

Harsha, an early, semidwarf rice variety for direct seeding

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ABSTRACT

Efforts to develop rice varieties suited for direct seeding in the rainfed rice fields of Kerala at Regional Agricultural Research Station, Pattambi resulted in the development of Cul. A4-4-2, a progeny of the cross between M. 210, the dwarf mutant of the traditional tall indica rice variety PTB 10 (Pureline selection from Thekkencheera) and PTB 28 (Mass selection from Kattamodan). This was released as Harsha for general cultivation during Virippu season of Kerala. Harsha combines the drought tolerance and blast resistance of PTB 28 with the 4.5 to 5 t ha⁻¹ high yielding ability of M. 210. The average yield is 4.5-5 t ha⁻¹ of grain and 4.5-5 t ha⁻¹ of straw. It is resistant to the major pests and diseases prevalent during the season and possess dormancy preventing germination of grains in the panicle during heavy rains.

Key words: Virippu season, direct seeding, drought tolerance, blast resistance, grain sprouting

Rice is grown in Kerala during three main seasons viz., Virippu (wet season) from April-May to September-October, Mundakan (dry season) from July-August to December-January and Pucha (Summer) from January-February to April-May. More than 80 % of the virippu rice is dry sown. Since moisture stress is of common occurrence in the system, traditional tall *indica* rice varieties with drought tolerance are preferred in these areas. Though the traditional varieties possess better quality attributes making them more attractive to the farmers, they are generally tall with lodging habit and have poor yielding ability (1.5-2.0 t ha⁻¹). This necessitated the development of rice varieties suitable for direct seeding in the virippu season of Kerala by combining the drought tolerance, disease resistance and quality attributes of traditional rice varieties with the high yield of modern rice varieties.

Hybridization between M. 210 (Mutant of PTB 10, an improved land race of Kerala) and PTB 28 (Improved land race) was carried out during 1990 and selection for desirable plant was continued up to the F₆ generation. Initial yield trials and comparative yield trials were conducted for six years in the research station. Multilocational trials were conducted in farmers' fields in Palakkad and Thrissur districts followed by AICRIP trials during 1999-2000. Screening of the cultures against biotic and abiotic stresses was carried out using

standard evaluation system of IRRI (1996) and assessment of quality parameters as per the procedure by Jennings *et al.* (1979).

Eleven superior lines selected from the segregating population after the F₆ generation based on characters viz., tolerance to water stress, reaction to diseases like blast and sheath blight and high yield were advanced and tested in initial evaluation trials. Based on the performance of these cultures in the initial yield trials, five promising cultures were promoted to comparative yield trials during 1996-1998 along with the popular varieties for the state. Culture A4-4-2 (Table 1) matured in 105-110 days and out yielded (5337 kg ha⁻¹) all other cultures as well as check in the station trials. In the farm trials in Palakkad and Thrissur Districts during 1999-2000, Cul. A4-4-2 with an average yield of 4220 kg ha⁻¹ was found best. In the All India Coordinated Trials (AICRIP) during 1999-2000, culture A4-4-2 (IET 16707) ranked ninth at National level under direct seeded conditions. The culture recorded a mean grain yield of 2958 kg ha⁻¹ and was found superior to all the check varieties.

Field screening of the culture to major insect pests and diseases revealed that it was tolerant to backed plant hopper, Leaf folder earhead bug and stem borer and showed less susceptibility to disease

Table 1. Characteristics of Cul. A4-4-2

Culture/ variety	Maturity duration (Days)	Plant height	Productive tiller plant ⁻¹	Mean grain yield (kg ha ⁻¹) in yield trials			
				IET	CYT	MLT	AICRIP
A4-4-2 (IET 16707)	105-110	78.0	9.4	3759	5337	4221	2958(9)
Jyothi (Check I)	110-115	79.0	6.8	4043	4217	3992	2384
Matta Triveni (Check II)	100-105	75.0	7.8	3679	3278	4026	2402

IET - Initial Evaluation Trials at Station Level, CYT – Comparative Yield Trials at Station Level, MLT-Multi Locational Trials at Regional Level, AICRIP-National Level Trials

like Blast and Sheath blight compared to check varieties (Table 2). An added advantage of the variety was that it did not exhibit vivipary, like varieties Jyothi and Matta Triveni (Table 3).

The quality parameters of culture A4-4-2 was found comparable to other varieties of the state viz., Kairali and Kanchana (Table 4). On cooking, the kernel

expands 1.2 times with a volume expansion of 5.3. Sensory assessment of the culture revealed that it is non sticky, well separated, moderately soft on touching chewing, and good to taste. The overall acceptability of the produce rice on cooking was also rated as good.

The area under direct seeded rice in Asia has been increasing steadily, as farmers seek higher

Table 2. Reaction of Culture A4-4-2 to major insect and diseases in SES scale

Culture/Variety	WBPH	Earhead Bug	Blue Beetle	Leaf Folder	Stem Borer	Blast	BLB	Sheath blight
A4-4-2	1	3	3	1	2	2	5	7
Jyothi (Check I)	5	5	7	1	7	3	3	9
Matta Triveni (Check II)	9	6	5	9	9	9	5	9

Table 3. Response of A4-4-2 to moisture stress and sprouting of grains in panicle

Culture/Variety	Leaf drying after one month drought (Score)	Survival on receipt of rains (%)	Sprouting of grains in panicle (%)
A4-4-2	5.0	70.0	0
Jyothi (Check I)	7.0	60.0	25
Matta Triveni (Check II)	7.0	50.0	40

Table 4. Quality characteristics of Culture A4-4-2

Quality characteristics	Index		
	A4-4-2	Kairali	Kanchana
Kernal lenth	6.95 mm	5.80 mm	6.0 mm
Kernal width	2.30 mm	2.20 mm	2.2 mm
L/B ratio	3.21	2.64	2.73
Classification	Long Bold	Short Bold	Medium Bold
Hulling %	75.0	79.0	80.0
Milling %	71.4	72.0	74.0
Head rice recovery (%)	69.0	68.0	74.0
Kernel colour	Red	Red	Red
Kernel length after cooking	8.4 mm	7.6 mm	9.4 mm
Elongation ratio	1.21	1.3	1.6
Abdominal white	Present	Present	Present
Volume weight	572 g/HL	600 g/HL	580 g/HL
Volume expansion	5.3	5.6	6.0

productivity and profitability with lower labour input. (Balasubramanian and James, 1999). In Kerala, there is a major shift from transplanting to direct sowing. Culture A4-4-2, shows high seedling vigour, drought tolerance and blast resistance, essential for varieties suitable for direct seeding during the wet season. Considering its superiority the culture Harsha during 2000 was released for cultivation in Kerala.

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