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Grain Quality Characters of Some Promising Lowland Rice Cultures

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Fifteen lowland cultures with higher yield potential in the first year and eight in the second year were tested for superior grain quality. Assessment of the quality parameters revealed that short bold cultures yielded 55 to 66% head rice, whereas the long bold and long slender yielded 55 to 63% and 45 to 61%. Cultures like CRK 4-25, CRK 4-22 and CR 835-2-4, because of long slender character associated with requisite cooking quality characteristics, may be utilized for consumption purpose and popular check variety viz., Gayatri and Manasarovar (short bold) along with CRK 2-26, CRK 7-17, CRK 13-11, CRK 17-17-5, CRK 21-1, CRK 1006-5 and CRK 24-17 may be suitable for internal trade and consumption. These genotypes have good quality attributes and hence may be used as donors for breeding varieties with high yield potential and quality for lowland areas.

Keywords: *Rice, Lowland cultures, Grain quality, Physical character, Cooking parameters*

INTRODUCTION

Rice is the most important staple food in India. It supplies not only the majority of calories but also nutrients including protein in the average Indian diet. Ordinary rice requires 20-30 minutes to cook. It has been shown that diet rich in carbohydrates can be useful in weight control. Grain shape and size are important traits in determining the market value. The consumers' preference depends on their socio-economic status, besides physical dimension. Grain quality is a prime factor that determines consumer preference and marketability of rice. In view of increasing demand on quality rice, it is essential to breed varieties possessing superior grain characteristics. Lowland rice is mostly located in the eastern region comprising of Assam, W.B., Bihar, Orissa, Eastern M.P. and eastern U.P. Generally, high yielding varieties are not popular in Kharif and traditional varieties occupy almost 70% of the area. The traditional varieties are susceptible to stem borers, lodge prematurely and give low yield.

MATERIALS AND METHODS

Thirteen rice cultures developed for lowland ecology were evaluated for grain quality using two popular varieties viz., Manasarovar and Gayatri as checks during wet season of 1998 under transplanted condition in favorable rainfed lowland (Table 1) where water depth was maintained up to 35 cm at a uniform dose of 40:20:20 kg N, P_2O_5 ha^{-1}. Next year (Wet season, 1999) six promising lowland cultures developed at CRLRRS, Kharagpur and one developed at CRRI, Cuttack were evaluated for grain quality with a popular variety, Manasarovar as check (Table 2). During the

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Table 1
Physio-chemical Properties of Promising Lowland Rice Genotype (1998)

Genotype	*Grain yield t/ ha*	*Hulling (%)*	*Milling (%)*	*Head rice (%)*	*Milled Kernel Length (mm)*	*Length/ Breadth Ratio*	*Classification*	*Alkali value*	*Amylose (%)*	*Water uptake ml/ 100g*	*Volume Expansion Ratio*	*Kernel Elongation Ratio*
CRK2-26	5.71	79.00	73.50	64.00	5.73	2.22	SB	3.0	20.15	180	3.70	1.78
CRK 7-11	4.46	78.00	72.60	56.60	6.21	2.42	LB	3.0	20.72	240	4.00	1.84
CRK 7-17	6.80	76.00	71.50	65.00	5.81	2.39	SB	3.0	15.42	140	3.70	1.79
CRK 2-2	5.53	76.00	70.30	58.70	5.86	2.56	MS	3.0	16.40	130	3.70	1.74
CRK 13-11	5.64	78.00	72.40	60.40	5.76	2.26	SB	3.0	16.40	190	3.70	1.74
CRK 7-9	7.71	79.00	73.00	56.00	6.41	2.47	LB	3.0	17.41	240	3.70	1.65
CRK 17-17-5	5.74	78.00	72.20	60.00	5.76	2.44	SB	3.0	16.90	150	3.70	1.67
CRK 21-1	6.89	80.00	75.00	65.00	5.72	2.23	SB	3.0	17.94	130	3.70	1.68
CRK 4-22-7	5.24	76.00	70.10	62.50	6.48	2.88	LB	7.0	15.90	260	3.70	1.70
CRK 11-115-3	5.67	76.00	71.30	63.00	6.25	2.89	LB	3.0	15.90	120	3.70	1.63
CRK 2-18-2	4.17	79.00	74.00	62.50	6.27	2.62	LB	3.0	17.94	190	4.00	1.72
CRK1006-5	6.24	80.00	74.20	60.70	5.40	2.04	SB	3.0	16.90	180	3.70	1.58
CRK 4-1-7	9.83	78.00	72.30	61.00	6.06	2.46	LB	3.0	20.15	180	3.70	1.58
Gayatri	5.50	79.00	73.50	66.50	5.01	1.84	SB	3.0	16.40	150	4.20	1.64
Manasarovar	7.11	78.00	72.60	65.10	5.70	2.28	SB	3.0	16.40	130	3.70	1.68

LB-Long bold, SB- Short bold and MS–Medium slender.

Table 2
Physio-chemical Properties of Promising Lowland Rice Genotypes (1999)

Genotype	*Grain yield t/ha*	*Hulling (%)*	*Milling (%)*	*Head rice (%)*	*Milled Kernel Length (mm)*	*Length/ Breadth Ratio*	*Classification*	*Alkali value*	*Amylose (%)*	*Water uptake ml/100g*	*Volume Expansion Ratio*	*Kernel Elongation Ratio*
CRK24-3	5.29	76.33	69.33	58.00	5.70	2.73	MS	7.0	18.3	303	4.0	1.70
CRK 4-25	4.19	77.33	72.66	61.33	6.33	3.12	LS	3.0	17.1	302	4.1	1.59
CRK 2-26	4.10	77.33	77.33	66.33	5.66	2.33	SB	3.0	17.7	297	4.1	1.66
CRK 24-17	4.88	76.66	71.66	54.66	5.76	2.47	SB	3.0	18.9	302	4.0	1.64
CRK 4-22	5.50	76.66	71.66	57.66	6.47	3.06	LS	7.0	19.8	303	4.0	1.68
CRK 4-1	4.48	77.00	72.66	59.33	6.26	2.59	LB	3.0	20.1	297	4.1	1.61
CRK 835-2-4	4.71	76.33	71.00	44.66	6.41	3.29	LS	3.0	19.8	302	4.0	1.66
Manasarovar	6.82	77.33	73.00	64.66	5.89	2.42	SB	3.0	19.2	303	4.0	1.65

LB-Long bold, SB–Short bold, and MS - Medium slender.

present investigation, efforts were made to study the grain quality characteristics of some of the water logging tolerant cultures having higher yield potential. Composite grain samples of the genotypes were analyzed for different quality characteristics viz, hulling, milling and head rice recovery (Ghosh et al 1971). Length and breadth of the milled kernel were measured using dial micrometer. Alkali value (Little et al 1958), amylase content (Juliano, 1971), water uptake and volume expansion (Beachell and Stansel, 1963) and kernel elongation Azeez and Sharif (1966) were also determined.

RESULTS AND DISCUSSION

In the first year trial out of the thirteen six cultures viz., CRK 7-11, CRK 7-9, CRK 4-22-7, CRK 11-115-3, CRK 2-18-2 and CRK 4-1-7 were found to be long bold whereas the check varieties viz., Gayatri and Manasarovar were short bold. In the second year trial out of seven cultures only three cultures viz., CRK 4-25, CRK 4-22 and CR 835-2-4 were found to be long slender and one i.e. CRK 4-1 was long bold (Table 1).

Commercial viability of rice depends on its head rice recovery. The two year trial showed that short bold cultures yielded 55 to 66% head rice, whereas the long bold and long slender yielded 56 to 63% and 45 to 61% respectively. There was little variation in hulling and milling percentage among the cultivars. The variability in head rice recovery among the short bold cultures suggested for scope to breed superior genotypes with higher head rice recovery.

Cooking quality is one of the vital factors for sustaining the acceptance of any rice variety by the consumer. Amylose content and alkali values are the two prime determinants of cooking quality. The genotypes in general exhibited intermediate alkali value (3.0) and amylase (15-21%) content. However, in general water uptake values were high in wet season 1999 which was mainly due to late harvesting at 40 days after flowering. Singh *et al.* (2000) also observed maximum values for water uptake (288ml) at 39 days after flowering. Amylose values of Manasarovar differed by about 3% in the two seasons. Satya Priya and Sreedhar (2000) observed that genotypes differ in their regression on environmental index for amylose content which was found highly unstable. Thakur *et al.* (1996) also reported that with delay in transplanting from 1st July to August 31st, there was increase in amylose content from 18.0 to 18.9% CRK 4-22 and CRK 24-3 recorded higher alkali value (7.0), indicating that when cooked the grains of the latter cultures would be fluffy and soft. Cooking parameters like volume expansion, water uptake and elongation ratio also add to consumers preference.

These quality characters, however did not show much variation among the genotypes and hence may be used as donors for breeding varieties having higher yield and quality.

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