IR8, which has no gene for bacterial blight resistance, and IR1545, which has a recessive gene *(xa5),* were further evaluated for response to kresek infection at different ages. Plants were inoculated by dipping their roots in bacterial suspension for 5 minutes. All IR8 seedlings were infected at ages ranging from 9 to 32 days after seeding (DS). At 9 and 16 DS, IR1545 was as susceptible as IR8. But at 23 DS, 54% of the IR1545 plants were infected with kresek, and at 32 DS, 8% were infected. That indicates that kresek resistance is expressed not only between varieties but also within varieties at different ages.

When IR8, IR20, IR1545, and DV85, which differ in resistance to bacterial blight, were tested for kresek infection by the root-dipping method of inoculation with Pxo82, DV85 was infected less than the others. IR8, IR20, and IR1545 also differed in response to kresek at different inoculum concentrations.

Fourteen varieties were then evaluated in the greenhouse and in the field for kresek reaction against two isolates, Pxo61 and Pxo82. The varieties varied in reaction to the two isolates. In addition, the reactions of Ketan Lumba, Lakshini Lumba, IR8 (susceptible check), and India Dular (resistant check) to the three Philippine pathotypes of *X. oryzae* for leaf blight indicated that their kresek reactions did not correlate with their leaf blight reactions.

On the basis of overall reaction to the two isolates in the greenhouse, India Dular was ranked as most resistant; the susceptible check IR8 ranked 13th of the 14 varieties. In the field test with the same inoculation method, India Dular was most resistant and IR8, most susceptible. Plants were scored at 2 1 days after inoculation in the greenhouse and at 6 weeks in the field.

Scoring for varietal resistance to kresek

T. W. Mew, associate plant pathologist, C. M. Vera Cruz and R. C. Reyes, research aides, International Rice Research Institute

Because kresek is a systemic infection of bacterial blight, the scoring of infection at a certain time after inoculation should be standardized. In a preliminary greenhouse test, the percentage of kresek development was found to climax 3 to 4 weeks after inoculation by the root-dipping method. Experiments using IR8 were thus designed to determine the proper number of plants to serve as bases for varietal testing and screening, and the optimal number of days after inoculation for scoring. Obviously, the higher the number of plants, the lower the coefficient of variation obtained on the basis of estimated standard error of the means. This holds true for the prolonged duration of infection after inoculation. For practical purposes, from 60 to 80 plants scored at any time from 21 to 24 days (C.V. = 13%) after inoculation seem adequate for greenhouse tests. In the field, a proper base is 100 hills/variety scored at the 5th week after artificial inoculation and transplanting.

Reaction of wild rice species to sheath blight

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Ten strains of wild species were raised in mud pots and inoculated with the sheath blight pathogen *Rhizoctonia solani* by the straw bit method. Their disease reactions were observed and recorded. *Oryza australiensis* and *O. nivara* were highly susceptible to the disease but *O. rufipogon* and *O. barthii* were resistant. The other wild rices were susceptible.

Nira, a brown planthopper-resistant variety

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During 1976 kharif and rabi, and 1977 kharif, the resistance to brown planthopper and stem borer of 844 bulk progenies, 804 single-plant selections, 988 germplasm entries, and 62 varieties were evaluated in the laboratory and in the field.

From 30 to 40 seeds of each rice strain screened were sown in 20-cm-long rows in wooden boxes. A susceptible check, Taichung Native 1 (TN1), was planted as a border. At 1 week after sowing, the wooden boxes were transferred to a galvanized iron tray filled with water. Brown planthoppers that had been raised on TN1 were transferred to the seedlings. (The original source of the hoppers was a collection

Reaction of varieties to brown planthopper in the laboratory. Tamil Nadu Agricultural University, India.

Designation	Origin	Damage rating[a]
Nira	USA	0
Aruvatham chormali	Malabar	1
Thone-lone-lon B.20	Burma	1
Morada	South Canara	1
Co 10	Tamil Nadu	1
ASD 11	Tamil Nadu	1
Arupatham Kuruvai	Coimbatore	3
Kuruvai kalyan	Tirunelveli	3
Moshanam	Chinglepet	3
Mutha samba	South Arcot	3
Velan samba	South Arcot	3
Ptb 15	Kerala	3
Ratna chooda	Ganjam	3
Gurida Akkalu	Ganjam	3
Menthi Bayahenda	Ganjam	3
Chennagi	Bellary	3
Seera Samba wild paddy	Sri Lanka	3
Bing Yang Chao	China	3
Changalisein	China	3
Itach-huning	China	3
Talichao	China	3
Glutinous variety	Burma	3

[a] On a scale of 1 to 9: 0 = immune; 9 = very susceptible.

made at Gobichettipalayam, Coimbatore.) When all TN1 seedlings were dead, the test seedlings were rated on a scale of 0 to 9 (0 = immune; 9 = very susceptible). Those whose grades were 3 or less are listed in the table.

Nira's rating was 0; further field tests in 1977 kharif and rabi confirmed the rating. Nira was not affected at all when caged with the insects.

Discontinuous variation in virulence of *Xanthomonas oryzae*

T. W. Mew, associate plant pathologist, International Rice Research Institute

We proposed a scheme, based on host-parasite interactions, to detect continuous and discontinuous variations in virulence of *Xanthomonas oryzae* on resistant rice. Figure 1 shows continuous variation in virulence among the isolates with no specificity in infection.

Results with the Philippine isolates and selected varieties with specific genes for resistance indicate that Pxo6l causes some lesions on varieties differing in specific resistance, yet it is more compatible with IR8, i.e. it produces larger lesions on varieties that have no functional genes for resistance in the Philippines. Likewise, Pxo79 causes more lesions on varieties with no functional genes and with the dominant gene *Xa4* for resistance. But Pxo71 is more specific to varieties with no functional gene and to varieties with the recessive gene *xa5* for resistance. DV85, which has two genes for resistance, is resistant to all of those isolates; however, Pxo71 always seems to produce longer lesions than the two other isolates on that variety. (That may indicate the aggressiveness of the isolate. Analysis of variance suggested the interaction effect (V × I) was highly significant.) The relative reaction among the selected differentials varied from one isolate to another. When the differential varieties were inoculated at different ages with these isolates, differential interactions between the isolates and the varieties were observed, showing specificity in infection between isolates and compatible varieties.

Rice varieties tolerant of root-knot nematode in rainfed areas

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Root-knot nematodes were observed on rainfed rice at the Ubon Rice Experiment Station, northeastern Thailand. The major soil texture of this predominantly rainfed rice region is sandy loam. Average annual rainfall is 1,500 mm. Five genera of nematodes were identified; *Meloidogyne,* which was very active in the rice field, was the major genus.

Of 64 varieties screened for tolerance, 22 were found promising (from 4 to 25% root-knot infestation) (see table). Crop growth on those rices was normal.

Varieties will be inoculated with nematode egg mass in further trials, both in fields and in pots.

Promising varieties with tolerance for root-knot nematode. Ubon Rice Experiment Station, Thailand.

Variety	Knot-formation (%)	Maturity (days)	Origin
RD6	4	144	Thailand
Burma Acc. 24161	5	not harvested	Burma
RD69 NF U-G-25	5	111	Thailand
Burma Acc. 24160	7	not harvested	Burma
Hawm Dong PMI 72–22	9	144	Thailand
147/54	10	111	Egypt
IR2071-636-5-5	15	111	IRRI
Hawm Dong PMI 72–40	15	144	Thailand
Amo1/1–82	16		Egypt
KDML'65 G_1 U-45	18	144	Thailand
RD2	18	125	Thailand
219/54	18	111	Egypt
IAC 1246	19	112	Brazil
RD7	20	111	Thailand
RD4	21	125	Thailand
158/54	21	111	Egypt
IR36	22	111	IRRI
IET4094	24	111	India
RD9	24	111	Thailand
Amol 1–78	25	111	Egypt
IR2061-465-1-5-5	25	112	IRRI
IR2071-625-1-252	25	112	IRRI

Effect of plant and leaf age on susceptibility to bacterial blight

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Rice plants are generally thought to be more susceptible to bacterial blight infection at the seedling than at the adult stage, and also to vary in resistance at different leaf ages. A variety's resistance or susceptibility to specific isolates appears independent of plant age but dependent on compatibility of host variety and isolate. Four varieties, IR8, IR20, IR1545, and DV85, were tested for resistance to the isolate Pxo82 at 9 to 37 days after seeding (DS). Pxo82 overcame the resistance of IR20 (Xa4) and IR8; the two varieties had long lesions that resulted in more infection at the seedling stage than IR1545 and DV85, which are resistant to Pxo82. Although lesions on those two varieties were longer at 9 than at 16 DS, their overall disease reactions at 9 DS were moderately resistant to resistant.

When individual leaves ranging from young to old were analyzed, significant interactions were noted among varieties but not among isolates. The interactions between varieties and isolates, however, were significant. When varietal resistance is evaluated with specific isolates, the leaf position at scoring may affect the reaction. On this basis, the varieties IR8,