Ongoing histochemical assay of reproductive organs of plants transformed with the pΔGus1177 plasmid permitted detection of GUS activity in the sterile lemmas and in the lemma and palea of the spikelets and in the maternal tissues of young developing anthers containing uninucleated microspores, but not in ovaries or in the walls of mature anthers containing binucleated pollen. We also found activity in pollen and in the pericarp of the mature seed.

Tissue specificity and developmental regulation of the rice *ltp* promoter make it a good candidate for driving genes conferring resistance to leaffolder and blast that mainly develops on young leaves.

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Pest resistance—diseases

Sources of resistance to sheath blight

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Sheath blight of rice, caused by *Rhizoctonia solani* Kuhn, is becoming a major rice disease because of the increased use of nitrogen fertilizer and shorter, high-tillering cultivars, which together produce a microclimate that enhances disease incidence.

Because chemical control is costly and not effective, we screened breeding lines developed at ARI to identify resistant sources. This experiment was conducted with 166, 147, and 144 entries during the 1993, 1994, and 1995 wet seasons, respectively, under irrigated transplanted conditions. TN1 was the susceptible check. Each entry was grown in two 2-m rows at 15- × 15-cm spacing. Artificial inoculation was done at maximum tillering by placing 2-3 typha bits containing the inoculum in the middle of the hill just above the water level, tied with a rubber band. Ten hills were inoculated per entry.

To compute relative lesion height, the average vertical height of the upper most lesion and average plant height were measured at grain filling. Results revealed that most of the entries were highly susceptible (Table 1) but two entries, RNR15336 and RNR82096, produced low relative lesion height (Table 2) and appear to be resistant to sheath blight.

RNR15336 (120 d duration) and RNR82096 (140 d duration) have long slender grains and are being evaluated in advanced yield trials. ■

Table 1. Frequency distribution of sheath blight disease among entries. Rajendranagar, Hyderabad, India. 1993-95.

Disease scale	Entries (no.)		
	1993	1994	1995
0	0	1	0
1	3	0	1
2	4	1	1
3	9	0	0
4	5	2	0
5	11	5	1
6	6	1	6
7	71	12	16
8	39	39	40
9	19	86	80

Table 2. Reaction to sheath blight disease of promising lines and other characters. Rajendranagar, Hyderabad, India. 1993-95.

Line	Parentage	Disease score [a]			Mean	Plant height (cm)	Tillers hill^{-1} (no.)	Grain yield (t ha^{-1})
		1993	1994	1995				
RNR15336	Saleem/ W12708	1.8	0.0	0.6	0.8	89	9.0	5.7
RNR82096	Tellahamsa/ Akaswari	0.6	1.6	1.2	1.1	89	8.4	5.5
TN1 (check)		6.2	8.6	7.8	7.5	91	10.2	4.2

[a] Mean of 10 hills.

Effect of blast disease on rice yield

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We studied the effect of blast disease on 12 rice varieties and lines at Edirne and Uzunköprü, Turkey, in 1995. Eighty kilometers separate the two sites.

The experiment was laid out at both sites in a randomized complete block design with four replications under continuous irrigation. Plot size was 20 m^2. Four hundred and fifty pregerminated seeds m^{-2} were broadcast in standing water on 20 May.

The same agronomic techniques were practiced at both sites. Fertilizer was applied at 150 kg N ha^{-1} in three equal splits (basal dressing and topdressing at tiller initiation and panicle initiation) and 80 kg P ha^{-1} as a single basal dressing.

Mean values for yield, yield components, and blast disease infection in Edirne (E) and Uzunköprü (U), Turkey. 1995.

Variety	Grain yield (t ha^{-1})			1,000-grain weight (g)			Total rice recovery (%)			Head rice yield (%)			Disease infection[a]	
	E	U	Mean	E	U	Mean	E	U	Mean	E	U	Mean	Leaf blast	Node and neck blast
													U	U
Ribe	5.8 d	4.6 abc	5.2 bcde	31.7 fg	31.0 b	31.4 eg	70.7 de	70.5 ab	70.6 bc	63.8 bc	56.3 a	60.1 bc	MS	MS
Ergene	6.7 bcd	4.4 bc	5.6 bcd	36.0 cd	28.3 cd	32.2 def	72.4 bc	70.5 ab	71.5 abc	63.2 c	53.2 ab	58.2 de	MS	S
Serhat-92	6.8 bc	3.8 bcd	5.3 bcde	32.5 ef	25.8 e	29.1 hi	73.5 ab	69.7 abc	71.6 ab	68.4 ab	42.4 c	55.4 g	MR	MS
Ana/Mar	6.1 cd	3.6 cd	4.9 de	33.5 e	26.9 de	30.2 gh	69.2 ef	69.2 bc	69.2 de	64.9 abc	47.4 bcd	56.1 fg	S	HS
Lap/PG	4.7 e	2.2 e	3.5 f	30.5 g	25.1 e	27.8 i	68.3 f	69.1 bc	68.7 e	55.4 d	45.6 cd	50.5 h	HS	HS
TR-427	7.4 ab	5.7 a	6.5 a	32.8 ef	28.3 cd	30.6 fgh	72.1 bcd	71.6 a	71.9 ab	69.3 a	54.7 a	62.0 a	MR	MS
TR-475	6.3 cd	4.6 abc	5.4 bcde	35.0 d	30.4 bc	32.7 cde	73.1 ab	70.0 abc	71.5 ab	65.5 abc	55.3 a	60.4 abc	MR	MS
TR-489	6.3 cd	4.8 ab	5.6 bc	36.1 cd	32.6 ab	34.3 bc	73.3 ab	71.7 a	72.5 a	63.3 c	56.8 a	60.0 bc	MR	MS
TR-648	6.9 bc	3.1 de	5.0 cde	39.0 b	32.3 ab	35.6 b	73.1 ab	70.1 abc	71.6 ab	64.4 abc	53.3 ab	58.8 cde	MS	S
TR-765	6.9 bc	5.1 ab	6.0 ab	36.5 c	31.0 b	33.7 cd	74.2 a	69.0 bc	71.6 ab	68.1 abc	55.1 a	61.6 ab	MR	MS
Ipsala	6.4 cd	3.2 de	4.8 e	40.8 a	34.2 a	37.5 a	71.1 cd	71.6 a	71.3 abc	64.4 abc	55.0 a	59.7 cd	MS	S
Surek-95	7.8 a	3.9 bcd	5.9 b	35.5 cd	26.7 de	31.1 efg	72.2 bcd	68.0 c	70.1 cd	64.4 abc	50.3 abc	57.3 ef	MR	S
Mean	6.5	4.0	5.3	35.0	29.4	32.2	72.1	70.1	71.0	64.6	52.1	58.3		
F values														
Variety	6.637**[b]	6.01**	8.64**	40.80**	12.14**	21.42**	9.47**	2.22*	5.21**	3.91**	3.54**	4.11**		
Location	-	-	267.52**	-	-	262.02**	-	-	41.81**	-	-	189.22**		
Location x variety	-	-	3.10**	-	-	3.11**	-	-	4.02**	-	-	2.83**		
LSD (0.05)	0.90	1.10	0.70	1.35	2.43	1.69	1.67	2.25	1.40	5.17	7.11	1.68		
CV (%)	9.46	19.42	13.81	2.68	5.75	5.27	1.61	2.23	1.97	5.56	9.49	7.62		

[a] Based on field Evaluation of 70 and 100-d-old plants in Uzunköprü only. No Infection was reported in Edirne. MR = moderately resistant, MS = moderately susceptible, S = susceptible, HS = highly susceptible. [b] * and ** = significant at 0.05 and 0.01 level, respectively.

initiation) and 80 kg P ha^{-1} as a single basal dressing.

We examined the effects of blast disease infection on rice yield, total rice recovery, head rice, and 1,000-grain weight.

The blast disease infection in 1995 was the most severe ever recorded in the Uzunk pr region. It caused a 20% yield loss over 25,000 ha of riceland, with some farmers not even harvesting their crops. There was no disease infection, however, in Edirne.

Significant differences in all characters studied were recorded for the two locations, with all being less for rice grown in Uzunk pr (see table). The varieties with moderate susceptibility to node and neck blast (Ribe, TR-427, TR-475, TR-489, and TR-765) differed less for yield and yield components between the two sites than the susceptible and highly susceptible varieties (Ergene, Serhat-92, Ana / Mar, Lap/ PG, TR-648, Ipsala, and S rek-95).

The environmental factors did not, in general, affect 1,000-grain weight very much, although huge differences did exist for some varieties between the locations. Blast infection, plus other environmental factors, was therefore the main reason for smaller yields at Uzunk pr.

Node and neck blast caused more damage to the varieties than did leaf blast because none of the varieties were even moderately resistant to it. ■

IRRN categories. Specify the category in which the note being submitted should appear. Write the category in the upper right-hand corner of the first page of the note.

Pest resistance—insects

Resistance of varieties derived from *Oryza sativa/Oryza officinalis* to brown planthopper in the Mekong Delta, Vietnam

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One hundred lines containing a brown planthopper (BPH) resistance gene from the wild rice species *Oryza officinalis* were sent from IRRI to CLRRI in 1990. Several of these lines were released to farmers and have been widely grown in the Mekong Delta, although susceptibility to blast has limited their popularity. It is not known whether the BPH resistance gene from *O. officinalis* is a novel gene or one of about 10 BPH genes already identified from other sources. In tests at IRRI, the gene appears to be dominant.

We report here on the resistance of varieties with the *O. officinalis* gene to BPH in the Mekong Delta, and compare them with a series of test varieties containing known resistance genes.