Indur Samba—a super fine-grain, short-duration, gall midge-resistant rice variety

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Indur Samba (RDR763) is a short-duration (120-125 d) rice variety derived from Samba Mahsuri / Surekha. It is resistant in gall midge endemic areas (Table 1) where sowings extend until 30 Jul in the wet season, and it is suitable for cultivation in winter and summer seasons. Indur Samba is a dwarf plant (75 cm) with medium-tillering (panicle-bearing tillers, 15-16 hill^{-1}) and erect leaves (see figure). It is semicompact, photoperiod-insensitive, and fertilizer-responsive. All plant parts are green. Panicle exsertion is complete. The panicle length is 18.9 cm with 213 grains panicle^{-1}. The test weight is 15.2 g and 12.2 g (kernel). Head rice recovery is 67%. It recorded grain yields higher by 17% than check Hamsa, and grain yield potential is 7.0 t ha^{-1} (Table 2).

Indur Samba is a super fine (medium slender grain) rice variety with kernel length (L) 5.388 mm and breadth (B) 1.854 mm (L / B of kernel 2.905 compared with 2.829 of Samba Mahsuri). Abdominal white is absent and cooking quality is good.

Indur Samba can supplement the locally popular Samba Mahsuri, another super fine (medium slender) grain type of long duration (150 d) that is susceptible to major pests and diseases. Indur Samba has gained wide popularity among the farmers and is grown in 5000 ha in the northern Telangana Zone. ■

Indur Samba (RDR-763)- A super fine rice variety with 120-125 days duration, high yield potential and suitability for gall midge endemic areas.

Table 1. Reaction of Indur Samba (RDR763) to gall midge in screening trials at Jagtial, Warangal, and Rudrur, Andhra Pradesh, India. 1995 wet season.

Variety	Jagtial				Warangal		Rudrur	
	Silvershoots (%)		Damaged plants (%)		Silvershoots (%)		Gall midge incidence (%)	
	30 DAT[a]	50 DAT	30 DAT	50 DAT	30 DAT	50 DAT	30 DAT	50 DAT
RDR763	0	1	0	5	0.00	0.00	0.20 (0.24)[b]	3.10 (2.90)
TN1 (susceptible check)	14	24	91	100	6.81			
Samba Mahsuri (susceptible check)							7.30 (20.00)	12.70 (23.00)

[a]DAT = days after transplanting. [b]Figures in parentheses are for 1994 WS.

Table 2. Performance of Indur Samba (RDR763) and check variety in different station trials at Rudrur.

Season	Trial[a]	Grain yield (t ha^{-1})		Increase over check (%)
		RDR763 (check)	Tella Hamsa (check)	
Winter 1990	OVT	3.8	3.3	16.0
1990 wet season	PVT	2.8	2.3	19.0
1991 wet season	AVT	5.2	4.4	17.6

[a]OVT = observation variety trial, PVT = preliminary variety trial, AVT = advance variety trial.

Stress tolerance — adverse soils

Screening for tolerance for iron toxicity

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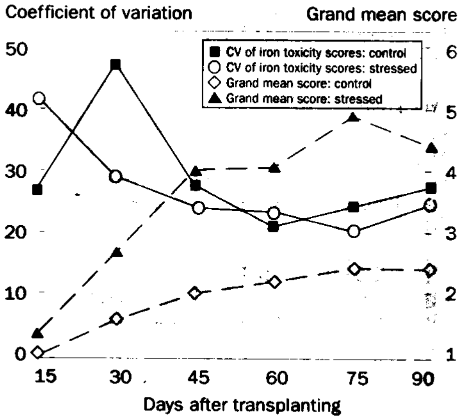
This study identified the appropriate time to visually score rice germplasm in order to select materials having the lowest yield reduction under iron toxicity. The experiment took place at Korhogo, 9° 22' N 5° 31' W, in northern C te d'Ivoire, during the wet season (May-Aug 1995) using a randomized complete block design with three replications on an irrigated Ultisol lowland that contained 343 ppm Fe in soil solution at the beginning of the season. Of 28 transplanted, Suakoko 8 and Bouak 189 were tolerant and susceptible checks, respectively, and two *O. glaberrima* were land races. Each plot of 40 hills had a planted border using the check varieties. The experiment was repeated simultaneously on a nearby control field which was free of iron toxicity.

Plant parameters studied are shown in the table. The varieties were scored for leaf symptom-based tolerance for iron toxicity at 15 d intervals from 15 to 90 d after transplanting (DAT). To obtain a measure of iron toxicity symptoms across phenological stages, the cumulative toxicity score was also analyzed.



Evolution of iron toxicity symptoms in stressed and control fields and coefficients of variation at different stages of assessment. Data pooled for 28 genotypes and 3 replications.

The *sativa* varieties ranged between 124 and 142 d to maturity (mean of 130), and average iron toxicity across varieties increased to a maximum of 4.8 at 75 DAT, with a range of 2.0-7.0 (1 = no symptoms; 9 = dead plants). Eleven entries showed maximal symptoms at 60 DAT, 24 at 75 DAT, and 15 at 90 DAT. Those with marginal symptoms at these sampling dates included the two *O. glaberrima* land races, which attained their maximum score at 45 DAT. The lowest coefficient of variation of 20.08% for iron toxicity scores across genotypes was also observed at 75 DAT (see figure).

Iron toxicity caused significant reductions ($P < 0.001$) in agronomic parameters as compared with the control plot, but the scores were significantly correlated with reductions in yield ($r = 0.63^{**}$) and plant height ($r = 0.59^{**}$). No such relation was noted with reduction in tiller number ($r = -0.003$ ns).

The cumulative score may be the best parameter to assess varieties, as it showed the highest correlations with agronomic performance, especially yield (see table). ■

Correlation between three ways of assessing rice varieties for tolerance for iron toxicity and some agronomic parameters.

Parameter	Score at 75 DAT[a]	Maximum score	Cumulative score
% height reduction	0.63**	0.61**	0.69**
% yield reduction	0.60**	0.64**	0.74**
% panicle reduction	0.46*	0.47*	0.54**
% tiller reduction	-0.003 ns	-0.015 ns	0.021 ns
% spikelet reduction	0.11 ns	0.13 ns	0.24 ns

[a]DAT = days after transplanting.

Integrated germplasm improvement— upland

Yumenohatamochi, a new upland rice variety in Japan

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In 1996 in Japan, upland rice was grown on 13,000 ha, or 0.7% of the total rice cultivated area, and comprised only 0.3% of the total rice produced. A new upland rice variety Yumenohatamochi has been released into Ibaraki, Toichigi, and Gunna prefectures, which had about 60% of the total Japanese upland rice area in 1996. Yumenohatamochi means "dreamy (excellent) glutinous upland rice" in Japanese. It is derived from the cross Norinmochi 4 / / Norinmochi 4/JC81 / / Norinmochi 4. The traditional Indian variety JC81 was chosen as parent because of its deep root system. Norinmochi 4 is a Japanese upland rice variety with high resistance to blast. Yumenohatamochi is a medium-maturing variety with medium culm length (Table 1). This variety inherited abundant rooting in deeper soil layers from its parent, JC81. Root tips of Yumenohatamochi reached to a soil layer of 85 cm depth, which was about 20 cm deeper than those of other varieties. Therefore, Yumenohatamochi showed outstanding yields in the drought years of 1992 and 1994 (Table 2). The drought resistance of this variety is the highest of other released upland rice varieties in Japan.

Table 1. Characteristics of Yumenohatamochi and popular local variety Tsukubahatamochi. Ibaraki, Japan.

Character	Yumenohatamochi	Tsukubahatamochi
Duration (d)	124	121
Culm length (cm)	71	78
Panicle length (cm)	19.8	20.5
Panicle number (no. m^2)	316	297
Yield (t ha^{1})	3.42	3.09
1,000-grain wt (g)	21.9	20.4
Grain quality[a]	5.2	5.0
Eating quality[b]	1.0	4.0

[a]Av from 1989 to 1995. [b]1 = excellent, 9 = poor.

In general, glutinous rice is used to make rice cake. The eating quality of rice cake from upland rice has been inferior to that of lowland rice varieties. Only lowland varieties have been used to make rice cake. According to eating quality studies performed in our institute, however, rice cake made from Yumenohatamochi showed high smoothness and softness and it was similar to rice cake made from lowland rice varieties. Eating quality of Yumenohatamochi was shown as the best among Japanese upland rice varieties. ■

Table 2. Yield and grain quality of Yumenohatamochi and Tsukubahatamochi in drought years. Ibaraki, Japan.

Variety	Total test years[a]			Drought years[b]		
	Yield (t ha^{-1})	Rate (%)	Grain quality[c]	Yield (t ha^{-1})	Rate (%)	Grain quality[c]
Yumenohatamochi	3.42	111	5.2	1.64	148	5.2
Tsukubahatamochi	3.09	100	5.0	1.11	100	5.9

[a]From 1989 to 1995. [b]1992 and 1994. [c]1=excellent, 10=poor.