

The F₃ consisted of 300 seedlings. Fifty F₃ plants were selected for height (90 to 100 cm), moisture stress and lodging resistance, tillering, boot leaf (wide, dark green, erect), leaf pose (45°), pigmentation, cluster and noncluster grains, good panicle length and number of grains, and yield. Disease and insect resistance, seed-to-seed duration (90-100 d), and grain characters were important.

Fifty different lines were raised to F₄

plants, and 200 individual progenies were screened as in F₃.

The F₅ were 200 different lines. Within each bulk progeny, rigorous roguing was practiced for unwanted segregants. Bulk progenies were selected for uniformity and good yield (av 1.5 t/ha).

Fifty miniplots from individual bulk progenies were raised in F₆ and rogued as in F₅. Fifteen bulk progenies were selected for good ideotypes, including 86-

to 90-d maturity; 85- to 90-cm height; resistance to moisture stress, lodging, Bl and *Helminthosporium* diseases; erect, broad, dark green boot leaves; good yield; and fine, coarse grains.

Fifteen miniplots from individual bulk progenies were raised in F₇ and observed for ideotype, yield, and disease resistance. Six AR-11 strains were successfully grown in multilocation trials. *ℳ*

Genetic Evaluation and Utilization

DISEASE RESISTANCE

Relative amounts of tungro (RTV)-associated viruses in selected rices and their relation to RTV symptoms

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Seedlings of 8 rice varieties with different levels of resistance to green leafhopper (GLH) and RTV were inoculated, 7 d after soaking, with GLH that had fed on TN1 plants with both rice tungro bacilliform virus (RTBV) and rice tungro spherical virus (RTSV), or RTSV alone. Infected seedlings were selected, symptoms were observed, and relative amount of virus antigens was determined by latex test/ ELISA about 1 mo after inoculation.

RTBV-infected IR50, IR58, IR60, and TN1 had mild stunting and red or orange leaves at later growth stages. Those infected with RTBV + RTSV were severely stunted, had red or orange leaves, and some interveinal chlorosis (Table 1). ASD7 and ASD8 plants with RTBV had the same symptoms as those infected with RTBV and RTSV. In contrast, when Utri Merah and Utri Rajapan (IRRI Acc. 11684) were infected with both viruses, they showed little stunting, no leaf discoloration, and only occasional interveinal chlorosis. Their symptoms were similar to those of other varieties infected with RTBV alone. Doubly infected Gam Pai 30-12-

Table 1. Symptoms of nine rices infected with RTBV + RTSV, and RTBV or RTSV alone at seedling stage.

Variety	Symptoms ^a		
	RTBV + RTSV	RTBV	RTSV
Gam Pai 30-12-15	s, Rt, Dc, Ic	s, Ic	No
ASD7	S, Rt, Dc, Ic	S, Rt, Dc, Ic	No
ASD8	S, Rt, Dc, Ic	S, Rt, Dc, Ic	No
Utri Merah	s, Dg, Ic	s, Dg, Ic	No
Utri Rajapan	s, Dg, Ic	s,Dg,Ic	No
IR50	S, Rt, Dc, Ic	s, Dc	No
IR58	S, Rt, Dc, Ic	s, Dc	No
IR60	S, Rt, Dc, Ic	s, Dc	No
TN1	S, Rt, Dc, Ic	s, Dc, Ic	No

^a S = severe stunting, s = mild stunting, Rt = reduced tillering, DC = leaf discoloration, Ic = interveinal chlorosis, No = no symptoms.

Table 2. Absorbance of crude extracts of plants infected with RTBV + RTSV, and RTBV or RTSV alone in ELISA (av of 4 plants). ^a

Variety	Absorbance at 405 nm			
	Plants infected with RTBV + RTSV		Plants infected with RTBV ^b	Plants infected with RTSV ^c
	RTBV ^b	RTSV ^c		
Gam Pai 30-12-15	1.04	0.34	0.37 ± 0.13	0.21 ± 0.1
ASD7	—	—	1.21 ± 0.11	0.89 ± 0.3
ASD8	0.65	0.64	0.98 ± 0.17	1.41 ± 0.1
Utri Merah	—	—	0.33 ± 0.3	0.10 ^d
Utri Rajapan	0.29	0.17	0.29 ± 0.16	0.51 ± 0.3
IR50	0.33	0.42	0.67 ± 0.23	0.44 ± 0.02
IR58	0.60	0.22	1.02 ± 0.5	0.87 ± 0.9
IR60	0.68	0.36	0.75 ± 0.4	0.59 ± 0.4
TN1	1.07	0.47	1.12 ± 0.22	0.46 ± 0.03

^a — = not tested. ^b Tested at 1:20 dilution. ^c Tested at 1:10 dilution. ^d From one individual only.

15 generally had mild symptoms with little stunting but occasional orange or yellow leaves and interveinal chlorosis. None of the test varieties with RTSV

had visible symptoms except occasional slight stunting.

The relative amounts of RTBV and RTSV antigen were designated as

absorbance values at 405 nm in ELISA (Table 2). ASD7 and ASD8 tended to have high RTBV and RTSV

absorbance. Utri Merah and Utri Rajapan had low absorbance. The results indicate a possible correlation

between symptom severity and the level of virus antigens in the plant tissues.

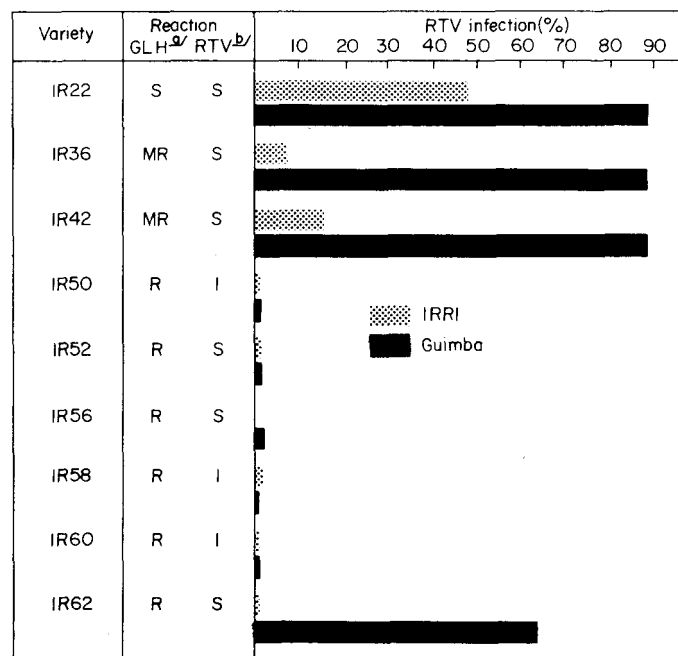
Reaction of IR varieties to tungro (RTV) under various disease pressure

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We conducted field trials to evaluate the reaction of IR varieties to RTV at IIRRI and Guimba (Nueva Ecija, Philippines) in 1984 wet season. One 3-wk-old seedling was transplanted per hill and left for natural infection. Disease symptoms were recorded 1 mo after transplanting, and random leaf samples were tested by latex agglutination for the presence of RTV-associated viruses.

Varietal reaction differed with local disease pressure, as determined by RTV infection of the susceptible check. At IIRRI, with low disease pressure, susceptible check IR22 had only 47% infection; IR36 and IR42, which are moderately resistant to green leafhopper (GLH), had 6 and 15% infection. Varieties with high GLH resistance had lowest RTV infection (see figure). Serological tests showed that IR22 generally was infected with both rice tungro bacilliform virus (RTBV) and rice tungro spherical virus (RTSV), as were IR42 and IR36 at lower levels. The other varieties either were not infected or had only a low level of RTSV (see table).

At Guimba, IR62 as well as IR22, IR36, and IR42 had high RTV infection (see figure). RTV-associated viruses occurred in the same pattern as at IIRRI (see table).



RTV infection of IR varieties under different disease pressures. IIRRI and Guimba, Nueva Ecija, Philippines, 1984 wet season.

^a Data from IIRRI Entomology Department.

^b Greenhouse mass screening results, IIRRI Plant Pathology Department: 0-30% infection, resistant (R); 31-60%, intermediate (I); 61-100%, susceptible (S).

Incidence of RTV-associated viruses in naturally infected IR cultivars as detected by latex agglutination. ^a

Variety	Plants infected (%)							
	IIRRI ^b				Guimba			
	RTBV + RTSV	RTBV	RTSV	Healthy	RTBV + RTSV	RTBV	RTSV	Healthy
IR22	52	22	17	8	60	8	21	11
IR36	6	9	26	58	19	11	36	34
IR42	32	13	33	22	34	5	37	24
IR50	0	1	0	99	0	0	2	98
IR52	0	0	0	100	0	1	2	97
IR56	—	—	—	—	3	1	24	72
IR58	5	1	11	83	0	0	3	97
IR60	0	0	0	100	0	1	1	98
IR62	0	0	11	89	10	4	37	48

^a RTBV = rice tungro bacilliform virus, RTSV = rice tungro spherical virus. ^b — = not tested.

The results show that varieties with high insect resistance can escape field

infection better than those with low or moderate resistance.

Reactions of eight rices to tungro (RTV)

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Eight rice varieties were inoculated for 8 h in cages by the mass screening method

or in test tubes with 1, 3, or 5 green leafhoppers (GLH) *Nephotettix virescens* per seedling. Seedling infection increased with GLH number. Regardless of GLH number, percentage infection was higher in test tube than in mass inoculation (Table 1).

ARC1 1554 was resistant regardless of

insect number or inoculation method. Basmati 375A reaction changed from resistant to intermediate in the test tube when GLH number increased from 1 to 3 or 5, but was resistant at 5 GLH/ seedling in the mass-inoculation test. IR28 and Ptb 18 reactions changed from resistant to intermediate in the