QUALITY EVALUATION OF NEW HYBRIDS OF RICE *(ORYZA SATIVA* L.)

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Abstract : The success of rice hybrid is primarily depends on good yield and good marketing quality in terms of physical characteristics such as hulling %, head rice rice recivery, grain type, cooking characteristics such as valume expansion and valume elongation ratio and chemical charareristics in terms of amylose content, gel consistancy alkalispreding value and aroma of the 69 experimental; hybrids and 4 standard checks developed in zanal agriultural research station VC farm mandya , the hulling percentage varied from 51 -74%, l/b ratio ranged from 2.76 -4.53m gel consistancy found to be highest in case of kcms35a/msn68 and amylose content ranged from 13.0 – 26.1%. Many hybrids had intermidiatre gelatinization temperature, the hybrids KCMS 31A/KMR-3, KCMS 33A/KMR-4, KCMS 34A/THANU and CRMS31A/KMR-3 proved good physical and cooking characteristics and also they scored high yield over standard commercial checks and hence they can used for further breeding programme.

Keywords : Amylose, Quality, Hybrids

INTRODUCTION

Rice *(Oryza sativa L.)* is one of the most important staple food crop in the world although rice grown across humid countries more than 90% is produced and consumed in asia. Rice grown in an area of 146 m ha with a production of 546 mt in the world in hybrid rice technology though yield is prime objective it is ultimately grain quality which determines the success of hybrid from trade and consumption point of view it is reported that lower head rice recovery stickiness and mild aroma are negative factors affecting grain quality of hybrids (Ahmed 2006).

MATERIAL AND METHOD

The present investigation is carried out at zonal agricultural research station V Cfarm mandya , U A S Bangalore during 2009. 69 hybrid s were developed by line x tester method are used for the physical chemical and cooking quality analysis along with 4 commercial ckecks such as Rasi , I R 30864, Thanu and KRH-2.

Physical characters

Head rice recovery: one hundred gram of dehusked rice grains were used to determine head rice recovery and percentage of head rice and broken rice were calculated by standard procedure (Dela Cruz N and G S Kush, 2000).

L /B ratio:

The length / breadth ratio was calculated by using following formula :

$$\text{L / B ratio} : \frac{\text{Mean length of grain in millimeters}}{\text{Mean Breadth of grain in millimeters}}$$

Endosperm chalkiness

Chalkiness of endosperm was determined by observing milled rice under stereo microscope based on extent of chalkiness grains are classified in to white belly, white centre and white back (Dela Cruz N And G S Kush, 2000).

Chemical characters

Alkali spreading value

Ten milled rice in petridish taken and reacted with 10 ml of KoH (POTASSIUM HYDROXIDE). The sample was kept constantly for 23 hours in an incubator at 27 – 30. C.

Gel consistency: The gel consistency meseares tendency of cooked rice to harden after cooling. 100 gram of rice flour was taken in a test tube add ed 0.2 ml of of ethyl alcohol containg 0.25% thymol blue and 2.00 ml of 2.8 gram koh in 250 ml distilled water was added and mixed well bring vortex mixture kept in boiling water both for 20 min. later tubes were removed laid horizatly for one hour and measured by using graph paper the degree of his inregration and transparency of the paste dissolved out of kernals were evaluated using a 7 point scale. Little, R.R., et al., 1958 and Bhattacharya, K.R., 1979.

Amylose content

100 mg of rice flour was placed in 100 ml volumetric flasks and added 1 ml of 95% ethanol . the n 9 ml ml of 40 gm naoh dissolved in one liter was added and heated in a boiling water bath for 10 min. samples were diluted to 100 ml of flasks and 1 ml of acetic acid was adeed to acidify the sample along with 1.50 ml iodine salution then distilled water was added to make the volume of 100 ml and the suspention was mixed well and kept for 20 min. as a control naoh solution was used for the caliberation of spectrophotometer and samples were measured at 620 nm . samples with known values of high medium and low amylase content were used to draw standared amylase content curve, the amylase content of different samples were calculated in comparision with standard graph Perez,

C.M. and Juliano B.O., 1978.

Aroma

The leaf bits cut in to one cm size were taken in a petridish and added with 1.76 percent potassium hydroxide solution after 10 min the content was smelt to identify the presence or absence of aroma.

Cooking characters

Volume expantion and elongation ratio:

15 mL of water was taken in 50 mL graduated centrifuge tubes and 5 g of rice sample was added. Then initially increase in volume after adding 5 g of rice was measured (Y) and soaked for 10 min. Increase of volume before cooking was noted (Y-1 5). Rice samples were cooked for 20 min on a water bath and placed on bloating paper. Ten cooked rice kernels were selected (intact at both ends) and length of the kernels measured using graph paper for computing the kernel length after cooking (KLAC). Then all the 5 g of cooked rice were placed in 50 mL water taken in 100 mL measuring cylinder and increase in volume of cooked rice in 50 mL of water was measured (X). Later, the volume raise was recorded (X-50). Then volume expansion ratio and elongation ratio were calculated. Juliano, B.O., 1971.

RESULT AND DISCUSSION

The present investigation we have evaluated 69 hybrids and 4 standard checks for their physical chemical and cooking characters and the results are discussed below

The milling percent of rice n is most important characters which is directly revealrd to the yield of rice if the milling percent is high the recovery of rice is also high. The milling percent of 69 new hybrid s varies from 62 – 78 % and among the checks KRH -2 had 77%where as ir30864 had 68% the hybrid KCMS 35A/KMR-3 yields 78%(table 1). The head rice recovery indicates that weight of whole grains obtained after processing for the quality evaluation head rice recovery is one of the most important characters and more than 65% of head rice recovery is desirable. The head rice recovery percentage varied from 51 to 74 percent, the hybrid KCMS 29A/KMR-3 had lowest 51% AND KCMS 34A/THANU had 74% being highest among 69 hybrids.the head rice recovery percentage depens up on grain type, chalkiness, and drying condition.

A good quality rice should be low broken rice percent among 69 hybrids evaluated it is ranged from 12 to 26 percent the hybrid KCMS 34A/THANU having low broken rice recovery. Among 69 hybrids studied the l/b ratio ranged between 2.76 to 4.53 the hybrid KCMS29A/KMR-3 being lowest and the hybrid KCMS 38A/MSN 68 being highest. The hybrid s having l/b ratio in the range of medium sledor to long sledor are more desirable and most prepared quality rice.

High chalkiness is one of the undesirable characters among the hybrid studied most of the hybrid s had less chalkiness it varies from 16 to 63 percent. The hybrid KCMS 34A/Thanu scores lowest chalkiness of 16 % which is less than the standard hybrid check KRH-2 had 19%. Based on orientation of chalkiness in endosperm grains may be classified in to white belly, white centre and white back. Many of the hybruids tested are white centre type where as KCMS37A/KMR-3 , KCMS37A/MSN 64 and CRMS 31 A/MN 69 are found white belly.

Chemical characteristics

The alkali spreading value and GT were calculated for all the rice samples examined (Table 1). The alkali spreading value was calculated as low, intermediate and high. HYBRIDS KCMS33A/ MSN64, KCMS35A/MSN67 and KCMS3 7A/KMR-3 showed high alkali spreading value. The lowintermediate alkali spreading values was recorded in 53 hybrids. Rice with low GT were recorded in 13 hybrids Which disintegrates completely in 1.7 percent KOH solution, whereas rice with intermediate GT showed partial disintegration. Rice with high GT remains largely unaffected in alkali solution. In addition, the disintegration of rice starch granules is affected by the fine structure of amylopectin. (Umemoto, T.M. *et al.*, 2002).

Based on gelatinization temperature rice samples wrere classified in to low intermediate and high . the hybrid kcms35a/msn 67 recorded 54-590 c being the low where as kcms 289a/msn67, kcms39a/msn 68kcms31 a/msn 68, kcms 35a/msn68, kcms35a/msn69 were recorded more than 740 c and the remaing hybrids were intermidiate they scored 70 – 740 C. with respect to gel consisstancy among the 69 hybrids studied 8 hybrids showed soft and 1 hybrid kcms35a/msn68 showed hard and remaing hybrids found medium gel consistancy.

Amylose content The per centage of amylose content in the present investigation varies from 13% in KCMS33A/MSN 64 while highest amylose of 26.1% was observed in kcms 33a/msn 68. In consumption point of view people prefer rice having intermwdiate amylose content ranged bet ween 20 – 25% , Rach mat, R., R. Thahir, and M. Gummert,2006.

ALL the hybrid s in the present investigation are non scented and check hybrid KRH-2 is scented.

Cooking characteristics

It is observed that there is positive correlation of amylise content volume expansion ratio and the alkalispreading value which indicates high amylose rice hybrids will absorb more water at low GT and will produce a greater volume of cooked material (H ussain A.A., D.M. Muarya and C.P.Vaish, 1987) .The volume expansion ratio ranged from 2.1 - 4mm in rice samples , while in high yielding check hybrid KRH-2 score 3.4 mm .

Summary

In the present investigation to study physical chemical and cooking characteresticks reveals that of the 69 newly developed experimental hybrids, kcms 31a/kmr-3, kcms 33a/kmr-4, kcms 34a/thanu and crms31a/kmr-3 showed good physical characterestics viz., hulling percentage, head rice recovery , l/b ratio , low broken rice recovery and low chalkines. Among the 69 hybrids 28 hybrids showed excellent chemical properties as they had 20-25% amylose content, intermediate alkali spreding value , medium gel consostancy.

Table 1: Physical, chemical and Cooking Characteristics of Rice Samples

SL. No.	HYBRIDS	HULLING(%)	HRR(%))	BRR(%)	L/BRATIO	CHALKINESS	CHAKINESS TYP[E	A S V	G C	AC	AROMA	GT	GT TYPE	V E	ER
1	KCMS29A/	74	51		212.76	31	WC	L	SOF	14.8	NS	>74	H	3.1	1.6
2	KCMS29A/	73	59		143.01	36	WC	I	MED	20.0	NS	70-	I	3.2	1.7
3	KCMS29A/	73	55		233.57	28	WC	I	MED	21.2	NS	70-	I	3.3	1.8
4	KCMS29A/	71	57		223.17	21	WC	LI	MED	22.4	NS	70-	I	3.4	1.8
5	KCMS29A/	72	64		213.38	25	WC	L	SOF	16.4	NS	>74	H	3.0	1.5
6	KCMS29A/	73	63		183.81	24	WC	L	MED	21.4	NS	>74	H	3.2	1.6
7	KCMS29A/	74	69		193.34	27	WC	L	MED	22.1	NS	70-	I	3.6	1.8
8	KCMS31A/	74	68		212.80	18	WC	I	MED	23.2	NS	70-	I	3.5	1.7
9	KCMS31A/	75	67		222.82	21	WC	I	MED	24.1	NS	70-	I	3.6	1.6
10	KCMS31A/	71	63		243.53	25	WC	I	MED	20.6	NS	70-	I	3.7	1.5
11	KCMS31A/	68	61		213.14	22	WC	LI	MED	20.8	NS	70-	I	3.6	1.4
12	KCMS31A/	63	64		214.11	20	WC	LI	SOF	16.9	NS	>74	H	3.2	1.6
13	KCMS31A/	62	69		184.02	21	WC	LI	MED	20.9	NS	70-	I	3.8	1.8
14	KCMS33A/	65	68		162.79	22	WC	LI	MED	21.8	NS	70-	I	3.9	1.9
15	KCMS33A/	66	64		152.87	17	VOP	LI	MED	21.1	NS	70-	I	3.9	2.0
16	KCMS33A/	67	63		213.44	19	WC	I	MED	22.4	NS	70-	I	3.4	1.8
17	KCMS33A/	65	59		213.33	21	WC	H	SOF	13.0	NS	55-	L	3.1	1.6
18	KCMS33A/	64	59		203.22	23	WC	LI	SOF	14.2	NS	55-	L	3.2	1.6
19	KCMS33A/	65	63		183.56	26	WC	LI	MED	20.6	NS	70-	I	3.4	1.5
20	KCMS33A/	69	64		163.37	29	WC	I	MED	21.3	NS	70-	I	3.1	1.4
21	KCMS34A/	71	65		173.38	19	WC	L	MED	22.1	NS	70-	I	2.6	1.3
22	KCMS34A/	74	65		123.29	18	WC	L	MED	24.1	NS	70-	I	3.7	1.7
23	KCMS34A/	75	74		163.25	16	WC	LI	MED	23.2	NS	70-	I	2.8	1.4
24	KCMS34A/	74	69		183.41	24	WC	L	MED	22.4	NS	70-	I	4.0	2.2
25	KCMS34A/	76	68		173.47	22	WC	I	MED	23.2	NS	70-	I	3.4	1.6
26	KCMS34A/	73	67		163.69	26	WC	I	MED	23.4	NS	70-	I	3.6	1.8
27	KCMS34A/	75	66		183.63	28	WC	I	MED	23.5	NS	70-	I	3.8	1.9
28	KCMS34A/	77	64		193.22	26	WC	I	MED	22.5	NS	70-	I	3.9	2.0
29	KCMS35A/	78	63		143.38	29	WC	I	MED	21.5	NS	70-	I	3.4	1.6
30	KCMS35A/	64	65		163.00	28	WC	I	MED	21.6	NS	70-	I	2.6	1.3
31	KCMS35A/	69	61		173.42	29	WC	I	MED	21.8	NS	70-	I	3.6	1.8
32	KCMS35A/	71	67		183.23	19	WC	I	MED	22.6	NS	70-	I	3.6	1.9
33	KCMS35A/	69	68		173.66	24	WC	L	MED	23.2	NS	70-	I	2.8	1.3
34	KCMS35A/	74	63		153.38	29	WC	LI	MED	20.4	NS	70-	I	2.9	1.6
35	KCMS35A/	75	64		183.59	31	WC	H	SOF	16.6	NS	54-	I	2.1	1.1
36	KCMS35A/	76	65		203.62	40	WC	L	HAR	26.1	NS	>74	H	3.9	2.1
37	KCMS35A/	77	66		253.41	42	WC	LI	SOF	14.2	NS	>74	H	3.8	2.1
38	KCMS37A/	72	52		182.84	63	WB	H	SOF	14.6	NS	70-	I	2.1	1.1
39	KCMS37A/	74	68		192.93	35	WC	L	MED	22.1	NS	60-	L	3.1	1.6
40	KCMS37A/	75	61		183.29	38	WC	LI	MED	25.1	NS	70-	I	3.1	1.6
41	KCMS37A/	77	64		163.04	41	WC	LI	MED	24.1	NS	70-	I	3.2	1.7
42	KCMS37A/	73	65		173.52	46	WB	I	MED	24.0	NS	70-	I	3.1	1.7
43	KCMS37A/	75	66		183.97	32	WC	I	MED	22.5	NS	70-	I	3.2	1.7
44	KCMS37A/	77	67		193.72	34	WC	I	MED	22.7	NS	70-	I	3.1	1.7
45	KCMS37A/	70	64		203.50	35	WC	I	MED	22.4	NS	70-	I	3.2	1.8
46	KCMS38A/	71	61		183.11	34	WC	I	MED	21.1	NS	70-	I	2.8	1.4
47	KCMS38A/	72	71		163.10	35	WC	I	MED	20.8	NS	70-	I	3.1	1.6
48	KCMS38A/	69	64		144.18	39	WC	L	MED	21.9	NS	70-	I	3.2	1.7
49	KCMS38A/	64	65		143.67	41	WC	L	MED	22.7	NS	70-	I	3.1	1.8

50	KCMS38A/	65	59	153.95	36	WC	L	MED	23.2	NS	70-	I	3.5	1.9
51	KCMS38A/	63	67	164.51	32	WC	I	MED	24.1	NS	70-	I	3.9	2.1
52	KCMS38A/	67	68	154.41	37	WC	LI	MED	22.8	NS	70-	I	2.7	1.2
53	KCMS38A/	64	64	144.53	26	WC	LI	MED	21.7	NS	70-	I	3.1	1.5
54	KCMS38A/	71	65	184.45	23	WC	LI	MED	22.4	NS	70-	I	3.2	1.6
55	CRMS31A/	64	69	203.57	20	WC	LI	MED	21.3	NS	70-	I	2.8	1.4
56	CRMS31A/	63	65	223.86	24	WC	LI	MED	21.4	NS	70-	I	2.9	1.3
57	CRMS31A/	64	67	143.87	25	WC	LI	MED	22.4	NS	70-	I	2.8	1.4
58	CRMS31A/	65	64	183.58	26	WC	LI	MED	23.1	NS	70-	I	3.0	1.6
59	CRMS31A/	62	66	193.60	27	WC	LI	MED	23.4	NS	70-	I	2.9	1.5
60	CRMS31A/	68	67	124.09	28	WC	LI	MED	23.6	NS	70-	I	2.8	1.5
61	CRMS31A/	69	68	143.97	31	WC	I	MED	21.6	NS	70-	I	2.2	1.1
62	CRMS31A/	68	69	184.11	42	WB	I	MED	21.4	NS	70-	I	2.1	1.2
63	CRMS32A/	67	68	173.67	31	WC	LI	MED	22.1	NS	70-	I	2.1	1.1
64	CRMS32A/	66	64	183.58	22	WC	LI	MED	24.2	NS	70-	I	2.2	1.2
65	CRMS32A/	71	61	173.51	23	WC	LI	MED	24.2	NS	70-	I	2.8	1.4
66	CRMS32A/	64	60	164.11	27	WC	LI	MED	25.0	NS	70-	I	2.9	1.4
67	CRMS32A/	64	64	184.73	20	WC	I	MED	24.9	NS	70-	I	3.2	1.6
68	CRMS32A/	66	63	194.54	19	WC	I	MED	23.1	NS	70-	I	3.1	1.5
69	CRMS32A/	67	64	204.10	21	WC	I	MED	22.2	NS	70-	I	3.0	1.4
1	RASI	71	65	213.35	21	WC	L	MED	21.6	NS	70-	I	3.1	1.7
2	IR30864	68	67	193.90	21	WC	I	MED	20.1	NS	70-	I	2.9	1.4
3	THANU	69	71	133.23	18	WC	LI	MED	22.3	NS	70-	I	3.2	1.6
4	KRH-2	77	67	183.73	19	WC	LI	MED	23.2	S	70-	I	3.4	1.9

Head Rice Recovery(HRR), Broken Rice Recovery(BRR),Alkalispreading Value(ASV),Gel Consistancy(GC), Amylose Content(AC), Gelatinization Temperature(GT),Volu me Elongation(VE), Elongation Ratio(ER)

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