



'Uma' (MO 16) and 'Revathy' (MO 17): Two promising rice varieties with seed dormancy

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Abstract

To evolve rice varieties with seed dormancy, hybridisation programmes were initiated at the Rice Research Station, Moncompu in 1985 using locally adapted varieties like MO 4 ('Bhadra'), MO 5 ('Asha'), MO 6 ('Pavizham'), MO 7 ('Karthika'), 'Pokkali', MO 1 and 'Kuruka'. Selection up to the F₆ generation based on general performance and seed dormancy yielded two cultures—KAU M 42-6-3 from the MO 6/'Pokkali' cross and KAU M 45-20-1 from the cross of culture 12814 with MO 6. These cultures performed consistently well in the yield trials and were, therefore, released by the State Seed Subcommittee in 1998 as 'Uma' (MO 16) and 'Revathy' (MO 17) respectively for use in Kerala.

Key words: High yielding varieties, gall midge resistance, Kuttanad

Introduction

Harvesting the *kharif* rice (additional crop) in Kuttanad, the 'rice bowl of Kerala', generally coincides with the rainy season. Heavy rains during the crop maturity phase and thereafter, in particular, may lead to *in situ* seed sprouting—both in the field as well as in the threshing yard, especially if the varieties do not possess post-harvest seed dormancy. Many popular high yielding varieties like 'Jyothy' (Urs, 1987), however, lack dormancy in full measure. Consequently, considerable yield losses occur on account of *in situ* seed germination. Evolving high yielding varieties with post-harvest seed dormancy suitable for the *kharif* season of Kuttanad, therefore, assumes significance. It will probably help the farmers to reduce yield losses due to sprouting of seeds within the panicle, besides preventing the associated quality deterioration of the produce. With the objective of evolving high yielding varieties with seed dormancy, breeding work was initiated at the Rice Research Station, Moncompu since 1985.

Materials and methods

The materials consisted of locally important high

yielding varieties *viz.*, MO 4, MO 5, MO 6, MO 7 and varieties acknowledged to possess seed dormancy *i.e.*, 'Pokkali', 'Kuruka' and MO 1. After hybridization, progenies of the crosses (eight)—MO 6/'Pokkali', MO 1/MO 6, MO 5/'Kuruka', Culture 12814/MO 4, Culture 12814/MO 5, Culture 12814/MO 6, Culture 12814/MO 7, and MO 6/'Kuruka'—were screened up to the F₆ generation for grain yield, seed dormancy and overall performance. Initial evaluation trials (IET) were conducted with 34 cultures and two checks—MO 6 and 'Jyothy' in 1986-87. Based on the performance in IET, ten cultures were promoted to the preliminary yield trial (PYT) stage, which was conducted during *kharif* 1989, *rabi* 1990 and *kharif* 1990 with two check varieties. From PYT, seven cultures were carried forward to the comparative yield trials (CYT), which in turn, was conducted for four seasons during 1991 to 1993. Based on yield, pest and disease tolerance and seed dormancy, three cultures *viz.*, KAU M 42-6-2, KAU M 42-6-3, and KAU M 45-20-1 were further advanced to multi-localational trials (MLT). MLT was conducted in cultivators' fields at five locations during *kharif* 1995, with 'Jyothy' as check. Based on yield performance and duration, two cultures, *viz.*, KAU M 42-6-3 (medium

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duration) and KAU M 45-20-1 (short duration) were selected for farm trials (FT) in Alappuzha District (*rabi* 1997). KAU M 42-6-3 (IET 14758) was simultaneously included in the initial variety trial–irrigated mid early (IVT-IME) of the Directorate of Rice Research (DRR) for *kharif* 1995 along with 63 other entries at 12 locations. The yield trials were laid out in a randomized block design with two replications (plot size: 10 m²), and following the general crop husbandry recommendations of KAU (1986). The cultures were scored for pests and disease incidence as per the Standard Evaluation System of Rice (IRRI, 1995). Quality analyses for percentage of hulling, milling, head rice recovery, amylose content, water uptake and elongation ratio were done at the Central Rice Research Institute, Cuttack.

Results and discussion

The yield data of IET, PYT and CYT (pooled means) are presented in Table 1. In general, the cultures KAU M 42-6-3, KAU M 45-20-1 and KAU M 42-6-3 showed consistently good performance. Furthermore, culture M 42-6-3 emerged as the best (5333 kg ha⁻¹) during the PYT stage. Straw yield also was highest (6000 kg ha⁻¹) for this culture, yet the differences were not statistically

Table 1. Grain yield of rice cultures in the initial yield trial, preliminary yield trial and comparative yield trial

Culture/ variety	Parentage	IET	PYT (kg ha ⁻¹)	CYT
M 42-6-3	MO 6/'Pokkali'	9110	5333	5203
M 45-20-1	Cul. 12814/MO 6	10610	4528	4241
M 42-6-2	MO 6/'Pokkali'	9944	4861	4919
M 42-8-1	do	8170	4028	4106
M 42-46-2	do	5670	4583	3591
M 46-13-3	Cul. 12814/MO 7	8710	4961	4044
M 46-18-2	do	8720	4556	4166
MO 6		8720	4944	3738
'Jyothy'		8020	4072	3353
CD (0.05)		—	459	205

IET= Initial yield trial (*rabi* 87 and *kharif* 87); PYT= Preliminary yield trial (*kharif* 89, 90 and *rabi* 90); CYT = Comparative yield trial (*rabi* 91, *kharif* 91, *kharif* 92 and *rabi* 93)

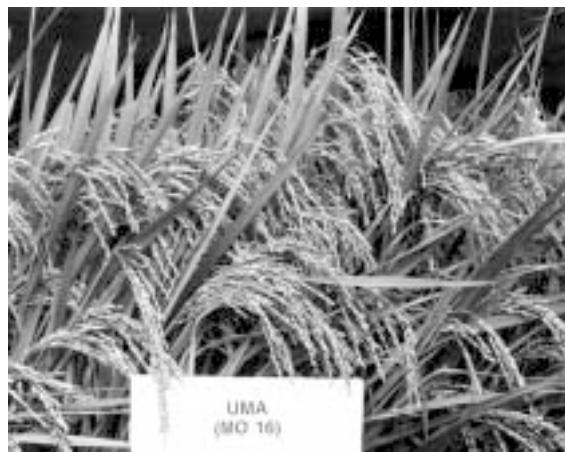


Figure 1. A general view of 'Uma'



Figure 2. Views of 'Revathy'

Table 2. Grain yield of rice cultures from the multilocational trials during *kharif* 1995

Culture/ variety	Location-wise yield (kg ha ⁻¹)					Pooled mean
	Pulimcunnu	Chempumpuram	Kottayam	Kumarakom	Oravanakulam (Kottayam)	
M 42-6-2	4310	4837	5847	6430	5162	5317
M 42-6-3	6497	6425	6363	6583	4887	6151
M 45-20-1	5622	5761	5713	5465	4812	5472
MO 6	5142	5550	5831	5595	4250	5523
'Jyothy'	4810	4850	5012	4837	3987	4694
CD (0.05)	682	694	658	410	1016	579

significant (data not presented). In CYT too, M 42-6-3 out-performed (5203 kg grains ha⁻¹) other cultures. Likewise, when the three cultures were evaluated in MLT at five locations, M 42-6-3 emerged as the best with an yield of 6151 kg ha⁻¹ (Table 2). This trend was reflected in the farm trials (Table 3) and the Initial Variety

Table 3. Grain yield of Cul. M 45-20-1 and M 42-6-3 in the farm trials at various locations in Alappuzha District during *rabi* 1997

Locations	Culture/variety (yield in kg ha ⁻¹)		
	M 45-20-1	M 42-6-3	'Jyothy'
Ramankary	3550	na	2875
Purakkad	3000	na	2000
Neelamperur	3550	na	1537
Chengannur	3450	na	2875
Pooled means	3390	na	2320
Nooranad	na	4250	3250
Mavelikkara	na	3500	3025
Kayamkulam	na	4350	3250
Pooled means	na	4035	3175

Farms trials were conducted separately for each culture with 'Jyothy' as the check variety; na=not available

Table 5. Plant characters, response to pest and disease incidence and seed dormancy of cultures M 42-6-3 and 45-20-1 *vis a vis* TN 1 and 'Jyothy'

Culture/variety	Plant height (cm)	Productive tillers per hill (no.)	Days to 50 % flg	Stem borer (% WEH)	Disease score (0-9)		BPH (0-9)	GM Bio Type 5 (%)	Dormancy (weeks)
					Sh. bl.	Sh. rot			
M 42-6-3	102.8	11.8	93	7.0	1.2	0.8	1.8	3.2	3
M 45-20-1	92.9	10.1	85	6.5	1.2	0.8	2.0	10.9	3
TN 1	70.5	7.0	75	20.0	7.5	8.0	9.0	90.0	0
'Jyothy'	80.4	11.2	84	9.0	2.0	3.0	3.8	90.0	0

flg = flowering; Sh. bl. = sheath blight, GM = gall midge, Sh. rot = sheath rot, WEH = white earhead, BPH = brown plant hopper

Table 4. Grain yield of Cul. M 42-6-3 and the check varieties in the IVT-IME of the All India Coordinated Rice Improvement Project during *kharif* 1995

Culture/ variety	Siriguppa	Sakoli	Kaul	Moncompu	Mean
	(Karnataka)	(Maharashtra)	(Haryana)	(Kerala)	
Yield (kg ha ⁻¹)					
M 42-6-3	7025	5371	5812	5800	4512
'Retna'	1262	4855	5562	2533	3935
'Vikas'	991	4080	5187	4200	4354
Local	5360	3977	6937	4000	4412
CD (0.05)	1032	1023	496	1204	—

Source: DRR (1995)

Trial- IME of the All India coordinated trials (4512 kg ha⁻¹; Table 4) too. For instance, in the IVT-IME of *kharif* 1995 with 63 entries over 12 locations, KAU M 42-6-3 (IET 14758) was superior to 'Retna', 'Vikas' and the local check (DRR, 1995). Coincidentally, M 42-6-3 was ranked as first at Siriguppa and second at Moncompu. Culture M 45-20-1 also out-yielded the check variety 'Jyothy' in the IET, PYT, CYT, MLT and farm trials.

Data on plant characters, reaction to pests and diseases and post harvest dormancy of these cultures are presented in Table 5, which again underscore their superiority. Furthermore, both M 42-6-3 and M 45-20-1 are suitable for direct sowing and transplanting. In addition, they showed tolerance to pests like brown plant hopper, gall midge (biotype 5) and diseases like sheath

blight and sheath rot, besides have a hulling % of 81.5 and milling % of 76.0 (Table 6).

On a final note, KAU M 42-6-3 is a medium duration (115 to 120 days for *rabi* and 125-130 days for *kharif*) culture and KAU M 45-20-1 is a short duration (105 to 110 days) dwarf culture; both having about three week-long seed dormancy. Since these cultures are photoinensitive, they are suitable for cultivation in all the three rice-growing seasons of Kerala. Considering the high yield potential and tolerance to pests and diseases these cultures were released as 'Uma' (MO 16) and 'Revathy' (MO 17) in 1998 by the 19th meeting of the State Seed Subcommittee held at Thiruvananthapuram on 16th May 1998.

Table 6. Grain quality analyses for M 42-6-3 and M 45-20-1

Quality attributes	M 42-6-3	M 45-20-1
Hulling (%)	81.5	81.5
Milling (%)	76.0	76.0
Head rice (%)	54.0	55.0
Length (mm)	5.08	5.55
Breadth (mm)	2.60	2.49
L/B ratio	1.95	2.23
Classification (bold)	medium	medium
Abdominal white	absent	absent
Kernel colour	red	red
Alkali value	7.0, 6.0	7.0, 6.0
Water uptake	355	340
Kernel length after cooking (mm)	3.7	3.7
Volume expansion	8.4	9.0
Elongation ratio	1.65	1.62

Source: CRRI, Cuttack

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