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Physical and Chemical Studies of Some Short Grain and Medium Slender Aromatic Rice (*Oryza sativa* L.)

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A B S T R A C T

The laboratory experiments were conducted in university lab entitled "Physical and chemical studies of some Short grain and Medium slender aromatic rice (*Oryza sativa L.*)" on the basis of the results obtained from the present study under the investigation of head rice recovery, grain length, grain breadth, length breadth ratio, alkali spreading value and amylose content are concluded as the head rice recovery ranged from 51.86-64.70 per cent. Data exhibited that maximum head rice recovery per cent was obtained 64.70% in R-3719 followed by R-3715, i.e., 63.79 per cent and minimum 51.86 per cent in Kalmunhi followed by R-3734 i.e., 54.51 per cent. The seed length varied from 4.96-7.26 mm. The maximum seed length was found 7.26 mm in R-3738, followed by R-3728 i.e., 7.24 and minimum for R-3715, i.e. 4.96 mm, followed by R-3730 i.e., 5.36mm. The seed breadth, varied from 1.63-1.95 mm. The maximum seed breadth was found 1.95 mm in R-3746,, followed by R-3724 i.e., 1.93 and minimum for R-3738, i.e. 1.63 mm, followed by R-3747 i.e., 1.65 mm. The length breadth ratio was ranged from 1.70-3.70 mm. Maximum L: B ratio was recorded with R-2804 i.e., 3.70 mm. followed by Kala Namak i.e., 3.68 mm and minimum length breadth ratio are found in R-3720 i.e., 1.70 mm. followed by R-3737 i.e., 1.79 mm. The Alkali spreading value was ranged from 360×500-600×466, respectively. The maximum alkali spreading value were obtained in R-3738 i.e., 600×466, respectively, followed by R-3722 and R-2802 i.e., 600×400, respectively while minimum alkali spreading value, were recorded in R-3747 that was 360×500 Followed by R-3746 that was 365×466 respectively. All the varieties of aromatic short grain and medium slender rice genotypes differed non significantly regarding alkali spreading value. The amylose content was ranged from 18.94-26.06 per cent respectively. The maximum amylose content were obtained in Kalmunhi 26.06 per cent, followed by Kala Namak, 25.33 per cent respectively, while minimum amylose content, were recorded in R-2812 that was 18.94 per cent, followed by R-2809 that was 18.98 per cent respectively. The result indicate the variation observed softness characteristics of All the varieties of aromatic short grain and medium slender rice genotypes differed in softness which was less, medium and more softness.

Introduction

Rice (*Oryza sativa* L.) is one of the most important staple foods in the world. About 90% of all rice grown in the world is produced and consumed in the Asian region where more than two billion people are getting 60-70% of their energy from rice. In the global scenario, the present population of 7.64 billion is expected to reach a figure of 9.77 billion by 2050. Rice is the world's second most important cereal crop after corn. Nearly 482 million metric tons of husked rice was produced in the last harvesting year worldwide. Traditionally, countries in Asia have the largest share in the world rice production. According to the most recent official data, with a production volume of over 210 million metric tons in 2017, China was the world's leading paddy rice producer, followed by India and India produce 99.18 million tons in 2017 and productivity is 2600 kilograms per hectare. Worldwide rice area is 161.1 m ha. Total global consumption of milled rice amounted to approximately 477.77 million metric tons in 2017 (Anonymous, 2018). Rice is grown in almost all the states of India with highest area in West Bengal followed by Andhra Pradesh and Bihar. Productivity of rice is highest in Punjab followed by Haryana and Tamilnadu. Uttar Pradesh occupies an area of 5.95 million hectare with an estimated annual production of 14.56 million tones. (Anonymous, 2016-17). The nutritional level of rice is high among cereals and other grains. The major part of rice kernel consists of carbohydrates in the form of starch 72-75%. Rice grain quality is determined by its physical and chemical properties as head rice recovery, seed length, seed breadth, seed breadth ratio an alkali spreading value amylose content and softness.

Materials and Methods

The Laboratory experiment were conducted during 2016 and 2018, in Completely Randomized Design with three replications on some aromatic short grain and medium slender aromatic rice genotypes at laboratory of department of Agricultural Biochemistry, department of Agronomy and Bio control lab of C.S. Azad University of Agriculture and Technology Kanpur, entitled "Physical and chemical studies of some Short grain and Medium slender aromatic rice (*Oryza sativa L.*)" The experiment was conducted under head rice recovery, seed length, seed breadth, seed breadth ratio the alkali spreading value and amylose content and softness. For the head rice recovery whole grains were collected from milled rice sample and then recorded weight of each variety/ strain was recorded separately and per cent HRR was calculated by

HRR % =

$$\frac{\text{weight of whole grain of milled rice}}{\text{wt.of paddy}} \times 100$$

Seed length and seed breadth of various rice varieties were determined by "Vernier Calliper's and measured in mm. Breadth of grain was measured by Dail Chackiness measuring machine. The L: B ratio of samples was determined on the basis of average length and width ratio of rice kernel. Kernel length and breadth measured by "Vernier Calliper's and the length of kernel divided by breadth. It indicates the length/breadth ratio (L/B ratio) and computed as follows:

Length Breadth ratio = Kernel length / Kernel breadth

The milled rice kernels were placed in 10 ml 1.7 per cent KOH in shallow contain and arrange them so that they don't touch. Let it stand for 23 hours at 30^0C and score for the alkali spreading value. The amylose content was determined by the method recommended by Juliano (1979).

Treatment varieties: 40

S.N.	TREATMANTS	VARIETIES
1	V1	R-3704
2	V2	R-3715
3	V3	R-3717
4	V4	R-3719
5	V5	R-3720
6	V6	R-3721
7	V7	R-3722
8	V8	R-3724
9	V9	R-3726
10	V10	R-3728
11	V11	R-3729
12	V12	R-3730
13	V13	R-3732
14	V14	R-3734
15	V15	R-3736
16	V16	R-3737
17	V17	R-3738
18	V18	R-3743
19	V19	R-3745
20	V20	R-3746
21	V21	R-3747
22	V22	R-3748
23	V23	R-2801
24	V24	R-2802
25	V25	R-2803
26	V26	R-2804
27	V27	R-2805
28	V28	R-2806
29	V29	R-2808
30	V30	R-2809
31	V31	R-2812
32	V32	R-2816
33	V33	R-2818
34	V34	R-2819
35	V35	R-2821
36	V36	R-2824
37	V37	P-1509
38	V38	Pa-1121
39	V39	Kalmuhin
40	V40	Kala Namak

Results and Discussion

Table 1 presented in the preceding experiments showed the head rice recovery, seed length, seed breadth and length breadth ratio. The head rice recovery ranged from 51.86-64.70 per cent and these values are closely related with the results reported by Ghosh and Chaudhary (1978), Verma and Srivastava (1993), Sarkar *et al.,* (1994), Singh *et al.,* (1997), Pandey *et al.,* (1999), Khan *et al.,* (2000), Singh *et al.,* (2000) and Patindol and Wang (2002). Grain size and shape hardness, presence or absence of abdominal while, moisture content processing and type of mills employed have direct bearing on head rice recovery. The varieties of aromatic short grain and medium slender rice genotypes having white centre gives lower head rice yield but translucent grain gives high head rice grain. Hence, the varieties of aromatic short grain and medium slender rice genotypes were differed significantly (Rani *et al.,* 2006).

The seed length varied from 4.96-7.26 mm respectively. Seed size is governed by its genetic potential. The present data on all the varieties of aromatic short grain and medium slender rice genotypes obtained was found to be similar to the value reported by Khan *et al.,* (2000). The seed breadth varied from 1.63-1.95 mm respectively. Seed size is governed by its genetic potential. The present data on all the varieties of aromatic short grain and medium slender rice genotypes obtained was found to be similar to the value reported by Khan *et al.,* (2000). The L/B ratio in the range of 4.96-7.26 mm, 1.63-1.95 mm and 1.70-3.70 mm, respectively. It is governed by genetic potential. Highest length and kernel length and L: B ratio observed in R-2804 i.e., 3.70 mm. followed by Kala Namak i.e., 3.68 mm and maximum breadth observed in 1.95 mm in R-3746,, followed by R-3724 i.e., 1.93mm. Similar observations have been also recorded by Panwar *et al.,* (1991), Chaubey *et al.,* (1988), Singh *et al.,* (1997), Pandey *et al.,* (1999), Khan *et al.,* (2000), Singh *et al.,* (2000), Sharma (2000), Sharma *et al.,* (2005) and Husaini *et al.,* (2009). Hence, varieties were differed significantly (Rani *et al.,* 2006).

Table 2 presented in the preceding experiments showed the chemical composition of some important nutritional factors like Amylose content, alkali spreading value and softness of all the varieties of aromatic short grain and medium slender rice genotypes. The chemical parameters in the present investigation are discussed below under following underlines resulted as the amylose content was varied from 18.94-26.06 per cent in milled rice. Amylose content ranged from 18.94-26.06 per cent in various varieties of aromatic short grain and medium slender rice genotypes respectively. It is governed by genetic potential. The amylose content of various varieties of aromatic short grain and medium slender rice genotypes. The results have been supported by Kim *et al.,* (1980), Chaubey *et al.,* (1988), Panwar *et al.,* (1991), Chikkalingaiah *et al.,* (1997), Singh *et al.,* (1997), Borua *et al.,* (2003), Nayak *et al.,* (2003), Patindol and Wang (2002), Zhou *et al.,* (2002), Sood *et al.,* (2006), Trivedi (2005-06), Bansal *et al.,* (2006), Devi *et al.,* (2008) and Husaini *et al.,* (2009). The data showed tha Alkali Spreading Value varied from 360×500-600×466 ml respectively. Maximum alkali spreading value was 600×466ml in R-3738, respectively. The variability lies among the varieties to assess the gelatinization temperature in various varieties of aromatic short grain and medium slender rice genotypes.. Our results are in agreement with Abidi *et al.,* (1973). The result presented in table 2 indicate the variation observed appearance characteristics of All the varieties of aromatic short grain and medium slender rice genotypes differed in appearance which was less, medium and more softness.

Table.1 Physical parameters

S.N.	Varieties	Head Recovery	Seed Size		L/B Ratio
			Length (mm)	Breadth (mm)	
1	R-3704	55.40	6.73	1.85	2.65
2	R-3715	57.47	4.96	1.90	2.99
3	R-3717	63.79	6.14	1.89	3.03
4	R-3719	64.70	5.60	1.86	2.71
5	R-3720	61.38	6.96	1.74	1.70
6	R-3721	56.97	6.46	1.83	1.95
7	R-3722	58.18	6.50	1.79	1.81
8	R-3724	57.85	6.16	1.73	3.47
9	R-3726	61.30	5.94	1.87	3.40
10	R-3728	57.76	7.24	1.81	2.80
11	R-3729	62.59	6.06	1.82	3.22
12	R-3730	55.83	5.36	1.82	3.26
13	R-3732	60.65	6.56	1.72	2.64
14	R-3734	54.51	6.94	1.93	2.25
15	R-3736	56.34	6.87	1.85	2.30
16	R-3737	57.05	6.33	1.71	1.79
17	R-3738	57.71	7.26	1.63	1.81
18	R-3743	59.67	6.00	1.92	1.91
19	R-3745	60.66	5.76	1.76	2.28
20	R-3746	59.01	6.10	1.95	2.90
21	R-3747	55.28	6.87	1.65	2.86
22	R-3748	56.50	6.23	1.68	2.88
23	R-2801	58.18	5.46	1.76	2.74
24	R-2802	57.34	6.69	1.73	2.94
25	R-2803	56.33	6.25	1.86	3.20
26	R-2804	56.76	6.36	1.88	3.70
27	R-2805	56.96	6.48	1.70	3.32
28	R-2806	56.56	5.97	1.71	2.94
29	R-2808	57.83	6.28	1.74	3.27
30	R-2809	59.35	6.91	1.72	2.81
31	R-2812	61.11	6.57	1.84	2.21
32	R-2816	61.37	6.45	1.76	2.09
33	R-2818	59.71	7.20	1.75	2.87
34	R-2819	58.65	6.56	1.85	1.82
35	R-2821	58.36	6.66	1.84	3.42
36	R-2824	59.59	6.10	1.89	3.25
37	P-1509	59.76	6.86	1.72	2.85
38	Pa-1121	56.70	6.46	1.72	1.95
39	Kalmunhi	51.86	6.33	1.68	3.41
40	Kala Namak	55.56	6.08	1.90	3.67
41	**CD at 5%**	**5.05**	**0.97**	**0.06**	**1.12**

Table.2 Nutritional parameters

S.N.	Varieties	Amylose Content	Alkali Spreading Value	Softness
1	R-3704	21.46	580×481	More
2	R-3715	24.54	500×400	Medium
3	R-3717	19.79	450×480	Less
4	R-3719	21.50	410×400	More
5	R-3720	21.76	500×440	Medium
6	R-3721	23.13	525×500	More
7	R-3722	21.82	600×400	Less
8	R-3724	19.62	510×425	Medium
9	R-3726	23.58	500×435	Less
10	R-3728	20.19	450×350	More
11	R-3729	24.51	450×550	Less
12	R-3730	24.64	455×450	Medium
13	R-3732	19.68	550×400	Less
14	R-3734	24.07	500×400	More
15	R-3736	24.04	500×300	Less
16	R-3737	19.81	400×500	Medium
17	R-3738	23.33	600×466	More
18	R-3743	23.16	566×455	Less
19	R-3745	19.16	500×488	Medium
20	R-3746	24.12	365×466	Less
21	R-3747	24.70	360×500	More
22	R-3748	24.12	540×300	Less
23	R-2801	23.36	450×400	Medium
24	R-2802	24.63	600×400	Less
25	R-2803	24.07	450×450	Less
26	R-2804	24.46	360×450	Less
27	R-2805	24.29	450×450	More
28	R-2806	23.22	450×450	Less
29	R-2808	23.60	540×350	Medium
30	R-2809	18.98	450×335	Less
31	R-2812	18.94	455×450	Medium
32	R-2816	20.66	380×425	Less
33	R-2818	23.76	480×400	More
34	R-2819	24.49	500×500	Less
35	R-2821	24.63	555×440	Medium
36	R-2824	23.93	400×460	Less
37	P-1509	19.37	380×470	More
38	Pa-1121	22.97	480×540	Less
39	Kalmunhi	26.06	500×520	More
40	Kala Namak	25.33	510×530	More
41	**CD at 5%**	**1.94**	**N/A**	**N/A**

The present experiments concluded that the entitled "Physical and chemical studies of some Short grain and Medium slender aromatic rice (*Oryza sativa L.*)" explained as the head rice recovery ranged from 51.86-64.70 per cent, Grain size and shape hardness, presence or absence of abdominal while, moisture content processing and type of mills employed have direct bearing on head rice recovery. The seed length varied from 4.96-7.26 mm respectively. Seed size is governed by its genetic potential. The seed breadth varied from 1.63-1.95 mm respectively. Seed size is governed by its genetic potential. The L/B ratio range of 4.96-7.26 mm, 1.63-1.95 mm and 1.70-3.70 mm, respectively. It is governed by genetic potential. Highest length and kernel length and L: B ratio observed in R-2804 i.e., 3.70 mm. followed by Kala Namak i.e., 3.68 mm and maximum breadth observed in 1.95 mm in R-3746, followed by R-3724 i.e., 1.93mm.

The chemical parameters in the present investigation are discussed below under following underlines resulted as the amylose content was varied from 18.94-26.06 per cent in milled rice. Amylose content ranged from 18.94-26.06 per cent in various varieties of aromatic short grain and medium slender rice genotypes respectively. It is governed by genetic potential. The data showed that Alkali Spreading Value varied from 360×500-600×466 ml respectively. Maximum alkali spreading value was 600×466ml in R-3738, respectively. All the varieties of aromatic short grain and medium slender rice genotypes differed in appearance which was less, medium and more softness.

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