

Table 1. Reactions of 8 rice varieties to RTV infection with 1, 3, and 5 insects per seedling in mass screening and test tube inoculation.^a

Variety	Mass screening			Test tube screening		
	1	3	5	1	3	5
ARC11554	R	R	R	R	R	R
Basmati 375A	R	R	R	R	I	I
Latisail	I	S	S	S	S	S
Peta	I	I	S	S	S	S
Ptb 18	R	I	I	R	S	S
TKM6	S	S	S	S	S	S
IR28	R	R	I	R	I	S
TN1	I	S	S	S	S	S

^a Resistant (R) = 0-30% seedling infection, intermediate (I) = 31-60% seedling infection, and susceptible (S) = 61-100% seedling infection.

Table 2. Presence of RTBV and RTSV in RTV-infected plants of 8 rice varieties as detected by latex agglutination.

Variety	Plants tested (no.)	Plants (no.) that reacted to		
		RTBV+ RTSV	RTBV	RTSV
ARC11554	25	1	12	0
Basmati 375A	6	0	5	0
Latisail	31	18	10	1
Peta	31	15	11	2
Ptb 18	17	2	3	0
TKM6	33	4	25	0
IR28	30	5	21	0
TN1	29	19	9	0

mass inoculation and from resistant to susceptible in the test tube inoculation as GLH number increased.

Seedlings infected with RTV at 3 GLH/seedling were tested for RTV-associated viruses by latex agglutination. Many infected Latisail, Peta, and TN1 plants reacted to rice tungro bacilliform virus (RTBV) and rice tungro spherical virus (RTSV) (Table 2). Most ARC1 1554 and Basmati 375A plants reacted only to RTBV.

GLH fed on RTV-infected plants were given daily serial transmissions to 7-d-old seedlings of each variety. GLH retained the virus for 2 d on ARC1 1554, IR28, Peta, and Ptb 18; 3 d on Latisail; 4 d on TKM6; and 5 d on TN1. *ℒ*

Individuals, organizations, and media are invited to quote or reprint articles or excerpts from articles in the IRRN.

Genetic Evaluation and Utilization INSECT RESISTANCE

Genetic analysis of resistance to brown planthopper (BPH) in selected rices

R. Velusamy, postdoctoral fellow, Entomology Department, IRRI, and S. Chelliah, director, Tamil Nadu Rice Research Institute, Aduthurai 612101, India

ASD11, IET5741, IET6315, T7, and V.P. Samba were identified as BPH resistant in greenhouse screening at the Paddy Breeding Station, Coimbatore. We studied the genetics of resistance of

those varieties by crossing each with Vaigai, a BPH susceptible variety.

The F1 seedlings were resistant to BPH in all the crosses, indicating the dominant nature of resistance in those varieties (see table). The F2 population segregated as 3:1 resistant:susceptible, indicating that resistance is conditioned by a single dominant gene. The F3 population was studied only in Vaigai/ V.P. Samba. It segregated as 1 resistant: 2 segregating: 1 susceptible, thus confirming the monogenic nature of BPH resistance in V.P. Samba. *ℒ*

Reaction to BPH in F1, F2, and F3 progenies of crosses between Vaigai and BPH-resistant varieties

Cross	F1 reaction	F2 seedlings			F3 families			
		Resistant (no.)	Susceptible X ² (no.)	3:1	Resistant (no.)	Segregating (no.)	Susceptible X ² (no.)	1:2:1
Vaigd/ASD11	Resistant	238	85	0.297	Not tested			
Vaigai/IET5741	Resistant	198	85	3.826	Not tested			
Vaigai/IET6315	Resistant	241	92	1.225	Not tested			
Vaigai/T7	Resistant	207	76	0.518	Not tested			
Vaigai/V. P. Samba	Resistant	236	83	0.234	53	106	41	2.16

Insect pest resistance of IR5-IR62

E.A. Heinrichs, F.G. Medrano, H.R. Rapusas, C. Vega, E. Medina, A. Romena, V. Viajante, L. Sunio, I. Domingo, and E. Camanag, Entomology Department, IRRI

We evaluated IR varieties for resistance to 15 insect pest species in the greenhouse, screenhouse, and field. Hopper resistance was determined in 7- to 10-d-old seedlings by the standard seedbox screening test. Stem borer resistance was evaluated by infesting plants 30 d after transplanting and determining percent deadhearts. Leafhoppers *Cnaphalocrocis medinalis* and *Marasmia patnalis* were placed on 30-d-old plants in greenhouse tests. *Nymphula depunctalis* larvae were placed on 11-d-old plants in greenhouse tests. Screening for *Hydrellia philippina* was with natural field populations.

Stenchaetothrips biformis were released in the greenhouse when plants were at the first-true-leaf stage. *Scotinophara latiuscula* nymphs were placed on 15d-old plants growing in seedboxes and *Leptocoris oratorius* on plants at milk stage.

Recently recommended IR varieties are resistant to biotypes 1, 2, and 3 of *Nilaparvata lugens* (see table). Most varieties are resistant or moderately resistant to the *Nephotettix* species. Only a few varieties are moderately resistant to *Sogatella furcifera*, *Recilia dorsalis*, *S. biformis*, and *S. latiuscula*. Many are moderately resistant to *Chilo suppressalis*, but only a few are to *Scirpophaga incertulas*. Only IR40 is moderately resistant to *H. philippina* and no variety has resistance to *C. medinalis*, *M. patnalis*, *N. depunctalis*, and *L. oratorius*. *ℒ*

Variety	Maturity ^b <i>N. lugens</i> biotype ^c			Reaction to									
	<i>Nephotettix</i>			<i>S. furci-</i> <i>ferac</i>	<i>R. dor-</i> <i>salis</i>	<i>C. sup-</i> <i>pressalis</i> ^d	<i>C. medi-</i> <i>nalise</i> ^e	<i>M. pat-</i> <i>nalise</i> ^e	<i>N. depunc-</i> <i>talis</i> ^e	<i>H. philip-</i> <i>pinaf</i>	<i>S. bi-</i> <i>formis</i>	<i>S. lati-</i> <i>uscula</i>	<i>L. ora-</i> <i>torius</i>
	1	2	3										
IR5	S	S	S	MR	S	S	S	S	S	S	S	S	S
IR8	S	S	S	MR	S	S	S	S	S	S	S	S	S
IR20	S	S	S	MR	S	S	S	S	S	S	S	S	S
IR22	S	S	S	MR ^g	S	S	S	S	S	S	S	S	S
IR24	S	S	S	MR	S	S	S	S	S	S	S	S	S
IR26	R	R	R	MR	S	S	S	S	S	S	MR	S	S
IR28	R	R	R	R	S	S	S	S	S	S	S	S	S
IR29	R	R	R	R	S	S	S	S	S	S	S	S	S
IR30	R	R	R	R	S	S	S	S	S	S	S	S	S
IR32	R	R	R	MR	S	S	S	S	S	S	S	S	S
IR34	R	R	R	MR	S	S	S	S	S	S	S	S	S
IR36	R	R	R	MR ^h	S	S	S	S	S	S	S	S	S
IR38	R	R	R	MR ^h	S	S	S	S	S	S	S	S	S
IR40	R	R	R	MR	S	S	S	S	S	MR	S	S	S
IR42	R	R	R	MR	S	S	S	S	S	S	S	S	S
IR43	R	R	R	MR	S	S	S	S	S	S	S	S	S
IR44	R	R	R	MR ^h	S	S	S	S	S	S	S	S	S
IR45	R	R	R	MR	S	S	S	S	S	S	S	S	S
IR46	R	R	R	MR ^d	S	S	S	S	S	S	S	S	S
IR48	R	R	R	MR	S	S	S	S	S	S	S	S	S
IR50	R	R	R	MR	S	S	S	S	S	S	S	S	S
IR52	R	R	R	MR ^h	S	S	S	S	S	S	S	S	S
IR54	R	R	R	MR	S	S	S	S	S	S	S	S	S
IR56	R	R	R	R	S	S	S	S	S	S	S	S	S
IR58	R	R	R	R	S	S	S	S	S	S	S	S	S
IR60	R	R	R	R	S	S	S	S	S	S	MR	S	S
IR62	R	R	R	R	S	S	S	S	S	S	MR	S	S

^aBased on replicated experiments. ^bDAS = days after seeding. ^cBased on greenhouse evaluation of seedlings. ^dBased on a greenhouse evaluation of 40- to 70-d-old plants. ^eBased on the reaction of 30- and 11-d-old plants in the greenhouse. ^fBased on field observations at 30 d after transplanting. Varieties with ratings as based on the standard evaluation system of 1-3 are considered resistant (R), 5-7 moderately resistant (MR), and 9 susceptible (S). ^gOccasional susceptible reactions. Least resistant of the IR varieties except IR22, which is highly susceptible. ^hReaction to biotype varies, occasionally being susceptible and often resistant. IR46 has field resistance to biotype 2. Tests still to be conducted.

Green leafhopper (GLH) virulence on three rices

H. R. Rapusas and E. A. Heinrichs,
Entomology Department, IRRI

Varieties resistant to GLH *Nephotettix virescens* (Distant) are widely grown in Asia. We studied the extent of selection after rearing GLH on a resistant variety for six generations and determined its virulence on another variety with the same major gene for resistance.

GLH colonies were reared separately in the greenhouse on Ptb 8 and IR42 for 6 generations and on TN1 for more than 50 generations. Colony virulence was evaluated based on population growth on Ptb 8, IR42, and TN1. Ptb 8 and IR42 have the *glh 4* gene for resistance to *N. virescens*.

Thirty-day-old potted plants of the test varieties were covered with 10- × 90-cm mylar film cages and arranged in a randomized complete block design with 10 replications on a water pan tray in the greenhouse. The plants in each cage were infested with 5 pair (male and female) of 3-d-old GLH adults and their progeny were counted 25 d later.

Significantly more progeny per female were produced by the Ptb 8 colony on Ptb 8 than on the IR42 and TN1 colonies (see table). The progeny produced by the IR42 colony also was highest on IR42, although it did not differ significantly from that produced on the Ptb 8 colony. The TN1 colony had the lowest population growth on the three varieties.

Results indicate that the *N. virescens* colonies were most virulent on the variety on which the colony was reared,

Population growth (progeny/female) of *N. virescens* colonies on three rice varieties.

Colony	Progeny/female ^a		
	Ptb 8	IR42	TN1
Ptb 8	75 a (b)	30 ab (c)	116 a (a)
IR42	13b (c)	43 a (b)	79 b (a)
TN1	22b (b)	19 b (b)	65 b (a)

^aSeparation of means in a column or in a row (in parentheses) by Duncan's multiple range test at the 5% level.

indicating a certain degree of GLH adaptation to the variety. Although Ptb

8 and IR42 have the same major gene for GLH resistance, the rate of

adaptation was faster on Ptb 8 than on IR42. *S*

Reaction of rices to *Sogatella furcifera* in free-choice and no-choice seedling bulk tests

J. Singh, Plant Breeding Department, Punjab Agricultural University, Ludhiana, India, and H. R. Rapusas and A. Romena, Entomology Department, IRRI

We evaluated the reactions of N22, ARC10239, ADR52, Podiwi A8, N'Diang Marie, and IR2035-117-3 to *S. furcifera* in the IRRI greenhouse in 1984. TN1 was the susceptible check.

In the free-choice test, seeds were sown in 60- × 40- × 10-cm wooden seedboxes. One row of 25 seeds per entry was sown for each of 3 replications. Seven-day-old seedlings were infested with five 2d- and 3d-instar *S. furcifera* nymphs per seedling. Damage was rated at 8 d when susceptible TN1 died and 10 d when most varieties showed hopperburn.

Reaction of rice varieties to *S. furcifera* in free-choice and no-choice tests, IRRI, 1984.

Variety	Damage rating ^a		
	Free-choice test		No-choice test
	8	10	
N22	5 (0.00) b	7 (0.57) ab	4 (-0.28) bc
ARC10239	4 (-0.38) ab	6 (0.31) a	5 (-0.05) c
ADR52	3 (-0.57) ab	3 (-0.57) a	3 (-0.46) b
Podiwi A8	4 (-0.19) b	6 (0.50) ab	7 (0.45) d
N'Diang Marie	5 (0.00) b	6 (0.38) ab	4 (-0.17) bc
IR2035-117-3	2 (-0.88) a	4 (-0.19) a	1 (-1.38) a
TN1	9 (1.49) c	9 (1.49) b	9 (1.27) e

^a Test for paired values for no-choice and free-choice at P = 0.05 = nonsignificant. Figures in parentheses are transformed score values for ranked data.

Reaction was rated by the *Standard evaluation system for rice* 0 to 9 scale (see table).

In the no-choice test, 19-d-old potted plants were covered with a 10- × 90-cm mylar cage and arranged in randomized complete block design with 5 replications. Five pair of 3-d-old *S. furcifera*

adults were released per cage. Damage was rated 21 d later (see table).

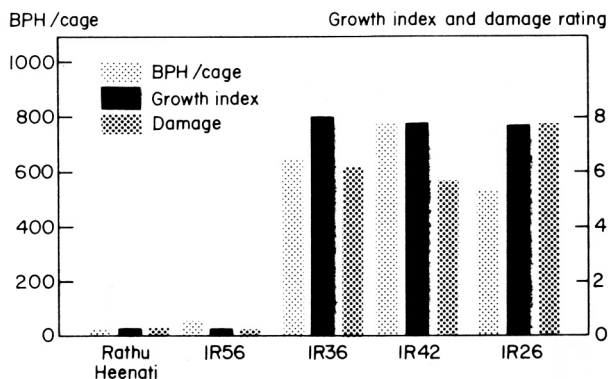
IR2035-117-3 was most resistant in both tests. At 10 d after infestation in the free-choice test, ADR52 performed as well as IR2035-117-3. TN1 was most susceptible, followed by Podiwi A8 and N22. *S*

Response of resistant rices to brown planthoppers (BPH) collected in Mindanao, Philippines

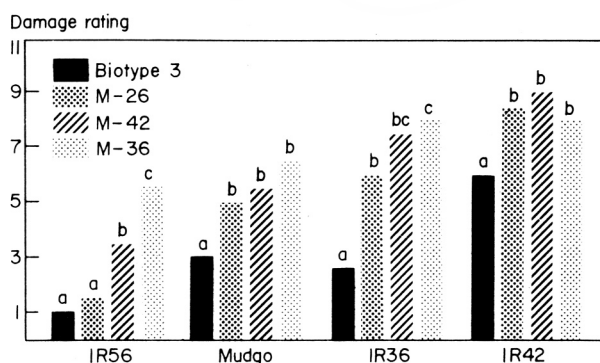
F. G. Medrano and E. A. Heinrichs, Entomology Department, IRRI

IR36 and IR42 (with *bph 2* gene for resistance to BPH *Nilaparvata lugens*) have been extensively grown in the Philippines, Indonesia, and Vietnam for about 7 yr. In 1982, they were attacked by BPH in Mindanao, Philippines. A BPH population was collected in Mindanao and evaluated at IRRI using the standard seedbox screening, population growth development, and growth index studies. IR26 with *Bph 1*, IR36 and IR42 with *bph 2*, and Rathu Heenati and IR56 with *Bph 3* were screened for resistance.

In the population development study, 10 newly hatched nymphs were caged on 35-d-old potted test varieties. The number of BPH/cage was recorded 40 d



1. Resistance of selected varieties to Mindanao BPH, 1983.



2. Resistance of selected varieties to Mindanao BPH, 1984. M-36, M-25, and M-42 = Mindanao BPH reared on IR36, IR26, and IR42, respectively.