

later. In the growth index study, 10 newly hatched nymphs were caged on 40-d-old test plants. Growth index was computed by dividing percent adult recovery by the mean developmental period on each variety. In the seedbox screening test, varieties were sown in seedboxes and 7-d-old seedlings were each infested with 8 2d- to 3d-instar nymphs. The reaction of all varieties was rated by the *Standard evaluation system for rice* when IR26 seedlings died.

The Mindanao population multiplied

on and killed IR26, IR36, and IR42 but not IR56 and Rathu Heenati (Fig. 1). Because the population had characteristics of biotype 2, which kills IR26, and of biotype 3, which kills IR36 and IR42, the population was believed to be a mixture of those biotypes. To verify that, colonies of the population were purified by rearing them separately on IR26 to maintain a biotype 2 culture and on IR36 and IR42 to maintain a biotype 3 culture. The 17th generation

of colonies grown on IR26, IR36, and IR42 were compared with those of a greenhouse culture of biotype 3 reared on ASD7.

In the seedbox screening test, both *Bph 1* (Mudgo) and *bph 2* gene (IR36 and IR42) varieties were damaged by all of the Mindanao colonies (Fig. 2), indicating that the Mindanao collection represents a biotype different from previously identified biotypes 2 and 3. *ℳ*

Genetic Evaluation and Utilization

UPLAND RICE

Relation of seedling vigor to stand establishment in some upland rice genotypes

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Seedling vigor influences early crop establishment, especially in suboptimum environments, and has been used as a criterion to measure plant establishment in several crops.

We studied the relation of seedling vigor to stand establishment in eight upland rice varieties — Kinandang Patong, Nam Sagui 19, UPLRI 5, IR43, IR20, ITA118, IR6115-1-1-1, and ITA1 16 - which represent dwarf, intermediate, and tall statures. The varieties were planted in a randomized complete block design with four replications on the IRRI upland farm on 28 Jun and 13 Jul (wet season) 1983. Each plot included eight 4-m-long rows at 25-cm spacing. Seedling rate was 100 kg/ha. We measured seedling height at 15 and 30 d after sowing, growth rate at 15-d intervals, number of seedlings/m², and plant dry weight (g/m²) 30 d after seeding. Seedling vigor was visually assessed by the *Standard evaluation system for rice* 1-9 scale.

In the laboratory we recorded 1,000-seed weight (g), seed germination, and

3d germination count (TDGC). To test seed germination, 25 seeds of each variety in 4 replications were put in petri dishes at 32° C in a germinator. Germination counts were recorded 24, 48, 62, and 96 h after planting and germination at 72 h was expressed as TDGC. Index of germination speed and correlation coefficients were calculated using standard statistical methods.

Among the laboratory determinations, only the correlation between speed of germination and TDGC was positive and significant ($r = 0.88$). IR20, followed by Nam Sagui 19, had the highest TDGC and speed of

germination index. In the seedling vigor characters studied in the field, seedling vigor score was significantly correlated ($r = 0.95$) with seedling dry weight in the 13 Jul planting when there was mild soil moisture stress. Nam Sagui 19 had the highest seedling vigor rating (1) and also the highest seedling dry weight (50 g/m²). The study suggests the possibility of using TDGC in the laboratory as a measure to determine seed vigor and proves the usefulness of seedling vigor scoring (1-9 scale) for upland rices. Tall plants such as Nam Sagui 19 seem to have superior seedling vigor under field conditions. *ℳ*

Genetic Evaluation and Utilization

DROUGHT TOLERANCE

DJ.12.519, a promising rice cultivar for rainfed, shallow, drought-prone areas in Senegal

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We evaluated DJ.12.519 (D.25.4/Se 288D) for rainfed, shallow, drought-prone conditions at the Djibélór Agricultural Research Center

in Senegal. Its performance was tested at Djibélór and Diana-Bâ from 1981 to 1983 in station trials with Ikong Pao as a check (see table).

DJ.12.519 mean yield over 3 yr was 3.1 t/ha in Djibélór and 4.0 t/ha in Diana-Bâ. Ikong Pao yielded 2.0 t/ha and 2.7 t/ha at the stations. DJ.12.519 is a semidwarf, with high tillering ability and duration of 105-110 d. It is a good substitute for Ikong Pao, which has become susceptible to neck blast. *ℳ*

Grain yield of DJ.12519 and local Ikong Pao for drought-prone areas in Senegal. ^a

Variety	Yield (t/ha)					
	1981 (1029 mm, 80 d)		1982 (943.8 mm, 72 d)		1983 (769.2 mm, 71 d)	
	Djibélor	Diana-Bâ	Djibélor	Diana-Bâ	Djibélor	Diana-Bâ
DJ.12.519	3.6	4.1	4.3	5.1	1.3	2.9
Ikong Pao	3.4	3.0	2.2	3.8	0.3	1.3

^aValues in parentheses indicate rainfall (mm) and no. of rainy days.

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Genetic Evaluation and Utilization ADVERSE SOILS TOLERANCE

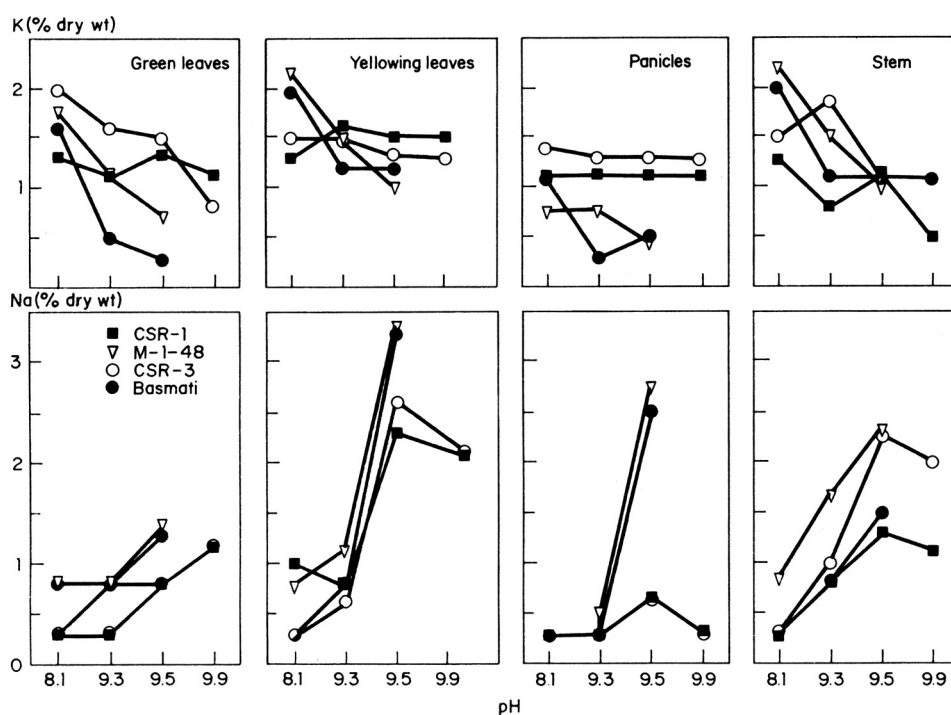
Accumulation and distribution of Na and K ions in rice genotypes with different sodicity resistance

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In glycophytes, salinity or sodicity resistance is commonly correlated with the ability to restrict the entry of ions into the shoot. Rice is not known to possess much exclusion and selectivity at the root level, but some recent reports suggest that salt-resistant varieties are able to maintain younger leaves at lower Na concentrations under NaCl salinity. However, no information exists about such distribution patterns under sodic stress.

Sodicity-resistant CSR-1 and CSR-3 and sensitive Basmati 370 and M-1-48 were grown on sodic soils artificially prepared by adding NaHCO₃ to create pH 9.3, 9.5, 9.9, and a sodic soil of pH 8.1 which correspond to 35, 45, 72, and 8 exchangeable sodium percentage (ESP). Plants were grown in 17-kg-capacity porcelain pots. CSR-1 and CSR-3 are selections from local indicas, Basmati 370 is a local selection for long grain and aroma, and M-1-48 is used as a check.

Resistant varieties had better survival, establishment, growth, and yield. Sensitive varieties had seed sterility and grain filling problems even at moderate pH 9.5 and yielded nothing at the highest pH.



Na and K concentrations in younger green leaves, senescing yellow leaves, panicles, and stems of 4 rice varieties at grain filling stage, Karnal, India.

Plant growth and distribution patterns of Na and K were monitored. Sensitive varieties had reduced growth and yield, higher Na concentrations, and lower K concentrations in all plant organs (see figure). Resistant varieties showed better growth and yields, relatively lower increases in Na concentrations, and less K depletion. Highest Na concentrations under sodic conditions were in the following order: senescing yellow leaves > panicles > stem > young green leaves.

Very high Na concentrations accompanied by low K concentrations in sodicity-sensitive varieties appear to be the primary reason for their poor growth and yield ability. *S*

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