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Performance of Scented Rice Varieties under Different Fertility Levels

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ABSTRACT

The field experiment was conducted during Kharif season of 2011-12.at Narendra Deva University of Agriculture and Technology, Narendra Nagar (Kumarganj), Faizabad (U.P.) Indiato find out the Performance of Scented Rice Varieties under Different Fertility LevelsThe maximum plant height (120.23cm) was recorded in the Kalanamak-3131 as compared to other varieties namely Pusa basmati and improved Pusa basmati at 90 days after transplanting of crop which might be due to inherited varietal character and among fertility The higher combined application of nutrients, (90 + 45 + 45 kg NPK + 60 ton FYM ha^{-1}) levels showed significantly higher plant height as compared to other treatments. The maximum number of shoots (10.48) and Dry matter accumulation (15.96 g hill^{-1}) were recorded in the variety improved Pusabasmati which found significantly higher than other varieties. In similar way yield attributing character like No. of grains/ panicle (299.47) Weight of grains/ panicle (2.08) Harvest index (39.29 %) and Grain yield (39.41q ha^{-1}) are also significant higher in improved Pusabasmati varieties and infertility level (90 + 45 + 45 kg NPK + 60 ton FYM ha^{-1}) showed significantly higher result. Regarding benefit cost ratio (1.46) it is found highest with combination with improved Pusabasmati along with (90 + 45 + 45 kg NPK + 60 ton FYM ha^{-1}) levels.

Keywords: *Scented Rice Varieties, Fertility, Growth and Yield*

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INTRODUCTION

Scented rice varieties have high market value due to high quality after high yielding varieties. Scented rice occupies a prime position on account at its extra .long, super fine, slender grains, pleasant and exquisite aroma, fine cooking quality, sweet taste, soft texture, length and breadth wise elongation on cooking with softness of cooked rice [1, , 4]. Demand for aromatic rice in recent years have increased to a great extent for both internal consumption as well as for export. However, the total production of aromatic rice in the country is nearly 5 million tonnes from an area of 0.7 m ha representing 1.5 per cent of the total rice area with an average productivity of 0.85 t ha^{-1} the Indian aromatic rice including Basmati which is considered as a nature s gift to sub-continent. Basmati word has been derived from two Sanskrit words (vas-aroma) and (may up –ingrained or present from beginning).Among various volatile compound found in rice, responsible for its aroma is 2-acetyle-1pyrroline (2-AP) is the most significant. Basmati is a globally reputed aromatic group of rice, having three distinct quality feature, pleasant: aroma, super-fine grain (>6.5mm long) space along with extreme kernel elongation and soft texture of cooked rice Increasing the production of high quality aromatic rice by the farmers for domestic as well as export purposes is major concern of future agriculture strategy. Nearly 50-70 per cent of the Basmati rice produced in India and Pakistan are exported which contributes 10% of world trade. Export of Basmati rice from India has grown steadily during the last decade and is likely to increase in future. Apart from those, different parameters of aromatic rice such as quantity, method and time of fertilizer application. The escalating cost, inadequate supply of chemical fertilizers along with deteriorating soil health have led to consider the combined sue of bio-compost and inorganic sources of N for achieving higher N use efficiency. Increased yield and to sustain soil fertility. Considerable improvement in grain quality of aromatic rice has been

observed under integrated use of organic and inorganic fertilizers as compared to RDF (Recommended dose of fertilizers) applied with inorganic fertilizer.Demand for aromatic rice recognized as high valued than normal rice in the world market [6]. However, the total production of aromatic rice in the country is nearly 5 million tonnes from an area of 0.7 m ha representing 1.5 per cent of the total rice area with an average productivity of 0.85 t ha^{-1} the Indian aromatic rice including Increasing the production of high quality aromatic rice by the farmers for domestic as well as export purposes is major concern of future agriculture strategy. The improvement of grain quality of aromatic rice has been observed under integrated use of organic and inorganic fertilizers as compared to RDF (Recommended dose of fertilizers) applied with inorganic fertilizer. Keeping in view the above idea the present investigation was focused on integrated nutrient management on scented rice.

MATERIALS AND METHODS

The field experiment was conducted at the Narendra Deva University of Agriculture and Technology, Narendra Nagar (Kumarganj), Faizabad (U.P.) India. during *Kharif* season of 2011-12. The experimental site falls under subtropical zone in Indo-gangetic plains having alluvial calcareous soil and lies between 24.4°-26.56° North latitude and 82.12°-83.98° East longitude with an elevation of about 113m from mean sea level. The experimental field was well leveled having good irrigation and drainage facilities. The source of irrigation was tube well. The soil of experimental field was sandy-clay loam textural class with (0.37 %) organic carbon, pH 7.72, (190.55 kg/ha) available nitrogen, (13.03 kg/ha) phosphorus and (257.10 kg/ha) available potassium before the transplanting of rice during 2011. The amount of total rainfall received in 2011 during crop period of investigation was 931.7 mm. The experiment was conducted in split plot design with three replications, and four treatments. There are 3 scented rice varieties namely Kalanamak- 3131, Pusabasmati -1 and Improved Pusabasmati (main treatment) and 4 fertilizer levels (F_1 -60+30+30 Kg NPK ha^{-1}, F_2 -90+45+45 Kg NPK ha^{-1}, F_3 -60+30+30kg NPK+6tonFYM ha^{-1} and F_4 -90+45+45kg NPK+6ton FYM ha^{-1}) as sub treatment. There were 12 treatment in combinations, each replicated thrice with Gross plot size 5m x 4m = 20m2 and Net plot size4.10 m x 3.2 m = 13.12 m^2. After making individual experimental unit, the amount of fertilizer were applied uniformly through area, single super phosphate, murate of potash and zinc sulphate. One third dose of nitrogen and total phosphorous, potash and zinc were applied as basal application before puddling and incorporated in the top 15 cm soil. Remaining dose of nitrogen was applied as top dressing in two equal doses each at tillering and panicle initiation stage, respectively. Urea was applied at the rate of 260 kg ha^{-1}, single super phosphate at 375 kg ha^{-1}, muriate of potash at 66.66kg ha^{-1} and zinc sulphate at the rate of 25 kg ha^{-1}. The rice crop was transplanted on 21th July 2011 with spacing 20x15 cm with and harvested on 25 December 2011. Five uniform plants were selected randomly from each plot, and were tagged for recording the quantitative and qualitative observations. The observations recorded during the course of investigation at 30, 60, 90 DAS interval and at harvest stage of the crop. The leaf area of five plants was measured by automatic leaf area meter at 30th, 60th and 90th days after sowing of the crop. Leaf area index was calculated by the formula. Leaf area index = leaf area / ground area Dry weight of plant was recorded at different stages of crop growth. Plant samples were dried in sun and subsequently into the oven at 70^0C until constant weight were obtained and total dry matter accumulation of whole plant was recorded. Nitrogen, phosphorus, potash and sulphur were estimated by using standard methods. The Nitrogen content was determined in grains as well as in straw by modified Kjeldahl method as described by Jackson [3]. Total N content at grain and straw was multiplied by the respective dry matter yield to get the total N uptake by plants, Phosphorus content was determined in grains as well as in straw by vando molybdophosphoric yellow colour method followed by spectrophotometric determination as suggested by Jacksan [3]. Total phosphorus in grain and straw was estimated by multiplying phosphorus content with dry matter of plant to find out phosphorus removal ha^{-1} and Potassium content was determined with the help of flamephotometer as described by Jackson [3]. Potassium was calculated by multiplying dry matter with Potassium content obtained from analysis of grain and straw to obtain Potassium content in grain and straw and Potassium removal ha^{-1}. The uptake of nutrient (kg ha^{-1}) were calculated by using the following formula (Black, 1967).

$$\text{Nutrient uptake} = \frac{\text{Dry matter production of crop}}{100} \text{xNutrient content in dry matter}$$

All the data obtained from rice and wheat for two consecutive years was pooled and subjected to analysis of variance [2].

RESULTS AND DISCUSSION

Effect of Growth, yield attributing and yield character of scanted rice variety as influenced by different treatments

The maximum plant height (120.23cm) was recorded in the Kalanamak-3131 as compared to other varieties namely Pusa basmati and improved Pusa basmati at 90 days after transplanting of crop which might be due to inherited varietal character and among fertility The higher combined application of nutrients, (90 + 45 + 45 kg NPK + 60 ton FYM ha^{-1}) levels showed significantly higher plant height as compared to other treatments. Singh and Bhattacharya [9] found that the plant height and dry weight of paddy increased with levels of NPK application up to the highest level (160: 80: 80 NPK kg ha-1) at all stages of crop growth.

The maximum number of shoots (10.48) and Dry matter accumulation (15.96 g $hill^{-1}$) were recorded in the variety improved Pusabasmati which found significantly higher than other varieties. This might be due to increased availability of nutrients which led to better root developments ultimately produced more number of shoots per hill and Dry matter accumulation at 90 days. The higher combined application of fertilizer (90 + 45 + 45 kg NPK + 60 ton FYM ha^{-1}) showed significantly higher number of shoot $hill^{-1}$ and Dry matter accumulation as compared to other level of fertility treatments at 90 days. The present findings in conformity to Tunga and Nayak [10] were reported that different doses of fertility in west Bengal comprising highest rate of NPK fertilizer on different high yielding rice and hybrid rice gave more yield and yield attributing character than low rate of fertilizer.In similar way yield attributing character like No. of grains/ panicle (299.47) Weight of grains/ panicle (2.08) Harvest index (39.29 %) and Grain yield (39.41q ha^{-1}) are also significant higher in improved Pusabasmati varieties and infertility level (90 + 45 + 45 kg NPK + 60 ton FYM ha^{-1}) showed significantly higher result Kumar *et al.* [5] conducted a field experiments at New Delhi to determine the response of nutrient management practices on Basmati rice. The recorded highest grain yield due to application of nutrients with ½ compost + ½ NPK. Variation in source of nutrient remained at par, and failed to produced significant different among themselves in respect to grain yield.

Effect of Economics of the scanted rice variety as influenced by different treatments

Maximum cost of cultivation (Rs 32094.36) and gross return (Rs 766710) were recorded under improved Pusabasmati with F_4 (90+45 + 45 kg NPK +6 ton FYM ha^{-1}) followed by Pusabasmati-1 with same fertility level under improved Pusabasmati with of F_4 (90+45 + 45 kg NPK +6 ton FYM ha^{-1}). Maximum net return (Rs 44626.45) and benefit cost ratio (1.46) were recorded under improved Pusabasmati with F_3 (60 + 30 +30 kg NPK +6 ton FYM ha^{-1}). Similar results shows by Singh and Singh [8] they reported that economic parameter *viz.,* gross income, cultivation cost and net return from rice were maximized at highest doses of N_{180}, P_{90} and K_{90} kg ha^{-1}.

Table No 1:- Growth and yield attributing character of mustard as influenced by different treatments at 90 days

Treatments	Plant height (cm) at 90 days	Number of Shoots per hill	Dry Matter accumulation (g/hill)	Days taken to 50% Panicle Emergence
Varieties				
V_1-Kalanamak-3131	120.23	6.15	14.16	103.58
V_2-Pusabasmati-1	100.42	8.95	15.47	103.58
V_3-Improved Pusabasmati	102.86	10.48	15.96	104.33
SEm ±	1.60	0.08	0.24	0.15
CD at 5%	6.28	0.31	0.94	NS
Fertility level				
F_1-60+30+30 Kg NPK ha^{-1}	100.24	7.10	14.08	102.89
F_2-90+45+45 Kg NPK ha^{-1}	112.18	8.90	15.82	103.67
F_3-60+30+30kg NPK+6ton FYM ha^{-1}	103.13	7.57	14.68	104.11
F_4-90+45+45kg NPK+6ton FYM ha^{-1}	115.80	10.53	16.21	104.67
SEm ±	2.57	0.07	0.38	0.22
CD at 5%	7.64	0.21	1.13	0.64

Table No 2:- Yield and economics of mustard as influenced by different treatments

Treatments	No. of grains/ panicle	Weight of grains/ panicle	Harvest index (%)	Grain yield (q ha^{-1})
Varieties				
V_1-Kalanamak-3131	219.61	1.52	28.97	28.90
V_2-Pusabasmati-1	290.26	2.01	39.19	38.20
V_3-Improved Pusabasmati	299.47	2.08	39.29	39.41
SEm ±	10.33	0.07	1.63	1.64
CD at 5%	40.54	0.28	NS	6.44
Fertility level				
F_1-60+30+30 Kg NPK ha^{-1}	243.67	1.69	35.10	32.07
F_2-90+45+45 Kg NPK ha^{-1}	286.67	1.99	36.24	37.73
F_3-60+30+30kg NPK+6ton FYM ha^{-1}	254.93	1.77	35.55	33.55
F_4-90+45+45kg NPK+6ton FYM ha^{-1}	293.84	2.04	36.37	38.67
SEm ±	7.54	0.05	1.05	1.16
CD at 5%	22.40	0.16	NS	3.44

Table 3: Economics of the different treatment combinations

Treatment	Grain yield (q ha^{-1})	Gross return (Rs ha^{-1})	Cost of cultivation (Rs ha^{-1})	Net return (Rs ha^{-1})	B:C ratio (%)
V_1 F_1	24.70	50668	28645.05	21482.95	0.74
V_1 F_2	26.27	52859	30072.84	22796.16	0.75
V_1 F_3	31.53	62041	30512.55	31528.45	1.03
V_1 F_4	32.74	64624	32094.36	32529.64	1.01
V_2 F_1	35.17	63911	28645.05	35265.95	1.23
V_2 F_2	36.78	66582	30072.84	36509.16	1.21
V_2 F_3	40.02	72340	30512.55	41827.45	1.37
V_2 F_4	40.82	73796	32094.36	41701.64	1.29
V_3 F_1	35.97	65239	28645.05	36593.95	1.27
V_3 F_2	37.59	68053	30072.84	37980.16	1.26
V_3 F_3	41.63	75139	30512.55	44626.45	1.46
V_3 F_4	42.44	766710	32094.36	44515.64	1.38

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