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Quality Parameters of Some Rice Varieties in Amgaon Tahsil of Gondia District

Ommala D. Kuchanwar, Monali A. Kore, P.C.Pagar, Shanti R. Patil, D.J. Jiotode, Vishakha T. Dongare and S. P. Wagh

Soil Science & Agricultural Chemistry section, College of Agriculture, Nagpur,
Dr. P.D.K.V., Akola

Abstract

During the present investigation efforts were made to study the grain quality of some grain rice grown in Amgaon tahsil of Gondia district in Maharashtra. For these work 24 rice variety samples were collected from 10 villages in Amgaon tahsil and analyzed in laboratory. The yield of rice ranged from 25 q ha^{-1} to 58 q ha^{-1} and test weight ranged between 14.30 to 30.40 gm. As per quality parameters of rice grain the Basmati, Suma and Pattru varieties were good for cooking and eating purpose due to their higher length/breadth ratio, amylase content and alkali spread as compared to other varieties grown in Javari, Borkanhar and Anjora, respectively. The Nashpoha variety was good for Poha due to its more breadth as compared to all other varieties grown at Javari. The varieties Jairam and Jyotika were medium in size whereas, Pattru, Nashpoha, Suma, Basmati, IR 64, MTU 1010, Ruchi were extra long and other remaining varieties were long in size. Kernel elongation ratio gives finer appearance in all varieties. The highest content of reducing sugar was recorded in Raja and non-reducing sugar in Kranti variety as compared to other varieties grown at village Anjora. All the varieties of rice were soft and relatively sticky for cooked rice based on amylase percentage. The reducing, non-reducing sugar and amylase content were low to adequate in range due to high temperature.

INTRODUCTION

One of the major cereal consumed by the people in South East Asia is paddy (*Oryza sativa* L.). This has significance with the origin of paddy in South East Asia, particularly in India and China (Chandraratna, 1964). Rice (*Oryza sativa* L.), a semi-aquatic annual grass native to tropical Asia, is the world's single most important food crop and a primary food source for more than a third of world's population. It is an integral part, inter-twined with the socioreligious customs, food habits as well as the economy of the country. More than 90% of the world's rice is grown and consumed in Asia, where 60% of the calories are consumed by 3 billion Asians (Khush, 1997). India, the second most populous nation, stands first in area, second in production, followed and preceded by China on these two aspects. The other major rice growing countries are Indonesia, Vietnam, Bangladesh, Thailand, Myanmar and Philippines among Asian countries. Now these days rice is excessively produced in whole of the world. Rice grain quality is a major factor from consumer as well as marketing point of view.

Grain quality has always been an important consideration in rice variety selection and development. Based on the survey of 11 major rice growing countries Juliano and Duff (1991) concluded that grain quality is second only to yield as the major breeding objective. In the future grain quality will be even more important as once the very poor , many of whom depend largely on rice for their staple food become better off and begin to demand higher quality rice (Juliano and Villarreal, 1993). Grain quality in rice is very difficult to define with precision as preferences for quality vary from country to country. The cooking quality preferences vary in different countries (Azeez and Shafi, 1966). The concept of quality varies according to the preparations for which grains are to be used. Rice is one cereal that is consumed mainly as whole milled and as boiled grain. The desired properties may vary from one ethnic group or geographical region to another and may vary from country to country (Juliano et al, 1964a). Grain quality characters are reported to play important role in genetic divergence too (Singh, et. al, 2008). Besides grain quality characters, agromorphological character like 1000 grain weight, panicle length also contribute towards genetic divergence (Singh and Singh, 2008). Further both grain quality and agro-morphological characters followed by molecular marker study may be utilized to explore the variability and relatedness among different Basmati and non basmati scented rice lines not only at morphophysiological and grain quality level but also at molecular level, which can be a positive step towards documentation of our scattered knowledge about germ plasm available in India.

MATERIAL AND METHOD

For quality of grain purpose, paddy samples of 29 different rice varieties namely, Raja, Kranti, Pattru, Jai shriram, Ekvira ankur, RP, Padma, Jyotica, IR64, Suma, HMT, Karjat 3, Jairam, Sindewahi, Swarthi, Shan, Nashpoha, Basmati, Bampi, Ashash, Srilaxmi, MTU1010, Ruchi, Charana were procured from 9 villages .

The villages name such as, Pangaon, Anjora, Bhajepar, Gortha, Thana, Javari, Borkanhar, Bamhani. All the samples were brought to laboratory, transferred into cotton bags and stored at room temperature for analysis.

Grain samples of all varieties were analyzed for different quality characteristics viz. length measured by placing on a micro-scale. Breadth of each grain was measured using a Vernier Caliper. The average of 29 such observations was taken for final reading of length and breadth of rice kernels in millimeter (mm). The L/B ratio was calculated by dividing the average length by the average breadth of rice kernel [Dela-cruz and Khush (2000)], alkali value following the method of Little et. al. (1958), amylose content (Juliano, 1972) and kernel elongation ratio by method adopted by Azeez and Shafi, (1966) were followed.

RESULTS AND DISCUSSION

The yield of rice ranged from 25 q ha^{-1} to 58 q ha^{-1}. Village wise yield levels of the Amgaon tahsil of Gondia district, the highest individual sample yield was obtained in the village Anjora in sample number 4, Bhajepar and Gortha in sample number 3 and Kalimati in sample number 2 (58 q ha^{-1}). Highest average yield was observed in village Anjora (55 q ha^{-1}). The lowest individual sample yield was observed in the village Javari in sample 3 and Thana village sample 1 (45 q ha^{-1}) and the lowest average yield was observed in village Thana (49.8 q ha^{-1}).

Regarding quality parameter analysis rice varieties test weight ranged between 14.30 to 30.40 gm. The physical parameters like Length, Breadth and length/ breadth ratio with husk and without husk the length of all varieties were ranged between 7.20 to 12.00 mm and 7.04-10.88. The varieties Jairam and Jyotika medium. Whereas, Pattru, Nashpoha, Suma, Basmati, IR 64, MTU 1010, Ruchi were extra long and other remaining varieties long. The breadth of the rice grain varieties with and without husk ranged from 1.84 to 3.00 mm and 1.16 to 2.44 mm. The length and breadth ratio of rice grain varieties with and without husk ranged between 2.62 to 6.90. On the basis of L/B ratio all varieties in Amgaon tahsil except Nashapoha were slender shape.

The Physical parameters of rice varieties after cooking were also analyzed. The lengths of rice grain were ranged between 9.44 to 12.96 mm. As per Khush *et al.* (1979) varieties such as Pattru, Nashpoha, Suma, Basmati, IR 64, MTU 1010, Ruchi, ashash were extra long, Jairam, Jyotika medium and other remaining varieties were long. After cooking length of the all rice grain varieties were extra long. The breadth of the rice grain varieties ranged from 2.90 to 3.48 mm. The length/breadth ratio of rice grain varieties were ranged between 2.72 to 4.01 mm. Suma variety was slender in shape and Shrilaxmi medium in shape. Kernel elongation ratios of varieties were ranged between 1.13 to 1.66 and it gives finer appearance in all varieties. On the basis of these observations, all varieties in Amgaon tahsil except Nashapoha were slender shape. Low value of L/B ratio indicating poor quality therefore, L/B ratio high posses good cooking quality (Hossein *et al.*, 2009).

Chemical parameter of rice varieties reducing sugar ranged between 1.88 to 2.28 percent and non reducing sugar were ranged between 10.50 to 14.58 per cent. The similar results were reported by Tambhale *et al.* (2011). The amylose content ranged between 15.65 to 22.63 per cent. On the basis of amylose percentage all the varieties soft and relatively sticky cooked rice and low to adequate in range. As per ranged given by Delacruz and Khush (2000), the amylose content in varieties ranged as low to intermediate. The Similar observations were observed by Sabouri (2009) and Lisle *et al.* (2000). Due to high temperature amylose content is reduced (Ruserreccion *et al.* 1977). In Amgaon tahsil as the temperature ranged between 24.1 to 45.6^0 C (max.) and 8.5 to 32.3^0 C (min), the amylose content in all varieties were low to adequate in range. The ranged between alkali spreading value 3.89 to 6.60. Alkali spreading value showed the different behavior in their group which may be attributed to amylose content.

CONCLUSION

Based on this study, it was concluded that, the physical and chemical quality parameters of rice grain varieties in Amgaon tahsil were good and consumer can get better aromatic and non- aromatic rice at lower cost and farmer's and traders can be benefitted by its high yield and during cooking water uptake, solid loss observed. Reducing, non-reducing sugar, amylose content was low to adequate due to high temperature.

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Table.1 Rice grain physical quality parameters

Sr. No.	Village name	Variety	Length (mm)			Breadth (mm)			L/B ratio			KER
			With husk	Without husk	After cook	With husk	Without husk	After cook	With husk	Without husk	After cook	
A	**Anjora**											
1	AN1	Raja	9.30	7.04	10.56	2.00	1.82	3.08	4.65	3.86	3.43	1.50
2	AN2	Kranti	8.80	6.98	9.54	1.90	1.62	2.90	4.63	4.30	3.29	1.36
3	AN3	Pattru	9.90	8.28	11.38	2.00	1.72	3.06	4.95	4.81	3.72	1.37
B	**Bamhani**											
4	BA1	Jaishriram	7.20	6.26	8.64	1.90	1.58	2.92	3.79	3.96	2.96	1.38
5	BA2	Ekvira ankur	9.60	7.64	11.84	2.90	1.88	3.94	3.31	4.06	3.01	1.55
6	BA3	RP	8.60	7.12	10.94	2.00	1.84	3.10	4.30	3.86	3.53	1.53
C	**Bhajepar**											
7	BH1	Padma	8.80	7.20	11.20	2.00	1.68	3.20	4.40	4.28	3.50	1.55
8	BH2	Jyotica	7.50	6.06	9.40	2.00	1.72	3.06	3.75	3.52	3.07	1.55
9	BH3	IR 64	9.00	7.90	12.16	2.50	2.08	3.48	3.60	3.79	3.49	1.53
D	**Borkanhar**											

10	BO1	Suma	10.00	8.36	12.82	2.20	1.90	3.20	4.55	4.40	4.01	1.53
11	BO2	HMT	8.10	6.90	10.76	1.90	1.62	3.16	4.26	4.25	3.41	1.55
12	BO3	Karjat 3	8.40	6.94	11.56	2.20	2.02	3.42	3.82	3.43	3.38	1.66
E	**Gortha**											
13	GO1	Jairam	8.40	7.24	10.98	2.00	1.78	3.00	4.20	4.06	3.66	1.51
14	GO2	Sindevahi	8.30	6.88	10.90	2.00	1.16	3.22	4.15	5.93	3.39	1.58
15	GO3	Swarthy	8.20	7.08	10.98	2.00	1.74	3.20	4.10	4.06	3.43	1.48
F	**Javari**											
16	JA1	Shan	8.80	7.32	12.10	2.60	1.96	3.52	3.38	3.73	3.44	1.65
17	JA2	Nashpoha	9.00	7.60	11.18	2.00	2.90	4.08	4.50	2.62	2.74	1.47
18	JA3	Basmati	12.00	10.88	14.44	2.60	1.98	3.72	4.62	5.49	3.88	1.32
G	**Pangaon**											
19	PA1	Bampi	9.90	8.50	12.64	2.60	2.44	3.88	3.81	3.48	3.26	1.48
20	PA2	Ashash	9.00	7.72	11.26	2.10	1.90	3.38	4.29	4.06	3.33	1.16
21	PA3	Shrilaxmi	8.20	6.94	10.20	2.00	1.86	3.04	4.10	3.73	3.36	1.18
H	**Thana**											
22	TH1	MTU 1010	9.70	8.24	12.96	2.10	1.72	3.14	4.62	4.79	4.13	1.17
23	TH2	Ruchi	9.26	8.14	11.18	1.84	1.18	3.02	5.03	6.89	3.70	1.13
24	TH3	Charana	8.10	6.96	10.34	2.10	1.96	3.32	3.86	3.55	3.11	1.16

KER= Kernel elongation ratio, L= Length, B= Breadth

Table.2 Rice grain test weight and chemical quality parameters

Sr. No.	Village name	Variety	Test weight (g)	Reducing sugar	non-reducing sugar	Amylose content	Alkali spreading value
A	**Anjora**						
1	AN1	Raja	16.80	2.25	14.04	8.50	5.35
2	AN2	Kranti	14.92	2.00	14.58	9.30	4.65
3	AN3	Pattru	21.46	2.25	11.52	10.20	6.20
B	**Bamhani**						
4	BA1	Jaishriram	14.30	2.18	13.08	9.40	4.23
5	BA2	Ekvira ankur	20.48	1.88	13.46	8.20	6.25
6	BA3	RP	15.39	2.13	12.56	11.00	5.70
C	**Bhajepar**						

7	BH1	Padma	19.25	2.28	12.59	9.60	5.30
8	BH2	Jyotica	14.48	2.08	11.76	10.40	5.00
9	BH3	IR 64	24.18	1.98	12.97	10.70	6.43
D	**Borkanhar**						
10	BO1	Suma	22.34	1.88	14.36	9.30	6.60
11	BO2	HMT	16.20	2.15	12.55	7.40	4.35
12	BO3	Karjat 3	18.89	2.08	10.50	7.90	4.12
E	**Gortha**						
13	GO1	Jairam	15.55	2.05	12.22	8.30	4.75
14	GO2	Sindevahi	15.51	2.28	13.31	8.70	3.89
15	GO3	Swarthy	15.87	2.30	11.59	9.30	5.75
F	**Javari**						
16	JA1	Shan	18.94	2.18	11.37	9.70	5.55
17	JA2	Nashpoha	30.40	2.13	10.58	8.40	6.35
18	JA3	Basmati	23.24	2.10	12.11	10.30	6.85
G	**Pangaon**						
19	PA1	Bampi	24.52	2.05	13.12	9.20	6.34
20	PA2	Ashash	20.38	2.00	13.41	8.50	5.45
21	PA3	Shrilaxmi	16.08	2.03	11.96	7.50	4.20
H	**Thana**						
22	TH1	MTU 1010	21.78	2.20	11.36	7.80	6.22
23	TH2	Ruchi	15.44	2.23	11.98	8.70	5.89
24	TH3	Charana	16.25	2.25	13.86	9.80	5.34

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