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Short Communication

Seasonal influence on quality characters in scented rice (*Oryza sativa* L.)

A. R. Nayak and J. N. Reddy

Central Rice Research Institute, Cuttack 753 006

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The quality of rice (*Oryza sativa* L.) vary greatly in their performance under different environmental conditions. So an experiment was conducted with the objective of studying the extent of variability and correlation among different quality characters in different seasons. The study was conducted using 28 scented and a non scented rice for their quality characters in *rabi* and *kharif* season in two consecutive years. Observations were taken for hulling, milling, head rice recovery percentage, kernel length, length/breadth ratio and was classified according to Ramiah Committee [1] and the alkali spreading value, water uptake and amylose content according to procedure of Little *et al.* [2], Beachel and Stansel [3] and Juliano [4] respectively. The data from two same seasons (*rabi* - *rabi* and *kharif* - *kharif*) were pooled after the Bartleft's test of homogeniety of variance [5]. The pooled analysis of variance, coefficient of variability heretability in broad sence genetic advance and correlation coefficient were estimated.

The analysis of variance revealed that significant difference exhibited in genotypes, environments and genotype x environment interaction for all the characters studied which supports the selection performance for better quality characters in scented rice. From the mean data (Table 1) significant difference was observed between rabi and kharif season. Higher hulling and milling percentage in *rabi* season due to higher binding of glucose molecules and more sunshine hour during grain filling [6]. The head rice recovery was also more in rabi due to compactness of starch in endosperm [7]. The other characters had more mean values in *kharif* season than *rabi* season.

The phenotypic ceofficient of variability were observed higher than the corresponding genotypic coefficient of variability (Table 2) is due to environmental influence. The grain yield had maximum GCV and PCV values followed by alkali spreading value in *rabi* season but in *kharif* season it was maximum for alkali spreading value followed by grain yield. Other characters showed medium to low values in both the seasons. The broad sence heritability was observed high for head rice recovery, kernel length, length/breadth ratio, alkali spreading value water uptake, cooked kernel length, elongation ratio, amylose content and grain yield in both *rabi* and *kharif* season. High genetic advance expressed in percentage of mean was observed for alkali spreading value and grain yield in both the seasons. So simple selection among germplasm bring about significant improvement for these quality characters through direct selection. Such characters are governed by additive gene action one or by fewer number of genes [8]. Medium values of genetic advance expressed in percentage of mean was observed for head rice recovery, kernel length, length/ breadth ratio, amylose content in both the seasons which indicates non additive gene action.

Study of association between the quality characters (Table 2) showed high values of genotypic correlation coefficients than there phenotypic correlation coefficients. The hulling percentage had positive significant correlation with alkali spreading value, elongation ratio and cooked kernel length which was negative significant in *kharif* season. This change is due to significant genotype × environment interaction. The kernel length had positive significant correlation with length/ breadth ratio, cooked kernel length in both the seasons but it has negative significant correlation with elongation ratio which was contrasted in *kharif* season. Alkali spreading value had positive significant correlation with water uptake in both *rabi* and *kharif* season. Water uptake had positive significant correlation with volume expansion and negative significant correlation with amylose content in both the seasons. The elongation ratio had negative significant correlation with volume expansion and grain yield in *rabi* and *kharif* season. Amylose content has significant negative correlation with water uptake in both the seasons and alkali spreading value in *rabi* season.

The characters like alkali spreading value and water uptake had high heritability and genetic advance with no change in direction of correlation in *rabi* and *kharif* season should be taken for selection. From the results of quality performance and yield in both *rabi* and *kharif* season some promising genotypes for various quality characters were indentified. Among them are IET-1 2016, IET-11348, HKR-241, CR 689-424 and CR 689-425 are superior for all the quality characters and grain yield and these can be used as donors for quality characters for good parental combinations in hybridization programme.

Table 1. Range, mean and variability parameters for quality charactes in scented rice In *rabi* and *kharif* season

Character	Range		Mean ± S.E. and C.D.				G.C.V.		P.C.V.		h^2 in %		G.A. in % of mean	
	Rabi	*Kharif*	*Rabi*		*Kharif*		*Rabi*	*Kharif*	*Rabi*	*Kharif*	*Rabi*	*Kharif*	*Rabi*	*Kharif*
Hulling %	67.9-76.1	62.6-76.1	73.3±0.80	1.60	70.9±0.9	1.84	1.50	2.24	2.17	2.89	48.1	59.7	2.1	3.6
Milling %	61.0-69.9	58.9-68.8	66.4±0.82	1.64	64.0±1.2	2.34	2.22	2.68	2.83	3.73	61.7	51.5	3.6	3.9
Head rice %	41.2-59.8	38.5-60.1	50.9±1.95	3.90	48.5±1.2	3.42	7.27	8.63	9.06	9.98	64.4	74.8	12.0	15.4
Kernel length (mm)	5.2-7.3	5.2-7.4	6.5±0.03	0.06	6.7±0.0	0.06	8.53	8.18	8.56	8.21	99.3	99.4	17.5	16.9
Length/brth. ratio	2.9-4.4	2.9-4.7	4.0±0.05	0.10	4.2±0.1	0.12	8.98	9.02	9.14	9.25	96.6	95.1	18.2	18.0
Alkali spread value	2.4-5.9	2.4-6.5	3.6±0.34	0.68	3.7±0.3	0.66	21.36	28.10	25.22	30.78	71.7	83.3	37.3	52.8
Water uptake	160.0-326.2	172.5-327.5	251.7±4.68	9.37	254.1±4.7	9.45	11.26	8.81	11.56	9.19	94.8	91.8	22.6	17.4
Kernel length (mm)	8.0-11.8	8.2-12.9	10.02±0.07	0.14	10.90±0.1	0.16	7.52	10.08	7.59	10.14	98.1	98.9	15.4	20.6
Elongation ratio	1.3-1.7	1.4-1.9	1.5±0.01	0.02	1.6±0.01	0.02	2.39	3.39	2.71	3.61	77.8	88.0	4.5	6.7
Volume expansion	3.6-4.8	3.5-4.3	4.1±0.18	0.36	3.8±0.14	0.28	3.17	0.83	7.17	5.24	19.6	2.5	2.9	0.3
Amylose content %	14.4-19.2	14.1-21.6	16.5±0.44	0.88	18.5±0.44	0.88	8.91	7.82	9.70	8.54	84.4	84.0	16.8	14.8
Grain yield (t/ha)	1.1-3.8	1.3-3.9	2.2±0.11	0.22	1.8±0.13	0.26	25.95	18.19	27.01	20.89	92.3	75.9	51.1	32.8

Table 2. Genotypic (r_g) and phenotypic (r_p) correlation coefficient among quality characters in *rabi* (above diagonal) and *kharif* (below diagonal) season in scented rice

Character		Hulling %	Milling %	Head rice recovery %	Kernel length	Length/ breadth ratio	Alkali spreading value	Water uptake	Cooked kernel length	Elongation ratio	Volume expansion	Amylose content	Grain yield
Hulling %	r_g		1.00**	0.44*	0.61**	0.39*	1.00**	0.48**	1.00**	1.00**	−0.43*	−0.68**	−0.37*
	r_p		0.96**	0.30	0.43*	0.29	0.96**	0.32	0.84**	0.88**	0.06	−0.44*	−0.25
Milling %	r_g	0.98**		0.32	0.51**	0.33	1.00**	0.41*	0.89**	1.00**	−0.35	−0.50**	−0.05
	r_p	0.90**		0.27	0.40*	0.29	0.80**	0.32	0.70**	0.72**	0.05	−0.37*	−0.04
Head rice recovery	r_g	0.52**	0.44*		0.09	0.02	0.48**	0.39*	0.17	0.23	0.16	−0.22	0.31
	r_p	0.40*	0.30		0.06	0.01	0.42*	0.32	0.12	0.18	0.04	−0.18	0.24
Kernel length	r_g	−0.45*	−0.43*	−0.61**		0.92**	0.23	0.15	0.98**	−0.54**	0.41*	−0.34	0.34
	r_p	−0.34	−0.30	−0.53**		0.91**	0.19	0.15	0.97**	−0.49**	0.20	−0.31	0.32
Length/breadth ratio	r_g	−0.55**	−0.54**	−0.66**	0.95**		−0.02	0.05	0.82**	−0.80**	0.33	−0.25	0.43*
	r_p	0.39*	−0.35	−0.54**	0.93**		−0.01	0.04	0.79**	−0.71**	0.15	−0.25	0.42*
Alkali spreading value	r_g	−0.56**	−0.40*	−0.33	0.03	0.01		0.74**	0.94**	1.00**	0.11	−0.58**	−0.14
	r_p	0.38*	−0.26	−0.23	0.02	0.00		0.60**	0.80**	0.99**	0.09	−0.43*	−0.09
Water uptake	r_g	−0.21	−0.12	−0.08	0.18	0.08	0.78**		0.30	0.46	0.93**	−0.63**	0.16
	r_p	−0.19	−0.13	−0.03	0.16	0.07	0.70**		0.28	0.36	0.54**	−0.55**	0.15
Cooked kernel length	r_g	−0.56**	−0.43*	−0.92**	0.94**	0.83**	0.06	0.26		−0.37*	0.05	−0.25	0.10
	r_p	−0.42*	−0.31	−0.80**	0.94**	0.80**	0.05	0.25		−0.27	0.03	−0.22	0.10
Elongation ratio	r_g	0.62**	−0.28	−1.00**	0.43*	0.18	0.16	0.38	0.68**		−0.97**	0.36	−0.97**
	r_p	−0.44*	−0.20	−0.89**	0.38*	0.14	0.16	0.34	0.66		−0.57**	0.31	−0.78**
Volume expansion	r_p	1.00**	0.98**	0.99**	−0.99**	−0.99**	0.61**	1.00**	−0.99**	−0.32		0.08	0.30
	r_p	0.43*	0.34	0.19	−0.37*	−0.37	0.14	0.47**	−0.28	−0.02		0.12	0.19
Amylose content	r_g	0.26	0.06	0.03	−0.14	−0.08	−0.40*	−0.73**	0.01	0.36	−0.99**		−0.20
	r_p	0.25	0.09	0.02	−0.13	−0.08	−0.33	−0.65**	0.01	0.31	−0.19		−0.19
Grain yield	r_g	0.06	−0.18	0.20	0.12	−0.00	−0.35	−0.12	−0.10	−0.57**	0.99	0.36	
	r_p	0.10	−0.03	0.16	0.10	−0.00	−0.27	−0.11	−0.08	−0.45	0.47**	0.29	

*,** significant at 5% and 1 % level respectively.

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