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Study on physio-chemical parameters in branded and unbranded rice (*Oryza sativa*) varieties/genotypes

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Abstract

The present study was conducted to evaluate twenty advance branded and unbranded varieties of rice for quality parameters. The samples was collected from market/ mandis and University farm as well after grading of the sample the quality analysis in the laboratory was conducted as per standard procedures in the laboratories of the Department of Agricultural Biochemistry. A significant variation was detected in all traits studied. There was considerable variability among varieties. Moisture content varied from 8.80-12.13 per cent. 1000 grain weight varied from 15.44-23.27 gm. Kernel length varied from 5.10-7.64 mm. Kernel breadth varied widely from 1.67-2.25 mm. Length breadth ratio varied widely from 2.47-4.02 mm. Protein content ranged from 7.03-8.12 per cent. Amylose content varied from 19.72-25.32 per cent. Starch content varied from 76.00-85.85 per cent.

Keywords: Quality rice, moisture content, 1000 grain weight, Kernel length, Kernel breadth, Length breadth ratio, protein content, amylose content, starch content

Introduction

Rice (*Oryza sativa*) is a member of Poaceae (old Gramineae) family and dietary staple food one of the most important cereal crops, especially for people in Asia, but its consumption outside Asia has also increased, recently (Orthoefer., 2005) [11]. India is an important centre of rice cultivation. The rice is cultivated on the largest areas in India. Historians believe that while the *indica* variety of rice was first domesticated in the area covering the foothills of the Eastern Himalayas (i.e. north-eastern India), stretching through Burma, Thailand, Laos, Vietnam and Southern China, the *japonica* variety was domesticated from wild rice in southern China which was introduced to India. Perennial wild rice still grows in Assam and Nepal. In India, rice it is mostly grown in 43.39 m ha area with the production of 104.32 m tonnes and productivity of 2404 kg/ ha. In U.P. rice is grown in area of 5.87 m ha with production of about 12.51 m tonnes with an average yield of 2132 kg/ha, (Anonymous 2016-17). It provides the bulk of daily calories for many domestic animals and humans (Ryan., 2011) [11]. Rice is a major cereal crop in the developing world and an important stable food source for over half of the world population. Although widely consumed as white rice, there are many special cultivars of rice that contain color pigments, such as Black rice and red rice (Sompong *et al.*, 2011) [20]. Egypt is the largest producer of rice in Africa, with supplying 5.9 million tons of rice in 2013 (more than 22% of rice production in Africa). The quality of milled parboiled rice is being assessed based on physical parameters like degree of milling , percentage head rice, broken grain, chalkiness, red streak grain, grain size, color, and shape 1000 grains weight (Abdelhady *et al.*, 2014) [11].

Materials and Methods

The present research work was carried out during summer season of year twenty advance branded and unbranded varieties of rice. Some variety of rice grown at Students Instructional Farm of Chandra Shekhar Azad University of Agriculture & Technology, Kanpur (U.P.) Some variety of rice buy from market in CRD design with three replications and after harvesting the grains were processed for different quality parameters.

Test weight was determined by weighing 1000 grains. Moisture content was determined by heating grains at 70°C for 24 hours by oven method. kernel length and breadth were determined by Vernier callipers. Average of 10 grains for was take for length and breadth. Length breadth ratio was calculate using the following formula:

$$\text{Length breadth ratio} = \frac{\text{kernel length (mm)}}{\text{kernel breadth (mm)}}$$

Protein content was determinations by jayapraguam *et al.* (1988) [6]. Amylose content of rice grains was determined by the method of Juliano (1979) [7]. The starch content was estimated by the method as described by (Hodge & Hofreiter, 1962 and Thayumanavan, 1987) [5, 22].

Results and Discussion

Data on moisture content ranged from 8.80-12.13%. The variety IPB-1 Scented showed the maximum moisture content (12.13%) followed by variety- pulav rice (11.44%), Azad Basmati (11.35%), PR-13 (11.23%). The minimum moisture

content was found in variety-Endrasan (8.80%). The variety IPB-1 Scented which was significant superior over the rest of varieties. Which is closely reported by Diako *et al.* (2011) [3], and Sagar and Ashraf (1987) [16]. Data on 1000 grain weight varied from 15.44-23.27gm. It is shown that the data on the 1000 grain weight the variety Hybrid 6444 showed the maximum 1000 grain weight (23.27gm) followed by variety-NDR-359 (22.77gm), Kanki (22.64gm), Prmal Sehlla (21.90gm). The minimum 1000 grain weight was found in variety-Kala Namak (15.44gm). The variety Hybrid 6444 which was significant and superior than other varieties. These results are in close with Pokhrel *et al.*, (2020) [13], Hiremath and Kasturiba (2018) [4] and Tiwari *et al.*, (2017).

Table 1: Physical Characteristics of branded and unbranded Rice Varieties:

S.N.	Varieties	Moisture (%)		Pooled mean value	Test Weight (gm)		Pooled mean value
		2019	2020		2019	2020	
1	Hydrabadi Briyani	8.89	8.85	8.87	20.25	20.30	20.27
2	Regular Basmati	11.20	11.24	11.22	20.21	20.35	20.28
3	Raj Rani	9.22	9.19	9.20	20.35	20.29	20.32
4	Pulav Rice	11.46	11.43	11.44	19.98	20.00	19.99
5	Every day Basmati	9.38	9.66	9.52	19.86	19.90	19.88
6	Prmal Sehlla	10.17	10.25	10.21	21.89	21.92	21.90
7	Hybrid 6444	9.86	9.92	9.89	23.24	23.31	23.27
8	Azad Basmati	11.23	11.48	11.35	21.30	21.39	21.34
9	IPB-1 Scented	12.10	12.16	12.13	19.90	19.99	19.94
10	Dehradun Basmati	8.99	8.70	8.84	19.95	20.00	19.97
11	PR- 13	11.20	11.27	11.23	20.80	20.90	20.85
12	Endrasan	8.94	8.66	8.80	20.75	20.78	20.76
13	Jaya	9.60	9.68	9.64	20.90	20.97	20.93
14	Sakkar Chine	9.30	10.30	9.80	20.95	20.98	20.96
15	Kanki	11.31	11.05	11.18	22.60	22.69	22.64
16	NDR 359	9.80	9.56	9.68	22.65	22.69	22.67
17	CSR 10	9.96	9.80	9.88	16.90	16.98	16.94
18	CSR 27	9.40	9.45	9.425	17.80	17.89	17.84
19	Ram Raj	10.11	10.05	10.08	18.85	18.94	18.89
20	Kala Namak	11.10	11.15	11.12	15.40	15.49	15.44
21	mean	10.16	10.19	10.17	20.22	20.28	20.25
22	S.E. (d)	0.022	0.023	0.025	0.019	0.018	0.026
23	C.D.(5%)	0.044	0.047	0.051	0.039	0.037	0.052

Data on Seed length varied from 5.10-7.64mm. The variety Hydrabadi Biryani showed the maximum Seed length (7.64mm) followed by variety- Regular Basmati (7.60mm), Pulav Rice (7.43mm), Prmal Sehlla (7.05mm). The minimum Seed length was found in variety-Raj Rani (5.10mm). The variety Hydrabadi Biryani which was significant and superior than other varieties. The result obtained was found similar to the value reported by Khan *et al.* (2000) [9], Surck *et al.* (1992) [21], Lio Changli *et al.* (1990) [10]. Data on seed breadth range from 1.67-2.25mm. The variety NDR-359 showed the maximum seed breadth (2.25mm) followed by variety- CSR-10 (2.15mm), Sakkar Chine (2.13mm), Endrasan (2.10mm). The minimum seed breadth was found in variety-Ram Raj

(1.67mm). The variety NDR-359 which was significant and superior over the rest of varieties. The result obtained was found to be similar value reported by Khan *et al.* (2000) [9]. Data on Seed length/breadth ratio range from 2.47-4.02mm. The variety IPB-1 Scented showed the maximum Seed length/breadth (4.02mm) followed by variety- Regular Basmati (3.94mm), Hydrabadi Biryani (3.89mm), Pulav Rice (3.82mm). The minimum Seed length/breadth was found in variety- PR-13 (2.47mm). The variety IPB-1 Scented which was significant and higher over the rest varieties. Similar observations have been also recorded by Sarkar *et al.* (1994), Panwar *et al.* (1991) [17].

Table 2: Physical Characteristics of branded and unbranded Rice Varieties:

S.N.	Varieties	Kernel length (mm)		Pooled mean value	Kernel breadth (mm)		Pooled mean value	L/b ratio		Pooled mean value
		2019	2020		2019	2020		2019	2020	
1	Hydrabadi Briyani	7.63	7.66	7.64	1.95	1.97	1.96	3.91	3.88	3.89
2	Regular Basmati	7.61	7.59	7.60	1.96	1.89	1.92	3.88	4.01	3.94
3	Raj Rani	5.09	5.11	5.10	1.88	1.94	1.91	2.7	2.63	2.66
4	Pulav Rice	7.42	7.45	7.43	1.93	1.96	1.94	3.84	3.8	3.82
5	Every day Basmati	6.64	6.62	6.63	1.99	1.66	1.82	3.33	3.98	3.65
6	Prmal Sehlla	7.11	7.00	7.05	1.90	1.86	1.88	3.74	3.76	3.75
7	Hybrid 6444	6.31	6.40	6.35	1.63	1.80	1.71	3.87	3.57	3.72
8	Azad Basmati	6.49	6.51	6.50	1.72	1.75	1.73	3.60	3.72	3.66
9	IPB-1 Scented	6.75	6.80	6.77	1.65	1.72	1.68	4.09	3.95	4.02
10	Dehradun Basmati	6.62	6.67	6.64	1.87	1.92	1.89	3.54	3.47	3.50
11	PR- 13	5.08	5.17	5.12	2.12	2.02	2.07	2.39	2.55	2.47
12	Endrasan	5.61	5.71	5.66	2.15	2.06	2.10	2.6	2.77	2.68
13	Jaya	5.16	5.46	5.31	2.17	2.05	2.11	2.37	2.66	2.51
14	Sakkar Chine	5.47	5.22	5.34	2.19	2.07	2.13	2.49	2.52	2.50
15	Kanki	5.42	5.64	5.53	2.14	1.99	2.06	2.64	2.83	2.73
16	NDR 359	5.71	5.92	5.81	2.21	2.29	2.25	2.58	2.58	2.58
17	CSR 10	5.81	6.01	5.91	2.06	2.25	2.15	2.82	2.67	2.74
18	CSR 27	5.65	5.91	5.78	2.30	1.76	2.03	2.45	3.35	2.90
19	Ram Raj	5.44	5.65	5.54	1.70	1.65	1.67	3.20	3.42	3.31
20	Kala Namak	5.22	5.26	5.24	1.91	1.78	1.84	2.73	2.95	2.84
21	mean	6.11	6.18	6.14	1.97	1.91	1.94	3.13	3.25	3.19
22	S.E. (d)	0.097	0.10	0.026	0.020	0.15	0.023	0.031	0.027	0.024
23	C.D.(5%)	0.19	0.20	0.53	0.041	0.30	0.047	0.063	0.054	0.048

Data on protein content varied from 7.03-8.12% of various cultivars of some branded and unbranded rice varieties/genotypes. The variety Kala Namak showed the maximum protein content (8.12%) followed by variety-Hybrid 6444 (7.89%), Hydrabadi Biryani (7.87%), Jaya (7.77%). The minimum protein content was found in variety-IPB-1 Scented (7.03%). The variety Kala Namak which was significant and superior over the rest of varieties. These results on protein content changed are closely supported by Reddy *et al.* (1986) [14] and Singh (1993) [19]. Data on amylose content range from 19.72-25.32%. The variety Kala Namak showed the maximum amylose content (25.32%) followed by variety- Endrasan (24.57%), Regular Basmati (24.55%), PR-

13 (24.52%). The minimum amylose content was found in variety-Raj Rani (19.72%). The variety Kala Namak which was significant and superior than the rest of the varieties. Similar findings has also been supported by Thenammai *et al.* (1975), Chikkalingaiah *et al.* (1997), Singh and Srivastava. (1997) [23, 2, 18]. Data on starch content range from 76.00-85.85%. The variety PR-13 showed the maximum starch content (85.85%) followed by variety- CSR-10 (85.26%), Ram Raj (85.08%), Sakkar Chine (84.28%). The minimum starch content was found in variety-Raj Rani (76.00%). The variety PR-13 was significant superior than other tested varieties. The result was in agreement with Karzan *et al.* (2016) [8].

Table 3: Nutritional characteristics of branded and unbranded rice varieties

S.N.	Varieties	Protein (%)		Pooled mean value	Amylose (%)		Pooled mean value	Starch (%)		Pooled mean value
		2019	2020		2019	2020		2019	2020	
1	Hydrabadi Briyani	7.85	7.89	7.87	21.33	21.49	21.41	82.05	80.10	81.07
2	Regular Basmati	7.17	7.21	7.19	24.49	24.61	24.55	81.12	80.13	80.62
3	Raj Rani	7.20	7.25	7.22	19.60	19.84	19.72	81.23	70.77	76
4	Pulav Rice	7.66	7.79	7.72	21.41	21.29	21.35	81.50	83.56	82.53
5	Every day Basmati	7.63	7.50	7.56	21.72	21.64	21.68	82.06	86.09	84.07
6	Prmal Sehlla	7.33	7.40	7.36	22.44	22.73	22.58	81.24	83.70	82.47
7	Hybrid 6444	7.83	7.95	7.89	21.74	21.88	21.81	78.23	77.07	77.65
8	Azad Basmati	7.27	7.29	7.28	22.87	22.67	22.77	79.36	76.42	77.89
9	IPB-1 Scented	7.10	6.96	7.03	23.50	23.58	23.54	82.14	84.91	83.52
10	Dehradun Basmati	7.30	7.35	7.32	20.14	20.273	20.20	83.05	85.70	84.37
11	PR- 13	7.03	7.26	7.14	24.42	24.62	24.52	86.33	85.37	85.85
12	Endrasan	7.50	7.70	7.60	24.59	24.55	24.57	83.45	85.49	84.47
13	Jaya	7.66	7.89	7.77	24.05	24.16	24.10	84.42	82.45	83.43
14	Sakkar Chine	7.09	7.12	7.10	23.86	23.97	23.91	84.70	85.06	84.88
15	Kanki	7.15	7.20	7.17	20.79	20.69	20.74	85.50	82.84	84.17
16	NDR 359	7.36	7.46	7.41	23.27	23.43	23.35	83.11	80.14	81.62
17	CSR 10	7.60	7.80	7.70	23.44	23.51	23.47	87.25	83.28	85.26
18	CSR 27	7.51	7.55	7.53	22.63	22.66	22.64	85.23	82.26	83.74
19	Ram Raj	7.06	7.35	7.20	21.10	21.19	21.14	86.57	83.59	85.08
20	Kala Namak	8.09	8.15	8.12	25.26	25.39	25.32	84.85	82.88	83.86
21	mean	7.41	7.50	7.45	22.63	22.70	22.66	83.16	82.09	82.62
22	S.E. (d)	0.14	0.13	0.026	0.21	0.10	0.027	1.05	1.00	0.72
23	C.D.(5%)	0.30	0.28	0.053	0.43	0.21	0.055	2.14	2.03	1.48

Conclusion

On the basis of above results Hybrid 6444, NDR-359, Kanki, and Prmal Sehlla were found superior in moisture content, 12.13%, 11.44%, 11.35% and 11.23% respectively. The minimum moisture content was found in variety-Endrasan, 8.80%. The variety IPB-1 Scented, pulav rice, Azad Basmati, and PR-13 showed the maximum 1000 grain weight, 23.27gm, 22.77gm, 22.64gm and 21.90gm respectively. The minimum 1000 grain weight was found in variety Kala Namak, 15.44gm. In the present investigation rice varieties Hydrabadi Biryani, Regular Basmati, Pulav Rice and Prmal Sehlla showed the maximum grain length, 7.64mm, 7.60mm, 7.43mm and 7.05mm respectively. The minimum Seed length was found in variety-Raj Rani, 5.10mm. In the present investigation rice varieties NDR-359, CSR-10, Sakkar Chine and Endrasan showed the maximum seed breadth, 2.25mm, 2.15mm, 2.13mm and 2.10mm respectively. The minimum seed breadth was found in variety Ram Raj, 1.67mm. Maximum L: B ratio was recorded in rice varieties, IPB-1 Scented, Regular Basmati, Hydrabadi Biryani and Pulav Rice showed the maximum L: B ratio, 4.02mm, 3.94mm, 3.89mm and 3.82mm respectively. The minimum Seed length/breadth was found in variety- PR-13, 2.47mm. Highest protein content in various varieties of rice Kala Namak, Hybrid 6444, Hydrabadi Biryani and Jaya range from, 8.12%, 7.89%, 7.87% and 7.77%. The minimum protein content was found in variety-IPB-1 Scented, 7.03%. The amylose content was ranged from in rice varieties Kala Namak, Endrasan, Regular Basmati and PR-13, 25.32%, 24.57%, 24.55% and 24.52%. The minimum amylose content was found in variety-Raj Rani (19.72%). In the present investigation rice varieties PR-13, CSR-10, Ram Raj and Sakkar showed the maximum starch content, 85.85%, 85.26%, 85.08% and 84.28% respectively. The minimum starch content was found in variety-Raj Rani, 76.00%.

References:

- Abdelhady S, Borello D, Shaban A, Rispoli F. Viability study of biomass power plant fired with rice straw in Egypt. International Conference on Applied Energy – ICAE. Energy Procedia. 2014;61:211-215.
- Chikkalingaiah GE, Ramesh S, Mohan RA. Evaluation of some selections of aromatic rices for quality traits. Mysore J. Agric. Sci. 1997;31:201-204.
- Diako C, Manful JT, Johnson PNT, Sakyi Dawson E. Physico-chemical characterization of four commercial rice varieties in Ghana. Journal of Food Science and Technology. 2011;3(3):196-202.
- Hiremath SP, Kasturiba B. Effect of germination on physico-chemical properties of rice varieties, Department of Food Science and Nutrition, College of Community Science, University of Agricultural Sciences, Dharwad, Karnataka, India. International Journal of Current Microbiology and Applied Sciences, 2018, 2319-7706.7.
- Hodge JE, Hofreiter BT. In: Methods in Carbohydrate Chemistry (eds. Whistler, R.L and Be Miller, J.N.), academic Press, New York, 1962.
- Jayapraguam M, Manicleam A, Ahmad NM, Thyumanavum. Protein content variation among rice varieties. International Rice Research Newsletter. 1988;13:2.4.
- Juliano BO. Amylose analysis in rice. A review, International Rice Research Institution 1979, 251.
- Karzan AO, Botan MS, Nahla YA, Basi HH, Shiraz MR. Evaluation of Starch and Sugar Content of Different Rice Samples and Study their Physical Properties, Department of Chemistry, Koya University. Indian Journal Of Natural Sciences. 2016;6:36.
- Khan MG, Akhter M, Sabar M. Basmati 2000- an extra long-grained aromatic rice variety. International Rice Res. Notes. 2000;28(1):33-35.
- Lio Changli, Ni Keyu, Liv Yuankum, Huang Zonghong. Ingamazham a yielding good quality Indica rice for China. International Rice Research Newsletter. 1990;15:6.12.
- Orthofer FT. Rice brain Oil In Bailey's Industrial Oil and Fat Products, Sixth Edition. New York: John Wiley & Sons, Inc, 2005.
- Panwar DVS, Gupta KR, Battan KR, Singh A. HKR 228, a semi-dwarf aromatic rice strain for Haryana, India. Intl. Rice. Res. Newsl. 1991;16:16-17.
- Pokhrel A, Dhakal A, Sharma S, Poudel A. Evaluation of Physicochemical and Cooking Characteristics of Rice (*Oryza sativa* L.) Landraces of Lamjung and Tanahun Districts, Nepal, Department of Agronomy, Plant Breeding and Agri-statistics, Institute of Agriculture and Animal Sciences, Lamjung Campus, Tribhuvan University, Nepal. International Journal of Food Science, Volume 2020, Article ID, 2020, 11.
- Reddy MV, Pashpama P, Reddy TP. Effect of storage on amino acid and biological quality of protein in different varieties of rice and sorghum, Nutritional Report International Rice. 1986;33(5):703.
- Ryan EP. Bioactive food components and health properties of rice bran, Journal of the American veterinary Medical Association. 2011;238:593-600.
- Sagar MA, Ashraf MC. Grain quality of some promising mutants. International Rice Research Newsletter. 1987;16:3.12.
- Sarkar RK, Nanda BB, Dash AB, Lodh SB. Grain characteristics and cooking quality of aromatic and non-aromatic long slender varieties of rice. Indian J. of Agric. Sci. 1994;64(5):305-309.
- Singh R, Srivastava VK. Report on Bsamati and Scented Fine grained types at Varanasi Centre., B. H. U., Varnasi, U.P, 1997, 30.
- Singh RK. Performance of Sarjoo-52 variety to various doses of fertilizers on yield and biochemical composition of rice (*Oryza sativa* L.) M. Sc. (Ag.) Thesis NDUA & T., Kumarganj, Faizabad, 1993.
- Sompong R, Siebenhandl-Ehn S, Linsberger-Martin G, Berghofer E. Physicochemical and antioxidative properties of red and black rice varieties from Thailand. China and Srilanka Food Chemistry. 2011;124:132-140.
- Surck H, Adin H, Bese N, Negis M.). Fine low land rice cultivars released in Turkey. International Rice Research Newsletter. 1992;17:1, 19.
- Thayumanavan. Physico-chemical properties as a basis for identifying preferred cooking quality. International Rice Research Newsletter. 1987;12(4):17.
- Thenammai P, Janarthanan R, Kasiviswalingam P, Gowder KRK, Subramanyan V, Ramaish S, Dakshinamurthy A. Physico-chemical properties and cooking characteristics of some cultivars of rice. Madras Agric. J. 1975;62(6):360-362.