

Karuna - A high yielding photosensitive rice variety for Kerala

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Abstract : High yielding photosensitive varieties with a lower level of management suitable for the second crop season are a dire need for Kerala, where the *rabi* crop (second crop) occupies a substantial segment of the total cropped area. To develop high yielding photosensitive rice varieties suited for the second crop season, a breeding programme was initiated at Regional Agricultural Research Station, Pattambi to combine the photosensitivity and resistance to biotic and abiotic stresses of traditional rice varieties with high yield. Hybridisation was carried out between photosensitive varieties popular in the state and high yielding rice varieties and the segregating progenies were subjected to screening during subsequent generations. A promising culture with good grain and straw yield, wide acceptability, tolerance to major pests and diseases prevalent during the season and food grain quality was evolved.

Keywords : Photosensitive varieties, Combination breeding.

Introduction

Spread of high yielding varieties during Mundakan season is rather low in Kerala due to various reasons like comparatively lesser yielding varieties resulting from a reduction in crop duration, high moisture stress, severe pest and disease attack, soil toxicity problems etc. To increase the area under high yielding varieties during second crop season, varieties which can withstand the adverse conditions are to be developed. Hence a combination breeding programme was initiated at Regional Agricultural Research Station, Pattambi to evolve photosensitive varieties with wide acceptability, tolerance to biotic and abiotic stresses and good grain quality.

Materials and Methods

Three most popular photosensitive varieties viz. CO 25, Ptb 2 and Kottarakkara 1 and three high yielding varieties viz. H 4, Jaganath and Mahsuri were selected for the crossing programme. Five crossing viz. Co 25/H 4, Ptb 20/H4, Ptb

20/Jaganath and Ptb 20/Mahsuri were effected at IRRI and the segregating progenies were passed through Rapid Generation Advance (RGA) system. F_2 generation seeds of these crosses were brought to RARS, Pattambi. Progeny rows were raised and superior individual genotypes showing high yield were selected in each generation up to F_8 after which the promising cultures were evaluated for yield and yield attributes as well as reaction to major pests and diseases in comparison to the check varieties Ptb 20, Nila and Co 25. The crop was raised under a fertilizer schedule of 40:20:20 Kg NPK ha⁻¹.

Results and Discussion

Ten promising cultures from five cross derivatives received from IRRI were evaluated for their yield and yield components in comparison with the three popular check varieties for four years at RARS, Pattambi. The mean grain yield of the cultures ranged from 2672 kg ha⁻¹ to 4135 kg ha⁻¹. Cul. 87117, a progeny of the cross Co 25/H4 was found to be superior to

Table 2. Yield (Kg ha⁻¹) of Karuna in multilocational trials

S.No.	Districts	Mean yield (kg ha ⁻¹)		
		Cul.87117	Ptb 20	Local check
1	Thrissur	3965.0	3214.0	2976.0
2	Palakkad	4326.0	3025.0	3141.0
3	Ernakulam	3876.0	3220.0	2896.0
Mean		4055.6	3153	3004.3

Table 1. Characteristics of Cul.87117 in comparison with popular second crop varieties of the State

Sl. No.	Cultures/ varieties	Plant height (cm)	Maturity duration (days)	Mean grain yield in kg ha ⁻¹	Mean straw yield in kg ha ⁻¹	Panicle length (cm)	Kernel colour	Test Weight (g)	Reaction to biotic & abiotic stresses			
									Blast	Sheath blight	Stem borer	Iron toxicity
1	Cul.87117	107	140-145	4135	7867	22.5	Red	24.95	4	3	3	2
2	Ptb 20	105	125-130	3570	6854	15.5	Red	24.27	2	3	3	3
3	Nilla	142	160-180	3130	4589	23.6	Red	26.81	8	3	7	2

Table 3. Yield (Kg ha⁻¹) of Karuna in farm trials

Culture/ Variety	Locations													
	1992-93				1994-95									
	1	2	3	4	5	6	7	8	Mean	1	2	3	4	Mean
Karuna	6000	4500	6250	3750	2700	2700	2100	2800	3850.0	5550	4050	2720	4720	4260
Check	4800	4750	5500	3500	2975	2950	1050	2850	3546.9	3200	3440	3180	3002	3205.5
% increase	25.0	-5.3	13.6	7.1	-9.2	-8.5	100.0	-1.8	8.5	73.4	17.7	-14.4	57.2	32.9

all other cultures with an average grain yield of 4135 kg ha⁻¹. The cultures and the check varieties were screened for their reaction to biotic and abiotic stresses. Cul. 87117 was found to be moderately resistant to sheath blight, blast, stem borer and iron toxicity. The results are presented in Table 1.

During 1991-92, Cul. 87117 was tested in three districts of Kerala viz. Thrissur, Palakkad and Ernakulam along with PTB 20 and local varieties popular in respective regions as check. Cul.87117 was best among the three with an average grain yield of 4055.60 kg ha⁻¹ (Table 2). Farm trials with this promising culture along with check varieties were conducted at twelve locations in different parts of Kerala during Rabi 1992 and 1994. Cul.87117 recorded on an average 3656.5 kg ha⁻¹ during '92-93 which was 9.76% increase over the check variety and 4260 kg ha⁻¹ during 94-95 with 41.9% over the check variety respectively (Table 3).

Quality characters of the two cultures were compared with that of Ptb 20, the ruling second crop variety of Kerala and Cul.87117 was found comparable in quality to Ptb.20. (Table 4). Cul.87117 is red kernelled with medium bold grains, characters which are highly preferred by keralites.

In breeding programmes for developing varieties for second crop season, emphasis should be given for varieties which can withstand a longer time in the nursery will enable the seeds to be sown early in the season and can be planted late, thus overcoming the danger of exposing the young seedlings of high yielding varieties with dwarf plant type to poor soil and field conditions during second crop season. Severe pest and disease incidence as well as soil problems during the season warrants varieties with high degree of tolerance to biotic as well as abiotic stresses. As straw is very important during the second crop season, the variety must be semi

Table 4. Quality characteristics of Karuna in comparison with PTB 20

S.No	Particulars	Cul.87117	Ptb 20
1	Hulling %	83.5	79.3
2	Milling %	77.5	72.5
3	Head rice recovery (%)	60.0	54.4
4	Length (mm)	6.18	5.0
5	Breadth (mm)	2.61	2.9
6	L/B ratio	2.37	1.72
7	Classification	LB	S
8	Kernel colour	Red	Red
9	Volume Wt. (HL/Kg)	32.3	30.2
10	Kernel length after cooking (mm)	10	10.5
11	Elongation ratio	1.62	2.1
12	Volume expansion	3.7	5.0

tall also.

Rosamma *et al.* (1992) analysing the reasons for low productivity of rice during the second crop season, reported that only a variety capable of better translocation of photosynthates can produce grain having high seed index, enabling it to attain high yield during second crop season. They also found that grain yield was significantly and positively correlated with plant height as well as 1000 grain weight during the second crop season and varieties having increased plant height and high seed weight can influence grain yield to a very high level.

Cul.87117 satisfies all the above needs, thus proving that it is a highly promising variety

suitable for the second crop season of Kerala which can yield well even under low management practices. Considering the grain quality, high yield potential, tolerance to pests and diseases and the semi tall nature, this culture has been released as "KARUNA" during 1998 for cultivation during second crop season in Kerala.

Reference

- Rosamma, C.A., Elsy, C.R. and Potty, N.N. (1992). Cause and effect relationship of low yield of second crop rice of Kerala. *Oryza* 29: 298-300.

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