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EFFECT OF DIFFERENT SOURCES OF ORGANIC NUTRIENT ON QUALITY PARAMETERS OF SCENTED RICE VARIETIES UNDER IRRIGATED CONDITION

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ABSTRACT

The experiment was carried out at Raipur, during *kharif* season of 2013 with three scented varieties viz. Dubraj, Badshahbhog and CR Sugandha Dhan 907 with five organic nutrient management options*viz*. (1/3N through each of enriched compost + cow dung manure + neem cake), (3/4 N through poultrymanure + 1/4 N vermiwash foliar application), (paddy crop residue treated with *Trichoderma* + rock phosphate + PSB @ 10 kg/ha), (3/4 N vermicompost +1/4 N vermiwash foliar application) and (*in -situ* green manuring + Azolla + BGA) to evaluate the effect on quality parameters under different varieties and treatments. CR Sugandha Dhan 907 recorded higher length and breadth(in mm) of paddy (8.52 and 2.56), brown rice (6.18 and 2.35),kernel (6.08 and 2.17), kernel length after cooking (9.21 mm) and elongation ratio (1.51).Hulling (76.67%), milling (70.16%), head rice recovery (57.22%) and alkali spreading value (GT)(4.24) was highest under Badshahbhog. The aroma quality was foundsrtong in Badshahbhog and CR Sugandha Dhan 907. All the organic nutrient management options was not found significant under above quality parameters.

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INTRODUCTION

India is second largestproducer after china and has an area of over 42.2 million hectares and production of 104.32 million tons with productivity of 2372 kg ha-1. The rice productivity is less than 2 tons per hectare in most of the states (Dash, 2009). Rice is the second most widely consumed cereal in the world next to wheat. It is the staple food for two thirds of the world's population (Kumari *et al*., 2014). Scented rice varieties occupy an important status in domestic as well as in international market due to its several outstanding qualities. However, scented rice varieties occupy less than 20 per cent of total area. These varieties of rice are very much popular among the users due to their aroma, grain dimensions, cooking qualities and palatability. Being endowed with the most favorable climate, the Chhattisgarh state has an excellent geographical centre of biodiversity particular for rice including scented varieties. These varieties are sold at high price in market due to their special aroma and acceptability. Aroma quality of scented rice is major character, which increases the value of rice. In addition to long grain Basmati type that has high export potential, a large number of indigenous short-grained aromatic varieties are cultivated in Chhattisgarh and different pockets of the other states. Application of organic fertilizers N significantly increases optimum cooking time, improves total amylase content and protein contents. Improvement in quality of scented rice by using the organic manures and biofertilizer have also been reported by Murali and setty (2001). Rice quality is considered from the viewpoint of milling quality, grain size, shape, appearance and cooking characteristics. Consumers judge the quality of rice mostly on its appearance, particularly the color, 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). Besides, other aspects of quality like amylase content and gelatinization temperature are also important (Bhattacharya, 1989 and Jennings *et al*., 1979). Rice with soft gel consistency cook tender and remain soft to medium gel consistency, is preferred by most rice consumers (Sarkar *et al*., 1994).

MATERIALS AND METHODS

Field experiment was conducted at Research cum Instructional Farm, IGKV, Raipur, during *kharif* season of 2013. The soil of experimental field was '*Vertisols*' which is locally known as '*Kanhar*'. The experiment was laid out in split plot design with 3 replications. The main plot consisting of three scented rice varieties *viz*. Dubraj, Badshahbhog and CR Sugandha Dhan 907with five organic nutrient management treatments as subplot *viz*. T_1(1/3N through each of enriched compost + cow dung manure + neem cake), T_2(3/4 N through poultrymanure + 1/4 N vermiwash foliar application), T_3(paddy crop residue treated with *Trichoderma* + rock phosphate + PSB @ 10 kg/ha), T_4(3/4 N vermicompost +1/4 N vermiwash foliar application) and T_5(*in -situ* green manuring + Azolla + BGA).All the organic sources of nutrients and rock phosphate were applied as per the treatments in respective plots to fulfill the nutrient requirement of 80:60:40 kg $N:P_2O_5:K_2O$ ha^{-1}. Entire quantity of all sources was applied as per the treatment on N basis four days before the

transplanting. Rice varieties were transplanted on July with 2 to 3 seedling hill^{-1} of 25 days of age at a spacing of 20cm x 10cm and harvested on second week of November.

The quality characters were estimated by standard procedures like hulling and milling, head rice recovery percentage according to Bajpai and Singh (2010), kernel length and breadth were measured by dial micro meter and length/ breadth ratio was calculated, alkali spreading value following the method of Little *et al*. (1958), cooked kernel length was recorded using a individually length was measured in mm (Pellaiyar and Mohandass, 1981).

RESULTS AND DISCUSSION

Effect on length, breadth and L:B ratio

The result of the experiment revealed that Length and breadth(mm) of paddy, brown riceand kernel(Table 1) was significantly higher under the variety CR Sugandha Dhan 907 which was comparable with Dubraj, but the lowest Length and breadth (mm) was recorded under variety Badhashbhog. However, L: B ratio of paddy, brown riceand kernel was recorded significantly highest under Dubraj which was at par with variety CR Sugandha Dhan 907. Lowest L:B ratio of paddy was recorded (2.79) under variety Badhashbhog. Different organic nutrient practices were unable to bring significant variation for length, breadth and L: B ratio of paddy, brown riceand kernel. However length, breadth and L: B ratio was observed under application of 1/3 N through each of enriched compost + cow dung manure + neem cake. Similar results were also found by Dahiphale *et al*. and (2004) Singh *et al*. (2005).

Effect on hulling, milling and head rice recovery (%)

Quality parameters *viz*. hulling, milling and head rice recovery (%)are presented in Table 2. These quality characters not significantly differed due to scented rice as well as organic nutrient supply. However, among the varieties, Badshahbhog recorded higher value of hulling (76.67%), milling (70.16%) and head rice recovery percentage (57.22%). The application of 1/3 N through each of enriched compost + cow dung manure + neem cake (T1) recorded higher value of hulling

Table 1: Length, breadth, L:B ratio of paddy, brown rice and kernelas influenced by scented rice varieties and organic nutrient management

Treatment	Paddy length (mm)	Paddy breadth (mm)	Paddy L: Bratio	Brown rice length (mm)	Brown rice breadth (mm)	Brown rice L: Bratio	Kernel length (mm)	Kernel breadth (mm)	KernelL: Bratio
Scented rice varieties									
V1 = Dubraj	8.16	2.32	3.51	6.15	2.23	2.76	6.01	2.11	2.85
V2 = Badshahbhog	6.06	2.17	2.79	5.12	2.10	2.44	5.04	2.06	2.45
V3 = CR Sugandha Dhan 907	8.52	2.56	3.33	6.18	2.35	2.63	6.08	2.17	2.80
SEm ±	0.20	0.07	0.06	0.12	0.05	0.05	0.12	0.04	0.05
CD (P = 0.05)	0.69	0.24	0.22	0.41	0.16	0.18	0.41	NS	0.19
Organic nutrient management									
T_1 = 1/3 N through each of enriched compost + cow dung manure + neem cake	7.66	2.36	3.23	5.85	2.25	2.60	5.75	2.12	2.71
T_2 = 3/4 N through poultrymanure + 1/4 N vermiwash (foliar application)	7.53	2.34	3.21	5.77	2.21	2.61	5.68	2.09	2.71
T_3 = Paddy crop residue treated with *Trichoderma* + rock phosphate + PSB@10 kg ha^{-1}	7.60	2.37	3.20	5.84	2.23	2.62	5.73	2.11	2.71
T_4 = 3/4 N vermicompost + 1/4 vermiwash (foliar application)	7.55	2.34	3.21	5.81	2.22	2.62	5.70	2.11	2.70
T_5 = *In-situ* green manuring + Azolla + BGA	7.55	2.34	3.21	5.82	2.23	2.61	5.68	2.13	2.66
SEm ±	0.22	0.07	0.10	0.17	0.07	0.08	0.17	0.06	0.08
CD(P = 0.05)	NS	NS	NS	NS	NS	NS	NS	NS	NS

Table 2: Hulling, milling and head rice recovery percentage as influenced by scented rice varieties and organic nutrient management

Treatment	Hulling (%)	Milling(%)	Head rice recovery (%)
Scented rice varieties			
V1 = Dubraj	75.88	65.38	51.52
V2 = Badshahbhog	79.67	70.16	57.25
V3 = CR Sugandha Dhan 907	75.97	65.30	52.25
SEm ±	1.93	1.66	1.33
CD (P = 0.05)	NS	NS	NS
Organic nutrient management			
T_1 = 1/3 N through each of enriched compost + cow dung manure + neem cake	78.81	69.30	55.21
T_2 = 3/4 N through poultrymanure + 1/4 N vermiwash (foliar application)	75.11	64.40	51.11
T_3 = Paddy crop residue treated with *Trichoderma* + rock phosphate + PSB@10 kg ha^{-1}	77.94	67.79	54.86
T_4 = 3/4 N vermicompost + 1/4 vermiwash (foliar application)	76.94	66.21	53.55
T_5 = *In-situ* green manuring + Azolla + BGA	77.03	67.05	53.61
SEm ±	2.24	1.95	1.56
CD(P = 0.05)	NS	NS	NS

Table 3: Kernel length after cooking, elongation ratio and alkali spreading value (GT) as influenced by scented rice varieties and organic nutrient management

Treatment	Kernel length after cooking (mm)	Elongation ratio	Alkali Spreading value (GT)
Scented rice varieties			
V1 = Dubraj	7.21	1.20	3.61
V2 = Badshahbhog	7.35	1.45	4.24
V3 = CR SugandhaDhan 907	9.21	1.51	3.81
SEm ±	0.12	0.03	0.08
CD (P = 0.05)	0.42	0.09	0.27
Organic nutrient management			
T_1 = 1/3 N through each of enriched compost + cow dung manure + neem cake	7.99	1.39	3.93
T_2 = 3/4 N through poultry manure + 1/4 N vermiwash (foliar application)	7.69	1.35	3.83
T_3 = Paddy crop residue treated with *Trichoderma* + rock phosphate + PSB@10 kg ha^{-1}	7.99	1.39	3.90
T_4 = 3/4 N vermicompost + 1/4 vermiwash (foliar application)	7.96	1.40	3.87
T_5 = *In-situ* green manuring + Azolla + BGA	7.97	1.40	3.89
SEm ±	0.14	0.04	0.09
CD(P = 0.05)	NS	NS	NS

Table 4: Rice aroma quality, as influenced by scented rice varieties and organic nutrient management

Treatment	Classification of aroma
Scented rice varieties	
V1 = Dubraj	Mild scented
V2 = Badshahbhog	Strongaly scented
V3 = CR SugandhaDhan 907	Strongaly scented

(78.81%), milling (69.30%), and head rice recovery (55.21%). Similar findings of non-significance difference on organic nutrient combination on rice milling qualities were also reported by Davari and Sharma (2010) and Rao *et al*. (2013).

Effect on Cooking quality

Cooking characters e.g. kernel length after cooking, elongation ratio, and alkali spreading value (GT) are presented in Table 3. It was noticed that CR SugandhaDhan 907 recorded significantly higher of kernel length after cooking and elongation ratio over rest of varieties. However alkali spreading value of Dubraj rice noted significantly superior over rest of the varieties. Whereas, among the different organic nutrient management treatments, none of the treatments was able to produce significant variation with respect to kernel length after cooking and elongation ratio and alkali spreading value. However, application of 1/3 N through each of enriched compost + cow dung manure + neem cakerecorded highest kernel length after cooking (7.99 mm) and 3/4 N vermicompost + 1/4 vermiwash (foliar application) and *In-situ* green manuring + Azolla + BGArecorded highest elongation ratio (1.40). Similar results were also obtained by Sharma (2002) and Sangeetha *et al*. (2013).

Effect on aroma quality

Data pertaining to aroma in rice quality of scented rice varieties is presented in Table 4. It was noticed that Dubraj variety had a mild aroma whereas strong aroma was found inBadshahbhogand CR SugandhaDhan 907 scented rice varieties. Different organic nutrient practices were unable to bring significant variation in aroma quality as aroma of scented rice variety is agenetic character. The higher aroma quality was found in this variety might be because of their native scented quality.

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