

## Yield of wet season ratoon rice in Konkan region, Maharashtra, India

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About 9,000 ha of the rice area in Konkan are double-cropped, under irrigation Dec-May and rainfed Jun-Oct. The May harvest is just before the start of monsoon rains in June. This leaves little time for land preparation for the wet season (WS) rice crop.

A WS ratoon crop would eliminate labor and seed costs and free the farmer from conventional puddling and transplanting.

In 1990, we compared yields of a ratoon crop and a WS crop in 100-m<sup>2</sup> plots.

Promising, medium-long duration Palghar 103-1-2 (a derivative of IR5/Zinya 63) was transplanted in Dec and ratooned the third week of May by cutting 8-10 cm above the ground. The field was cleaned, immediately weeded, and irrigated. Fertilizer (50 kg N, 20 kg P, and 42 kg K/ha) was basally placed between rows. Another 25 kg N/ha was topdressed 30 d later, coinciding with the emergence of ratoon sprouts.

The regular WS crop of Palghar 103-1-2 was transplanted in an adjacent plot the first week of Jul 1990, using 30-d-old seedlings.

The rains started the first week of June. At 4 wk after main crop harvest, percent regenerated hills was 70.

Identical yield of the ratoon crop and the main WS crop can be attributed to the high number of basal tillers in the ratoon crop (see table). The ratio of basal tillers

## Growth, yield attributes, and yield of ratoon rice and wet season rice.

Trait	Summer rice (Dec-May)	Ratoon rice <sup>a</sup> (Jun-Oct)	Wet season rice (Jun-Oct)
Plant height (cm)	103	133	135
Days to maturity	135	135	133
Panicle length (cm)	19	25	22
Number of spikelets/panicle	180	240	152
Productive tillers/hill	18	15	12
Grain yield (t/ha)	5.0	3.1	3.7

<sup>a</sup>Upper figure is basal tillers, lower figure is ratoon sprouts.

to ratoon tillers was 2: 1. Favorable wet season conditions (high temperature and humidity) as well as physiologically active stubble may have contributed to the emergence of basal tillers. This is also a characteristic of Palghar 103-1-2. The basal tillers were superior to ratoon tillers in growth and yield attributes. ■

## Pest resistance—diseases

### Pathogenic races of *Xanthomonas oryzae* pv. *oryzae*

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Bacterial blight (BB) caused by *Xanthomonas oryzae* pv. *oryzae* (Xoo) is a major disease in India. We tested the pathogenicity of 12 of 37 isolates on 17 cultivars.

Rice seeds were treated with Dithane M 45 and germinated. Twenty-day-old

seedlings were transplanted in earthen pots at 5 seedlings/pot and fertilized.

At 35 d after transplanting, plants were inoculated with Xoo (0.2 O.D. concentration) by spraying the top 5 leaves. Disease symptoms were recorded beginning 8 d after inoculation as phase I = lesion desiccated and/or pale green, 0.3-3.0 cm long; phase II = lesion desiccated and/or pale green, 3.1-9.0 cm long; phase III = lesion pale green with yellow boundary along the margin, 9.1-25 cm long; phase IV = lesion with brown central zone surrounded by a pale green region and yellow boundary along the

margin, 25.1-40 cm long; and

phase V = lesion with central necrotic zone surrounded by a pale green region and yellow boundary along the margin, 40.1 cm long, or total leaf blight.

Lesions coalesce at different stages. Infection on any given day after inoculation was calculated:

$$\% \text{ infection} = \frac{\text{no. of lesions on all 5 leaves}}{5} \times 100$$

Most individual lesions had developed by phase II (see table). Later lesions coalesced, giving apparently less infection even though infection was severe.

All 12 isolates of Xoo were virulent on all 17 cultivars. Resistant varieties

### Infection of 17 rice cultivars with 12 Xoo isolates.<sup>a</sup>

Isolate <sup>b</sup>	Infection (%) 10-12 d after inoculation (phase II)																
	Rasi	LG (I)	LG (F)	MS	IR58	RE	Lorai	TN1	XM	WA	Jaya	HK	BJ (I)	BJ (T)	DV86	K	DV85
Xoo-2	72	64	68	64	56	64	60	64	60	44	56	40	56	60	52	56	64
Xoo-3	60	64	64	60	48	64	60	60	64	64	64	64	60	64	56	60	60
Xoo-12	64	60	64	60	60	60	64	64	64	60	60	56	56	60	64	60	56
Xoo-13	64	60	56	64	60	60	56	56	56	60	60	64	64	60	44	60	56
Xoo-16	60	60	56	60	64	56	64	60	56	54	64	60	56	64	50	64	60
Xoo-17	64	56	60	60	60	60	64	48	60	60	44	60	60	60	60	60	56
Xoo-21	72	60	60	60	52	64	64	60	60	64	60	60	56	60	68	40	60
Xoo-22	76	60	60	60	60	60	48	60	60	60	64	60	56	56	60	64	56
Xoo-26	76	60	60	60	60	68	60	60	56	64	44	60	60	60	60	60	64
Xoo-27	72	60	56	64	60	60	60	56	56	64	60	56	56	56	56	40	60
Xoo-36	72	52	60	60	56	68	64	60	60	64	64	52	52	60	60	60	56
Xoo-37	72	60	60	60	48	56	60	60	56	64	60	60	56	56	56	60	60

<sup>a</sup> LG = Long pin, MS = Malagkit Sungsong, RE = Rantai Emas, RM = Rantai Mas, WA = Wase Aikoku 3, HK = Hashikalmi, I = India, F = Fiji, K = Kogyoku, T = Thailand. <sup>b</sup>All isolates were derived from an Andhra isolate except 2 (Xoo-36 and Xoo-37) from Tamil Nadu.

DV85 and Kogyoku were only relatively less susceptible than the rest.

Isolates 2, 26, and 36 were relatively highly virulent on all cultivars. Rasi seemed most susceptible; Kogyoku and DV85 were relatively less susceptible under our experimental conditions.

Pathogen groups IA, IB, II, IIIA, IIIB, IV, and V were differentiated in Japan on Kinmaze, Kogyoku, Rantai Emas, Wase Aikoku 3, Java 14, and IR8. Kogyoku was resistant to IA, IB, and V; Wase Aikoku 3 was resistant to IA, IB, II, IIIA, and IIIB; Java 14 was resistant to V.

Sayaphal has been reported resistant to Ia, Ib, and III; BJ and DV85 to Ia and Ib. DV85 is said to carry resistance genes *xa-5*, *Xa-7* and *xa-13*.

These results indicate that all 17 rices are highly susceptible to BB. The pathogen shows variable virulence on different cultivars. An isolate is not stable; on reisolation from different inoculated cultivars, it gives rise to variants, as indicated by isolates Xoo-1 to 35 derived from one isolate. The isolates we have probably represent a new virulent group. This indicates the need to look for resistance to the Indian pathogen in other sources. ■

## Reaction of rice cultures and varieties to rice tungro disease

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We screened 62 rice cultures and varieties for their reaction to tungro by exposing them to viruliferous green leafhoppers (GLH) *Nephotettix virescens*. Ten-day-old seedlings (100/cultivar) were exposed to different numbers of GLH/seedling.

IR72, IR33043-46-1-3, IR50404-57-2-2-3, IR52431-60-1-2-1, IR34686-56-2-2-2, CRM25, TNAU LFR 842718, and AS33773 showed 20-30% infection with one viruliferous GLW seedling (see table). With two GLH/seedling, only IR72 and IR33043-46-1-3 had <30% infection. For the same cultivars, infection was 35-50% with five GLH/seedling. ■

**Tungro disease infection symptoms of rice varieties/cultures exposed to 1, 2, and 5 viruliferous GLH/seedling.**

Variety or culture	Tungro infection <sup>a</sup>					
	1 GLH		2 GLH		5 GLH	
	%	Score	%	Score	%	Score
IR72	20	3	25	3	35	5
IR33043-46-1-3	22	3	28	3	40	5
IR50404-57-2-2-3	25	3	30	3	40	5
IR52431-60-1-2-1	25	3	30	3	42	5
IR34686-56-2-2-2	25	3	35	5	45	5
CRM25	27	3	35	5	45	5
TNAU LFR 84271	27	3	35	5	40	5
AS33773	30	3	40	5	50	5
IR44761-27-1-3-6	35	5	45	5	58	7
IR45131-45-2-2-1-3	35	5	42	5	57	7
IR45912-9-1-2-2	38	5	45	5	63	7
IR50363-8-1-1-3	40	5	43	5	62	7
IR44538-131-3-1-3	40	5	45	5	68	7
CH404-14-1	40	5	57	7	73	9
IR50363-27-3-2-3	42	5	57	5	65	5
IR39485-151-2-1-3	42	5	50	5	65	7
CR491-1553	42	5	55	7	73	9
CR30-26-1	43	5	58	7	75	9
CR544-1-7	43	5	58	7	75	9
TNAU801793	43	5	55	7	68	7
TNAU (AC) 88115	45	5	55	7	70	7
AS34011	47	5	55	7	72	9
IR44530-41-12-1	48	5	53	7	75	9
TNAU BPHR 831293	48	5	58	7	70	7
IR35346-28-3-3-1	50	5	62	7	77	9
CR544-1-6	50	5	68	7	82	9
IR50363-61-1-2-2	52	7	63	7	78	9
IR32809-314-2-3-1	52	7	62	7	75	9
IR32822-94-3-3-2-2	52	7	62	7	78	9
IR34686-179-1-2-1	52	7	63	7	80	9
AS25370	52	7	63	7	78	9
IR34583-22-1-2	53	7	68	7	83	9
IR47903-151-3-2-3-2	53	7	65	7	78	9
IR44482-9-3-1-3	55	7	65	7	80	9
IR52289	55	7	65	7	80	9
AS24717	55	7	65	7	75	9
TNAU BPHR831305	55	7	65	7	78	9
IR42029-38-1-3-3-2	55	7	65	7	80	9
IR49517-23-2-2-3-3	58	7	63	7	83	9
IR39323-182-2-3-3-2	58	7	63	7	80	9
ET9762	58	7	65	7	80	9
IR37721-16-3-1-3-2	62	7	68	7	83	9
IR45131-59-2-3-2-3	63	7	70	7	85	9
CR544-1-2	63	7	75	9	83	9
IET9757	63	7	73	9	80	9
CR380-26-39	65	7	78	9	85	9
IET98 19	65	7	70	7	87	9
BR153-2B-10-1-3	65	7	72	9	80	9
AS37800	68	7	80	9	88	9
TNAU85 1979	70	7	83	9	90	9
IR32809-26-3-9	72	9	85	9	90	9
BG380-2	72	9	83	9	90	9
AD85358	73	9	80	9	88	9
TM4309	73	9	83	9	90	9
AD85361	75	9	82	9	92	9
IR44482-49-2-2-2	78	9	83	9	90	9
AD85469	78	9	83	9	90	9
IET8059	78	9	88	9	93	9
IET9286 (TNAU BFHRB 71390)	78	9	83	9	90	9
AD86465	80	9	85	9	93	9
AD86749	83	9	90	9	93	9
TN1 (susceptible check)	90	9	100	9	100	9

<sup>a</sup> Mean of 3 replications. Score is by the *Standard evaluation system for rice* scale of 0-9.