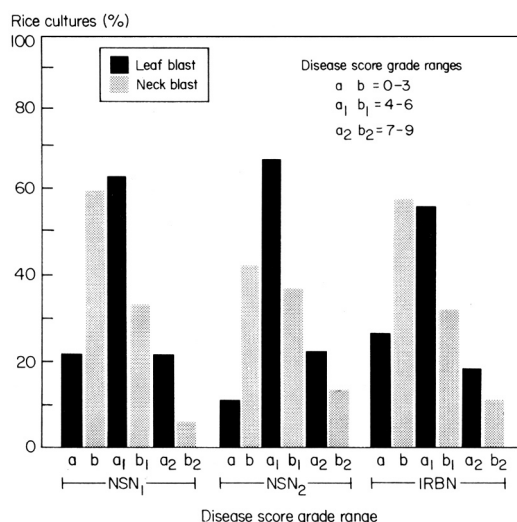


blast on various cultures of paddy in national screening nurseries (NSN-1 and 2) and the International Rice Blast Nursery (IRBN) trials conducted in 1980 at V. C. Farm, Mandya. Information from the entries screened — 290 in NSN-1, 285 in NSN-2, and 264 in IRBN — showed the variable reaction of cultures to blast and disease incidence.

The data for disease incidence (see figure) indicate that the lowest number of cultures reacted to neck blast in NSN-1, with a disease score range of 7-9. In the NSN-2 trial, the highest number of cultures reacted to leaf blast, with a score range of 4-6. In all three trials, a high number of entries reacted to neck blast (0-3 score range). The leaf blast score was 4-6. In all trials, 31-36% of the cultures had neck blast in the score range of 4-6.

The variability in disease reaction and



Rice cultures showing variable reactions to leaf and neck blast. Karnataka, India, 1980.

number of cultures reacting to the two stages of blast may be due to the variable agroclimatic factors prevailing during the season, variable inoculum poten-

tiality at the time of infection, and the resistant reaction of some cultures to the pathogen. ■

GENETIC EVALUATION AND UTILIZATION

Insect resistance

Rice varietal resistance to brown planthopper

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A total of 1,070 varieties (1,000 ARC, 20 IRRI, and 50 from other sources) were evaluated to identify better sources of brown planthopper (BPH) resistance as well as to study the mechanism of resistance in selected varieties. In a mass-screening replicated test, resistance (less than 1.5 score on a 0-5 scale) was shown by only 18 varieties: ARC5500, ARC5754, ARC5757, ARC5764, ARC5780, ARC5838, ARC5917, ARC5973, ARC5981, ARC5988, ARCI 2864, ARCI 3854, ARCI 3966, ARCI 14394, AR13507, ARCI 14539, ARCI 14766 A, and ARC14703. Moderate resistance (1.6 to 3.0) was observed in 73 varieties. ARC5780, ARC5973, and ARC12864 exhibited less damage and were comparable to the resistant check PTB 33.

A high degree of nonpreference and

antibiosis mechanism was evident in ARC5780 and ARC5988. Varieties less preferred by BPH nymphs were also less suitable for adult oviposition, with the exception of ARCI 3854, ARC 14766 A, and ARC15507. On selected resistant varieties nymphal mortality was higher and nymphal development was longer by 3-7 days, than in the susceptible check TN1. Resistant varieties bore a higher number of probing marks made by insects during attempts to feed. Feeding on resistant varieties was 6.6 to 11.9 times less than on the susceptible check. Insects lost 9 to 40% of their body weight while feeding on resistant varieties, but gained 27% on a susceptible variety. Some varieties showing moderate damage reaction (ARC59 18, ARC10443, ARC13984, ARC14529, and ARC14864) also exhibited more feeding marks, greater amounts of honeydew excretion, and higher gain in body weight of the insects, confirming a moderate degree of resistance.

The susceptible reaction in mass-screening tests of resistant varieties (IR26, IR28, IR30, IR32, IR34, IR36, IR38, and IR40) to different biotypes

and of donors such as Mudgo and ASD7 has further confirmed the possibility of different biotypes in the Hyderabad, India, area. Statistical analysis of more than 1,000 varieties showed that lemma and palea color was not associated with BPH resistance. ■

Research on brown planthopper biotypes in China

Wu Jung-Tsung, Chang Liang-You, Qiu Xi-Quang, and Mo Meng-Ye, Plant Protection Department, South China Agricultural College, Kwangchow, (Canton), China

This study was part of the brown planthopper collaborative project sponsored by IRRI. To determine the brown planthopper (BPH) biotype that occurs in different regions of China, responses of different rice varieties to BPH, the survival rate of nymphs, population buildup, and honeydew excretion of the insect were measured.

Twelve rice varieties with resistance genes were tested (see table).

BPH types were collected from 35 counties and cities in China, including

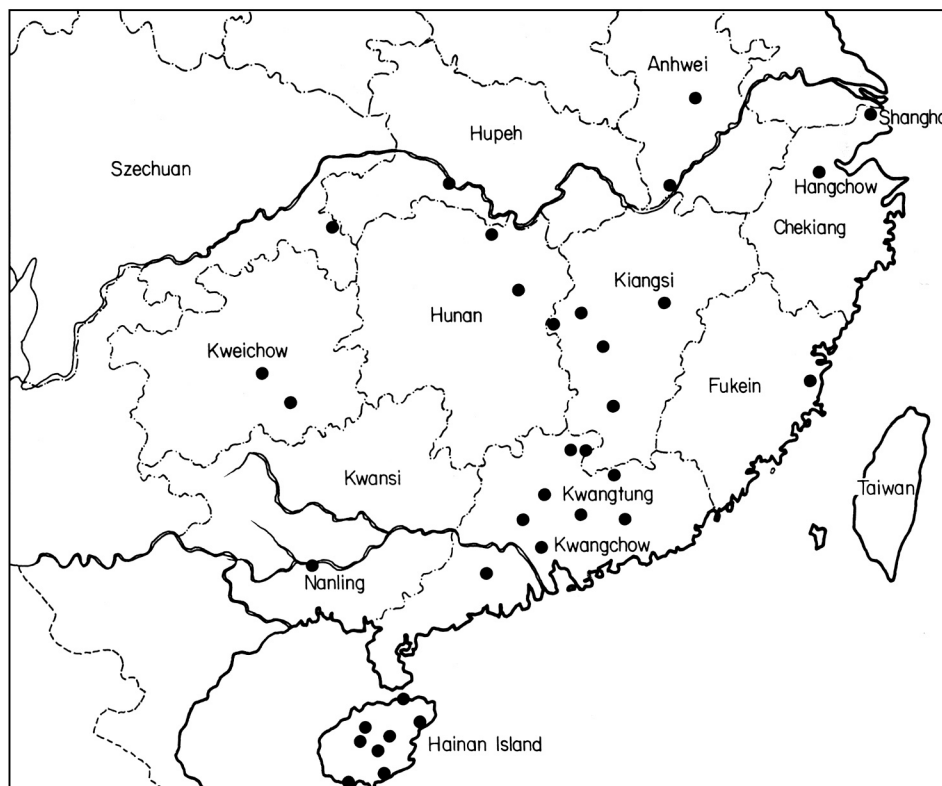
Rice varieties and resistance genes tested for brown planthopper response in China.

Variety	Gene
Mudgo	<i>Bph 1</i>
IR26	<i>Bph 1</i>
IR42	<i>bph 2</i>
ASD7	<i>bph 2</i>
H105	<i>bph 2</i>
Rathu Heenati	<i>Bph 3</i>
Babawee	<i>bph 4</i>
PTB 21	2 unidentified
PTB 33	2 unidentified
Sinna Sivappu	2 unidentified
Sudu Hondarawala	2 unidentified
TN1	none

10 provinces — Kwangtung, Kwansi, Fukien, Chekiang, Hupeh, Hunan, Kweichow, Szechuan, Anhwei, and Kiangsi (see figure). They infested TN1 seriously but were light on Mudgo, IR26, ASD7, Rathu Heenati, Babawee, PTB 21, PTB 33, Sudu Hondarawala, and Sinna Sivappu.

Survival of BPH nymphs on TN1 was significantly greater than on varieties with resistance genes. TN1 supported a larger population and allowed greater development of BPH.

The area of honeydew stained by ninhydrin on TN1 was greater than the area



Distribution of brown planthopper biotypes in China.

on resistant varieties. The heaviest honeydew was excreted by BPH fed on TN1. ■

The results indicate that BPH collected from the different regions of China are biotype 1. ■

GENETIC EVALUATION AND UTILIZATION

Adverse soils tolerance

Inheritance of tolerance for aluminum toxicity in Brazilian rice *Oryza sativa* L.

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Four Brazilian upland rice cultivars — Pratão, IAC 25, Perola, and Bico Ganga — and their F₁ and F₂ progenies from a diallel cross were evaluated for response to 0, 30, and 60 ppm Al in nutrient solutions. The characters studied were plant height, root length, and shoot and root dry weight of 25-day-old seedlings after 21 days of growth in the solutions.

Pratão and IAC 25 were more tolerant of aluminum toxicity than Pérola

and Bico Ganga. At 0 ppm Al, Pratão had shorter stems (2%), shorter roots (10%), and less dry weight (49%) than Pérola, but at 60 ppm Al had longer stems (23%), longer roots (15%), and greater dry weight (195%).

Tolerance for aluminum toxicity was controlled by more than one pair of genes, with transgressive segregation and quantitative inheritance observed. Specific combining ability was more important than general combining ability, indicating a greater nonadditive genetic factor. Specific combining ability for all the characters studied at different aluminum concentrations was least in the Pérola-IAC combination. Genotypic correlations were greater than phenotypic correlations, indicating that genetic components had greater contribution than environmental components. ■

GENETIC EVALUATION AND UTILIZATION

Temperature tolerance

Sensitivity of some modern rice varieties to high temperature at anthesis in the western districts of Orissa, India

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Anthesis or blooming is the only growth stage at which rice plants are sensitive to high temperatures. Spikelet sterility is mainly attributed to pollen desiccation. Jennings and others found some varieties, such as Hoveyze from south Iran, fertile at temperatures higher than 45° C when others are sterile.

Preliminary observations on the effect of maximum day temperature during