.95	32.94	39500	53349	1.35
SEm±	1.89	1.06	1.41	0.89			
CD at 5%	NS	NS	NS	NS			
Sub plot- Nutrient management							
N ₁ -RDF(100% inorganic)	38.62	70.29	113.91	33.97	36900	57201	1.55
N ₂ -150% RDF (50% inorganic + 50% organic.)	38.39	74.31	117.67	32.52	40100	54018	1.35
SEm±	1.33	1.32	1.66	0.05			
CD at 5%	NS	3.99	NS	0.14			
Sub-sub plot- Varieties							
V ₁ -Badshahbhog selection-1	37.00	67.01	109.00	33.96	38500	41611	1.34
V ₂ - Vishnubhog selection-1	42.47	77.26	124.73	34.11	38500	64977	1.69
V ₃ - Dubraj selection-1	32.41	62.66	100.07	32.31	38500	40947	1.06
V ₄ - Tarun bhog selection-1	37.91	72.21	122.13	31.05	38500	54289	1.41
V ₅ - CG Sugandhit bhog selection-1	42.74	75.35	123.08	34.78	38500	65323	1.70
SEm±	1.47	4.56	7.53	1.46	-	-	-
CD at 5%	4.52	NS	NS	NS	-	-	-
					-	-	-
CD at 5% A x B	1.62	5.64	5.75	2.01	-	-	-
CD at 5% A x C	3.19	NS	NS	0.18	-	-	-
CD at 5% B x C	NS	NS	NS	NS	-	-	-
CD at 5% A x B x C	NS	NS	NS	NS	-	-	-

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