TO STUDY THE ECONOMIC IMPORTANCE OF RICE (*ORYZA SATIVA* L.) VARIETIES SUITABLE FOR ORGANIC FARMING

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Abstracts: A study was undertaken to evaluate the growth performance and economic grain yield of 30 rice varieties. These are showed significant differences for yield and quality contributing traits *viz.*, plant population (m^{-2}), plant height (cm), number of effective tillers (m^{-2}), number of panicle (m^{-2}) weight of panicle (g), number of filled grain $panicle^{-1}$ and yield (qha^{-1}). The result revealed that the variety Indira Maheshwari produced significantly higher grain yield (46.90 q ha^{-1}) but on the basis of economic importance Aromatic varieties more expensive as compare to non aromatic rice varieties because they give best cost under market.

Keywords: Aromatic rice, *Oryza sativa,* Organic farming

INTRODUCTION

Rice (*Oryza sativa* L.) is the staple food for more than half of the world's population. About 90% of the world's rice is grown and consumed in Asia. Rice is an economically important food crop with nutritional diversification and helps in poverty alleviation. Rice is ranked as the world's number one human food crop so 'Rice is life' was the theme of International year of rice 2004 denoting its overwhelming importance as an item of food and commerce.

India is the second largest producer of rice after China about 104.40 million tonnes (Anonymous, 2012-13). Aromatic rice (*Oryza sativa* L.) is known for its characteristic fragrance when cooked. This constitutes a small but special group of rice, which is considered best in quality. Aromatic varieties fetch higher price in rice market than the non-aromatic ones. Basmati (scented) rice is best suited for this due to its lower nutritional requirement. To adopt organic farming of Basmati rice and wheat, areas need to be demarcated and reasonable price guarantee may be necessary (Prasad 2005). Identifying promising morpho-physiological traits associated with quality and yield plays an important role in varietal development programs. Development of rice cultivars with a high yielding ability is one of the most fundamental approaches for dealing with the expected increase in the world demand (IRRI, 1993). Therefore, the present investigation was made with an objective to estimate economic of yield and its components.

MATERIAL AND METHODS

Field experiment was conducted at the field of Research cum Instructional Farm, IGKV, Raipur (C.G.) during *kharif* season of 2011. Raipur is situated in mid-eastern part of Chhattisgarh state and lies at 21^0 16' North Latitude and 81^0 36' East Longitude with an altitude of 314.15 above the mean sea level. Trials were laid out in a Randomized Block Design with 3 replications with the spacing of 20 x 10 cm and the recommended cultural practices were followed plant population(m^{-2}), plant height(cm), number of effective tillers(m^{-2}), number of panicle (m^{-2}) weight of panicle (g), number of filled grain $panicle^{-1}$ and yield (qha^{-1})were recorded. The data were analyzed by using ANOVA (Panse and Sukhatme, 1967).These treatment laid down under the organic farming condition. The experimental material consists of 30 rice varieties of different groups. These 30 varieties were taken as treatments. In order to fulfill the nutrient requirement of 50:50:30 kg N: P_2O_5: K_2O ha^{-1} three main sources of nutrients - *i.e.* cow dung manure, compost crop residue, and vermicompost were applied on N basis (1/3 of each) 4 days before the transplanting. Also green manuring should be done before transplanting. Sowing of green manure crop (*Sesbnia aculeata*) @ 40 kg ha^{-1} seed was done in entire ploughed experimental field as a common application. The 45 days old green manure crop was upturned by disk plough and incorporated into soil and then properly puddled. The field was kept as such for six days for well decomposition of green manure.

Rice seedlings of all 30 varieties were grown separately in nursery by dry seedbed method of 5.0 m x 1.5 m size. Beds were raised upto 20 cm height. To achieve good germination and healthy seedling, beds were kept weed free and under saturated condition until uprooting for transplanting.

Plant protection was done with the spray of broad spectrum bio-pesticide *i.e*. Neemastra @ 3 percent liquid ha^{-1} 2 times after tillering stage at 15 days interval to reduce the infestation of gall midge / gallfly (*Orseolia oryzae*) and stem borer (*Sciropophaga incertulas*).

RESULT AND DISCUSSION

Table 1: Plant Population, Plant height, Effective tillers, yield attributes, grain and straw yield of different rice varieties under organic nutrient supply

Group/Varieties	Plant population (m^{-2}) at harvest	Plant height (cm) at harvest	No. of Effective tillers m^{-2} at harvest	No. of panicle m^{-2}	Panicle weight (g)	No. of Filled grain $panicle^{-1}$	Grain yield (q ha^{1})	Straw yield (q ha^{-1})	Harvest index (%)	Gross return (Rs. ha^{-1})	Net return (Rs. ha^{-1})
Traditional aromatic-non basmati type											
Dubraj	48.67	166.7	281	9	3.42	145	39.01	76.33	33.81	58520	40884
Gopal Bhog	49.00	159.5	246	14	2.86	122	27.05	53.04	33.73	40580	21081
Badshah Bhog	49.00	161.4	253	10	3.04	126	34.12	58.01	37.02	51185	32084
Jeeraphool	49.00	174.6	268	16	3.27	141	32.35	64.20	33.48	48527	29921
Bisni	49.00	183.7	285	8	3.44	144	36.48	69.26	34.46	54724	36523
Shyama Jeera	49.33	178.7	253	13	3.54	139	32.58	62.59	34.21	48875	30140
Vishnu Bhog	49.00	166.2	264	11	3.10	141	38.30	71.42	34.91	57448	39419
Improved aromatic varieties											
ISD- 1	49.00	104.4	258	17	3.40	145	34.53	65.15	34.48	51800	33942
Pusa Basmati	48.67	117.2	290	14	2.68	141	35.57	63.16	36.04	53350	35460
Kasturi	49.00	103.0	237	13	3.21	121	35.86	62.29	36.63	53785	35026
Vasumati	49.00	118.4	264	15	2.38	134	37.64	63.28	37.27	56465	37785
Traditional non-aromatic basmati type											
Safri	49.00	133.1	242	11	2.87	142	36.57	68.76	34.70	54853	36611
Mahsuri	48.67	128.1	275	14	3.22	139	40.79	77.88	34.37	61187	43675
Jaldubi	49.00	154.5	234	15	3.19	127	32.84	55.13	37.33	49265	29934
Improved non-aromatic non- basmati type											
MTU-1010	49.00	111.7	307	22	2.48	130	40.76	57.61	41.38	50944	31730
IR-64	49.00	103.2	300	21	2.41	130	41.51	57.50	41.89	51889	32667
Durgeshwari	49.00	117.8	290	18	3.28	133	46.78	67.61	40.88	58479	40066
Karma Mahsuri	48.67	100.4	296	18	2.81	141	42.61	61.06	41.08	53258	34321
Chandrahasini	49.00	98.5	294	19	2.80	138	41.11	60.47	40.45	51383	32399
I.B.D.-1	49.00	136.3	254	10	2.30	126	33.67	51.02	39.74	42092	22352
PKV-HMT	49.00	101.2	256	17	2.56	132	36.96	52.32	41.40	46201	26565
Swarna	49.00	79.4	263	18	2.45	123	35.83	51.30	41.12	44783	25065
Samleshwari	48.67	86.5	251	14	2.67	132	33.82	51.23	39.75	42281	22557
Indira Sona	49.00	104.9	302	22	3.65	147	45.13	65.48	40.82	56408	38305
IR-36	49.00	90.0	298	17	3.30	142	44.75	62.13	41.85	55940	37453
IndiraMaheshwari	48.33	128.8	294	17	3.81	151	46.90	61.25	43.35	58625	40183
Improved non-aromatic especially for poha and parboiled rice											
Mahamaya	49.00	111.9	311	21	3.61	150	46.40	63.15	42.34	58001	39580
Kranti	48.67	107.5	301	19	3.39	131	45.31	61.25	42.51	56641	37799
Rajeshwari	49.00	95.4	306	15	3.65	140	46.12	60.70	43.14	57650	39164
Bamleshwari	49.00	108.4	270	18	3.72	134	41.55	60.08	40.83	51932	32997
SEm ±	0.51	1.3	6	2	0.16	3	1.7	1.90	0.76		
CD (P=0.05)	NS	3.7	16	5	0.45	7	4.7	5.37	2.16		

Plant Population (m^{-2}), Plant height (cm) and Number of effective tillers m^{-2}

The plant population was not influenced significantly due to the different aromatic rice varieties**.** So, the result was found to be non- significant with respect to plant population but In case of plant height the tallest plant was observed in Bisni (183.7 cm) among all the groups but as far as individual group are concerned, Bisni, Vasumati (118.3 cm), Jaldubi (154.4 cm), Indira Barani Dhan-1(136.2 cm) and Mahamaya (111.9 cm) was the tallest in their respective group. Overall lowest plant height was observed in Swarna (79.3 cm).

Final number of tillers in terms of effective tillers at harvesting is a vital determinant of grain yield. Irrespective of different rice groups, significantly highest effective tillers m^{-2} was recorded in the variety Mahamaya (311). However IR-36(298),

Karma Mahsuri (296), IR 64 (300), MTU 1010 (307), Rajeshwari (306), and Indira Sona (302) was found at par with that of Mahamaya. While, the lowest effective tillers (234) were counted for Jaldubi.

Number of panicle (m^{-2}), Panicle weight (g) and Number of filled grains $panicle^{-1}$

Number of panicles per unit area is the most important component of rice yield and presented in Table 1. It was the result of the number of tillers produced and the proportion of effective tillers, which survived to produce panicle (Hossain *et al.*, 2008). The trend of panicle number among the different varieties differed slightly according to the final tiller number *i.e.* effective tillers. Rajeshwari produced highest number of panicles (291) followed by Mahamaya (289) and MTU -1010 (285). Jaldubi generated lowest (219) number of panicles m^{-2}. Among the different group of rice varieties, variety Indira Maheshwari gave the highest panicle weight (3.81 g) than rest of the varieties. Higher panicle weight might be associated with stronger source-sink relation of cultivars and correlated with more number of filled grains and panicle length. The variation for weight of panicle in case of varieties might be due to their genetic characters. Paraye *et al.* (2006) and Mhaskar *et al.* (2005) also reported the similar findings. Among all the varieties irrespective of different groups, Indira Maheshwari (151) produced maximum number of filled grains $panicle^{-1}$ than the others except Mahamaya, Dubraj, Bisni, Indira Sugandhit Dhan and Indira Sona.

Grain yield (q ha^{-1}), Straw yield (q ha^{-1}), Harvest index (%) and Economics

The genotypes, which produced higher number of effective tillers m^{-2} and higher number of grains $panicle^{-1}$ also showed higher grain yield in rice (Duta *et al*. 2002). Indira Maheshwari produced significantly higher yield (46.90 q ha^{-1}) over all the varieties except Indira Sona (45.13 q ha^{-1}), Durgeshwari (46.78 q ha^{-1}) of same group *i.e.* improved non-aromatic non- basmati type. The lowest grain yield was recorded in variety Jaldubi (32.84 q ha^{-1}) belonged to group of improved non-aromatic non- basmati type.

Irrespective of all the varieties of different groups, traditional aromatic-non basmati type varieties, Dubraj produced highest straw yield (76.33 q ha^{-1}) over all the other varieties. Variety Mahsuri of traditional non-aromatic basmati type stood second in rank and produced 76.13qha^{-1} straw yield. Overall lowest straw yield (51.02 q ha^{-1}) was recorded in Indira Barani Dhan-1 of improved non-aromatic non-basmati type rice. Rice varieties under traditional aromatic-non basmati type, improved aromatic varieties and traditional non-aromatic basmati group registered lower harvest index (ranged between 33 to 38 %) as compared to varieties of improved non-aromatic non-basmati type and improved non-aromatic especially for *poha* and parboiled rice achieved the higher values of harvest index (ranged between 40 to 43%) owing to their higher grain yield. Aromatic and basmati type rice varieties achieved a handsome return at higher prices as compared to normal high yielding varieties and appeared to be more profitable under organic farming conditions. Despite of producing higher yield, improved non aromatic non basmati type rice failed to retrieve more return than that of traditional or basmati type rice due to lesser prices. Mahsuri from traditional non aromatic basmati type produced the highest net return of Rs. 43675 ha^{-1} and B: C ratio (1.84).

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