GENETIC EVALUATION AND UTILIZATION

Drought resistance

Rasi, a drought-tolerant variety

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During 1979 dry season (Mar-Jul) AICRIP coordinated two trials with 17 entries, each grown in randomized block design with 3 replications at RAU, Pusa campus (25.59°N, 85.40°E, and 51.81 m above sea level). Recommended cultural techniques were used to raise a good crop. Unfortunately the trial could not be irrigated for 15 days (starting middle of May) during the vegetative growth stage, 33 days after transplanting. Leaf firing was visible after a week of water stress. Total precipitation until harvest was 800 mm, including 637 mm in July. Only Rasi (IET1444) did not have leaf firing drought symptoms. Leaf firing intensity varied from 15 to 50% of the leaf blade for other varieties. Rasi yields under drought conditions were promising (see table). □

Rasi yield performance under drought stress, Samastipur, India, 1979.

Variety	Days to 50% flowering	Grain yield (t/ha)
Rasi (IET1444)	99	3.7
Ratna	108	1.5
Pusa 2-21	108	1.9
Saket-4 (CR44-35)	102	3.1
CD (5%)	–	0.65
CV %	–	23.20

GENETIC EVALUATION AND UTILIZATION

Temperature tolerance

HPU741, a promising early, cold-tolerant rice variety

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HPU741, a cold-tolerant rice variety selected for earliness and uniform maturity, and designated as IR3941-45-Plp2B from the cross CR126-42-5/IR2061-213, is suitable for cultivation in low, mid, and high hills of Himachal Pradesh up to 1,550 m altitudes.

In transplanted experiments conducted throughout Himachal Pradesh from 1977 to 1982, HPU741 yield averaged 3.7 t/ha – 19.4% more than IR579, 5.7% more than China 988, and 8.8% more than Himdhan (Table 1).

In rainfed upland experiments from 1980 to 1982, it averaged 2.8 t/ha, 27.3% more than China 988 and 16.7% more than Himdhan (Table 1). Table 2 shows that tests in rainfed uplands experienced severe to moderate drought stress from flowering to maturity.

Yield stability parameters for 20 rices tested in the elite varieties trials in

Table 1. Grain yield of HPU741 in Himachal Pradesh, India.[a]

Year	Grain yield (t/ha)			
	HPU741	China 988 (check)	Himdhan (check)	IR579 (check)
Transplanted experiments				
1977	3.9 (5)	3.5 (5)	3.6 (5)	–
1978	3.7 (7)	3.6 (7)	4.0 (7)	3.5 (7)
1979	3.8 (6)	3.3 (6)	3.3 (6)	2.5 (6)
1980	3.7 (16)	3.0 (11)	3.0 (16)	3.0 (8)
1981	3.8 (14)	3.9 (9)	3.7 (14)	3.5 (7)
1982	3.4 (9)	3.8 (5)	3.3 (9)	2.6 (5)
Mean	3.1 (57)	3.5 (43)	3.4 (57)	3.1 (33)
Increase over respective checks (%)	–	5.7	8.8	19.4
Rainfed upland experiments				
1980	2.3 (3)	2.1 (3)	2.4 (3)	
1981	3.4 (4)	2.8 (4)	3.8 (4)	
1982	2.6 (8)	1.9 (8)	1.7 (8)	
Mean	2.8 (15)	2.2 (15)	2.4 (15)	
Increase over respective checks (%)	–	27.3	16.7	

[a]Figures in parentheses indicate the number of locations for which yields were averaged.

Table 2. Rainfall pattern during flowering to maturity period of direct-seeded rice in rainfed uplands, Palampur, H. P. India, 1980-82.[a]

1980	Rainfall (mm)	1981	Rainfall (mm)	1982	Rainfall (mm)
1-12 Sep	124.1 (10)	1-2 Sep	45.7 (1)	1-6 Sep	– (6)
13-23 Sep	– (11)	3-14 Sep	– (12)	7-14 Sep	33.4 (4)
24-25 Sep	21.0 (2)	15-21 Sep	125.3 (4)	15-21 Sep	– (7)
26 Sep to 7 Oct	– (12)	20-23 Sep	– (4)	22 Sep	7.6 (1)
8 Oct	8.2 (1)	24-29 Sep	39.6 (4)	23 Sep to 7 Oct	– (15)
9-15 Oct	– (7)	30 Sep to 15 Oct	– (16)	8-9 Oct	10.2 (2)
				10-15 Oct	– (6)

[a]Figures in parentheses indicate the number of rainy/dry days.

Table 3. Agronomic and quality characteristics of HPU741.

	HPU741	IR579 (check)	China 988 (check)	Himdhan (check)
Cross	CR126-42-5/IR2061-213	IR8/Tadukan	–	R575/T(N)1
Plant height (cm)	72	68	102	99
Days to maturity	124	138	128	130
Panicles (no./m^2)	220	258	245	207
Spikelets (no./panicle)	99	111	79	117
Spikelet sterility (%)	12.1	18.1	15.6	18.0
1,000-grain wt (g)	25.9	20.6	24.3	25.3
Protein (%)	6.3	8.0	6.3	7.6
Amylose (%)	17.5	21.7	21.0	22.9
Alkali digestion value (1-7 score)	5.5	6.9	6.3	7.0
Length-breadth ratio	3.0	3.6	2.6	2.2
Leaf blast (1-9 score)	2.0	4.0	5.0	4.5
Neck blast (%)	10	5	25	10

1977 and 1978 in 9 environments indicated that HPU741 had high yield (3.4 t/ha) and high stability (regression 1.02 and deviation from regression 0.38).

In 15 minikit trials in farmers' fields during 1980, it averaged 2.9 t/ha and outyielded local checks by 26.6%. The highest yield recorded was 6.9 t/ha on a progressive farmer's field.

HPU741 has low spikelet sterility, high grain weight, long slender grains, and resists leaf blast (Table 3). □

IRRI maps

Agroclimatic, rice cultural type, and country maps may be purchased from IRRI Agroclimatic and dry-season maps of South, Southeast, and East Asia; Rice area by type of culture, South, Southeast, and East Asia; and Map series of Bangladesh: rice area planted by season, rice area planted by culture type, farm size distribution, and base map, developed by R. E. Huke and E. H. Huke, Geography Department, Dartmouth College, USA, are available in sets. Also available is an agroclimatic map of the Philippines. For further information write: IRRI, Communication and Publications Department, Division R, P. O. Box 933, Manila, Philippines.

Pest management and control DISEASES

Rice grain discoloration in Assam, India

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Rice grain discoloration (also known as *dirty rice* or *pecky rice* in some countries) has increased sharply in Assam, particularly on the high yielding sali crop (Jul/Aug-Nov/Dec) grown under moderate fertilization. Grain discoloration reduces germination, causes coleoptile or radicle decay, or both, results in chaffy grain, and reduces yield. Surveys of stored grain samples in Assam show that 22 fungi are associated with about 93% of the spotted grain (see table). Bacteria and two nematodes (neither *Ditylenchus angustus* nor *Aphelenchoides besseyi*) have been isolated from the remaining discolored grain

Curvularia lunata, the most common fungus, was associated with 37% of the discolored grain; *Fusarium* spp., 13%; and *Chaetomium* spp., 6%. Occasionally, more than one fungus was isolated from a single discolored grain. Discolored grain varied from 7% in TTB2-6-1-1 to 18% in Ngoba (av, 12%). Germination of discolored grain was reduced 45% in Ngoba and 85% in IET4140 and TTB 4/7 (av, 63%). Weight loss varied from 20% in Mahsuri to 45% in IR8 (av, 26%).

In pathogenicity tests using spore and mycelial suspensions of 3 species of *Curvularia, Cephalosporium* sp., *F. chlamydosporum, Fusarium* sp., and *V. intertextum,* about 50% of the grains were infected when the inocula were placed outside the glumes. Up to 90% were infected when the glumes were forced open and the inocula were placed inside. □

Fungi associated with rice grain discoloration in Assam, India, and % of discolored grain.

Fungus	Discolored grain (%)
Aspergillus sp.	7
Curvularia geniculata (Tr. & Earle) Boedijn	6
C. lunata (Walker) Boedijn	37
C. veruciformis Agarwal & Sahni	1
Cephalosporium sp.	<1
Chaetomium globosum Kunze & Schm.	4
Chaetomium sp.	2
Drechslera oryzae (Breda de Haan) Subram. & Jain	4
Fusarium chlamydosporum Wr. & Rg.	2
F. moniliforme Sheld.	7
Fusarium sp.	4
Mucor sp.	1
Nigrospora sp.	<1
Pyricularia oryzae Cav.	3
Phyllosticta glumarum (Ell. & Tr.) Miyake	1
Rhizopus oryzae Went & Gerlings	<1
Trichoconiella padwickii (Ganguly) Jain	2
Torula sp.	<1
Verticillium intertexturn Isaac	3