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Research Article

Promising medium duration multiple resistant rice culture CB 05 022

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Abstract
CB 05022, the medium duration rice culture with the parentage of CO 43/ ADT 39 was developed at Department of Rice, TNAU, Coimbatore. The culture was evaluated at station trials and it gave 21.8% increased yield over ADT (R) 46. This culture was evaluated under AICRIP in irrigated transplanted low land ecosystem as IET 20884 for two years 2006-2008. Under IVT-IM the culture recorded a mean grain yield of 5485 kg/ha which was 21, 22% increase over the checks Jaya and Triguna respectively. Again the culture was tested under IVT-L during kharif 2009 wherein it recorded a mean grain yield of 5551 kg/ha which was 11.4% increase over Savitri. In the region wise performance, this culture ranked first in Eastern region and fifth in Western region. In overall basis, it ranked second among all entries. The culture was also tested under Disease Screening Nursery during 2009 and it showed multiple disease resistance again leaf blast, neck blast and brown spot. The culture is having good quality characteristics of intermediate amylose and GT, soft GC, high milling (70.7%) and head rice recovery (60.6). The culture is now under third year of testing under AICRIP. Owing to high yielding, multiple resistance to major diseases, this culture has great scope for exploitation under our varietal improvement programmes.

Key words: Rice Breeding , Quality, Multiple resistance

Introduction

The ultimate goal of crop breeding is to develop varieties with high yield potential and desirable agronomic characteristics. In rice breeding, the most important qualities sought by breeders have been high yield potential; resistance to major diseases and insects; and improved grain and eating quality. However, there seems to be some conflict between these aims. Emphasis on high grain quality tends to result in unstable yields. Conversely, too much emphasis on disease and insect resistance and stable yields leads to poor grain quality. Hence, breeding efforts should concentrate on varieties with the potential to minimize yield losses under unfavorable conditions, and to maximize yields when conditions are favorable (Khush and Aquino 1990).

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Improvements in rice quality are very important in meeting the demands of consumers for healthy, high-quality food. Most rice breeders feel that popular rice varieties in recent years are possessed with premium quality in terms of grain size, shape, appearance and palatability. There are many difficulties in evaluating consumer preferences, which vary widely from country to country and from person to person. However, consumers generally feel that even the best quality grain of improved high-yielding varieties is not as good as the best quality traditional varieties. Many traditional varieties in both the tropics and the temperate zone have excellent cooking and eating quality, but a low grain yield (Khush and Juliano 1985). For many years, breeders have focused their attention on simultaneous improvement of yield and quality, but with limited success. There seems to be some unknown genetic barrier to incorporating these traits into single cultivar. At present, it is not possible to be very optimistic that we shall be able to develop high-yielding varieties with quality as good as that of traditional varieties, but our efforts continue, as does our work to develop high-yielding varieties with various grain characteristics suitable for processing (Kim and Virmani, 1989).

Host plant resistance to various biotic stresses is a very important aspect of high yields, and can be expected to play a significant role in sustainable rice production. Intensive efforts have been made over the years to incorporate resistant gene(s) into improved varieties, and there are now numerous varieties resistant to rice blast, bacterial blight, RTD and plant hoppers. Some varieties possess multiple resistance to diseases and insects. But resistance in most varieties is controlled by a single gene and lasts only a few years, after which they become susceptible to serious disease or pest outbreaks. Resistance is often controlled by a single gene (vertical resistance) and lasts only a few years, after which they become susceptible through evolution of diverse races/ biotypes (Khush and Virmani 1985). With the objective of development of high yielding, multiple resistant rice variety, CB 05022, the medium duration rice culture with the parentage of CO 43/ ADT 39 was developed at Department of Rice, TNAU, Coimbatore.

Materials and Methods

The experiment was conducted at Department of Rice, TNAU, Coimbatore. The material used for this study included the popular rice varieties CO 43 and ADT 39. Hybridization was effected during 2000 and true F_1 was fixed during 2001. F_2 was raised during 2002 and promising plants were selected and forwarded to further generations. Homozygosity was attained during F_4 generation and the culture was named as CB 05022. Further the culture was tested under station trials, Multi-location trials and Adaptive Research Trials.

Results and Discussion

The culture CB 05022 is a medium duration culture, derived from the cross CO 43 / ADT39 with 109 cm plant height and 130-135 days duration, showed high yield potential and multiple resistance to major rice diseases. This culture was evaluated as IET 20884 under All India Coordinated Rice Improvement programme for two years from 2008-2009 across the country in Initial Varietal trial Irrigated Medium and IVT-Long.

Under AICRIP-IVT-IM, this culture CB 05022 recorded an overall mean grain yield of 5485 kg/ha which was 21 and 22 percent increase over the National check Jaya and Regional check respectively (Table 1). Under AICRIP-IVT-Long, this culture recorded a mean grain yield of 5551 which was 11 and 21 per cent increase over the National check (Savithri) and regional checks respectively (Table 2). In the region wise performance, this culture ranked first in eastern region and fifth in western region. In overall basis, under AICRIP it ranked second among all entries (Table 3).

The culture was tested in the station trials for 3 years during 2005-2007, wherein it recorded a mean grain yield of 7160 kg/ha which was 13% and 21 % increase over the local checks CO 43 and ADT (R) 46 respectively. Under Multi location trial, this culture was tested in 9 locations during 2009, wherein it recorded 6076 kg/ha with 9.50, 24.10 and 42.70 per cent increase over the checks ADT (R) 46, I.W. Ponni and BPT 5204 respectively (Table 4).

The culture was evaluated in ART during 2008-2009, in 25 districts wherein the culture out yielded the checks in many districts. The culture was tested under DSN during 2009 and it showed multiple resistance against blast, neck blast and brown spot (Table 5). The culture is having good quality characteristics of Intermediate Amylose (22.4%) and GT, soft GC, high milling (70.7%) and Head rice recovery (60.6). This culture is now under third year of testing under AICRIP. Owing to high yielding, good quality and multiple resistance to major diseases this culture has great scope for exploitation under our varietal improvement programmes.

References

Khush, G.S., and R.C. Aquino. 1990. Breeding for high yielding potential in rice: Focus on irrigated rice. Paper presented at IRRC, Aug. 27-31, Seoul, Korea.

Khush, G.S., and B.O. Juliano. 1985. Breeding for high-yielding rices of excellent cooking and eating qualities. In: Rice Grain Quality and Marketing, International Rice Research Institute, College, Laguna, Philippines, pp. 61-69.

Kim, C.H., and S.S. Virmani. 1989. Korea- IRRI high yield rice program. Research Report RDA (R) 4: 20-26.

Table 1. Performance of CB 05022 (IET 20884) in AICRIP: IVT IM - Kharif 2008 (kg/ha)

Sl. No	Location	CB 05022	Jaya (National check)	Regional check*
1	CRRI	6900(3)	4900	3724
2	Chiplima	5555	3888	4222
3	Jeypore	4009	2824	3851
4	Sabour	6166(1)	4083	4583
5	Chinsurah	4608	3472	3977
6	Masodha	4787	5452	5651
7	Varanasi	4812	5125	5625
8	Warasoeni	5172(7)	4111	3812
9	Raipur	5357(1)	3645	3571
10	Jagdalpur	6509(2)	5488	5196
11	Lakhoati	4575	6240	5750
12	Karjat	4166	4270	4010
13	Sindewahi	5504	4651	3622
14	Maruteru	4899	3950	5250
15	Warrangal	**5639**	4477	5833
16	Bapatla	4992	3784	3857
17	Coimbatore	6759(1)	5450	5226
18	Tirur	4538(3)	2973	2893
19	Mandya	9262(2)	7335	4695
	Mean	**5485**	**4533**	**4492**
	% increase over check		**21**	**22.1**

*Regional check- Pooja -Eastern; Salivahana -Western; Samba Mashuri - Southern

Table 2. Performance of CB 05022 (IET 20884) in AICRIP: IVT L - Kharif 2009 (kg/ha)

Sl. No	Location	CB 05022	Savitri (NC)	(RC)*
1	Bhubaneswar	4944 (5)	3611	3148
2	Chiplima	5000(1)	3888	2333
3	CRRI	4459	5236	5067
4	PTN	7060(1)	5208	2893
5	Bankura	6250	4006	5384
6	Chinsurah	5230(3)	4950	4850
7	Raipur	5448 (2)	3151	4380
8	Titabar	4807	5322	5494
9	Pondaghat	3787	4403	4261
10	Nawagam	8066 (2)	5232	4287
11	Maruteru	6029	5914	5070
12	Rajendranagar	6184(4)	5480	5649
13	Ragolu	9117 (8)	9705	6029
14	Bapatla	4020	5513	6666
15	Nellore	6017(2)	4938	3859
16	Thirupathisaram	4393(7)	4204	4204
17	Mudigere	3548	3972	3982
	Mean	**5551**	**4984**	**4562**
	% increase over check		**11.4**	**21.7**

*Regional check- Pooja -Eastern; Salivahana -Western; Samba Mashuri - Southern

Table 3. Performance of CB 05022 (IET 20884) in AICRIP: IVT L - Kharif 2009- Regional Means (kg/ha)

Sl. No	Regions	CB 05022	Savitri (NC)	(RC)*
1	Region 3	5402(1)	4421	4194
2	Region 4	4876(5)	4336	4236
3	Region 5	4870 (8)	5376	4719
	Mean	**5074(2)**	**4864**	**4450**
	% increase over check		**4.2**	**14**

*Regional check- Pooja -Eastern; Salivahana -Western; Samba Mashuri - Southern

Table 4. Performance of CB 05 022 in Tamil Nadu (MLT - III – 2009) (kg/ha)

Location	CB 05 022	ADT (R) 46	I. W. Ponni	BPT 5204
Aduthurai	6112	6210	4686	4864
Ambasamudran	6292	6123	5618	4045
Coimbatore	7272	5671	6354	5314
Madurai	3888	4167	3883	3888
Killikulam	7142	5249	5848	5022
Tirupathisaram	5080	5239	3855	4877
Trichy	7800	5900	5200	2600
Thanjavur	4833	4583	3750	2777
Pondicherry	6263	6819	4875	4944
Mean	6076	5551	4897	4259
Per cent increase over check		**9.50**	**24.10**	**42.70**

Table 5. Resistance reaction of CB 05022 (IET 21502) against major rice Diseases (2009)

Sl. No.	Culture	Blast	Sheath rot	Sheath blight	BLB	Brown spot	RTD
1	CB 05022	4.0	7.0	7.0	5.0	3.0	7.0
2.	ADT (R) 46	4.0	7.0	7.0	9.0	7.0	9.0

(Department of Rice, 2008)

Sl. No.	Culture	Blast	Neck blast	Brown spot	Sheath rot	Sheath blight	GD	RTD	Leaf blight
1	CB 05022	4.0	2.0	4.0	5.0	5.0	5.0	5.0	4.0
2	TN 1	6.0	4.0	3.0	5.0	7.0	5.0	7.0	7.0

(AICRIP, 2009)

Table 6. Resistance reaction of CB 05022 (IET 21502) against major rice Pests (2009)

Sl. No.	Culture	BPH	WBPH	GLH
1	CB 05022	5.0	5.0	5.0
2	ADT (R) 46	7.0	5.0	5.0