Himalaya 2 is high yielding, blast resistant, and early maturing. It yields 3.5 t/ha and has scented, long, bold grains which cook sticky, if used without previous storage. Other varietal characteristics are described in Table 2.

Yield stability data for 20 rices tested in 9 environments at different elevations in 1977 and 1978 show Himalaya 1 had high yield and high stability (regression 1.10 and regression deviation 0.56). Himalaya 2 had average yield and high stability (regression 1.02 and regression deviation 0.09).

In 1980 minikit trials in farmer's fields, both varieties averaged 3.6 t/ha and outyielded local checks by 44%. Highest yields recorded were 7.7 t/ha for Himalaya 1 and 6.3 t/ha for Himalaya 2. □

Table 1. Grain yield of Himalaya 1 and Himalaya 2 in Himachal Pradesh hills, India. [a]

Year	Himalaya 1	IR579	China 988	Himdhan	Himalaya 2	IR579	China 988	Himdhan
				Grain yield (t/ha)				
1976	–	–	–	–	3.9 (4)	3.3 (4)	–	3.5 (4)
1977	4.7 (6)	3.8 (6)	4.0 (6)	4.8 (6)	3.1 (3)	2.8 (3)	3.3 (3)	3.3 (3)
1978	3.9 (11)	3.5 (11)	3.6 (11)	4.2 (11)	3.6 (11)	3.5 (11)	3.6 (11)	4.2 (11)
1979	4.0 (10)	2.2 (10)	3.4 (10)	3.5 (10)	3.3 (10)	2.2 (10)	3.4 (10)	3.5 (10)
1980	3.3 (15)	2.8 (4)	2.6 (6)	2.7 (11)	3.1 (4)	2.8 (4)	–	–
Mean	3.9 (42)	3.1 (31)	3.4 (33)	3.8 (38)	3.5 (32)	2.9 (32)	3.4 (24)	3.6 (28)
				Increase over respective checks (%)				
		26	15	3	–	21	3	–3

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

Table 2. Agronomic and quality characteristics of Himalaya 1 and Himalaya 2.

	Himalaya 1	Himalaya 2	IR579	China 988	Himdhan
Plant height (cm)	65	74	68	102	99
Days to maturity	125	130	140	128	130
Panicles (no./m2)	254	226	258	245	207
Spikelets/panicle	111	110	111	79	117
Sterility (76)	12.4	19.3	18.1	15.6	18.0
1,000-grain wt (g)	24.8	25.5	20.6	24.3	25.3
Protein (%)	5.7	7.7	8.0	6.3	7.6
Amylose (%)	24.7	20.3	21.7	21.0	22.9
Alkali digestion value (1-7 scale)	6.2	6.7	6.9	6.3	7.0
Grain shape	Long slender	Long bold	Long slender	Medium bold	Medium bold
Blast, leaf (0-9 scale)	3.0	3.0	4.0	5.0	4.5
Blast, neck (%)	5	5	5	25	10

GENETIC EVALUATION AND UTILIZATION

Tissue culture

Anther culture in rice

G. Manimekalai Gurunathan and S. R. Sree Rangasamy, Tissue Culture Unit, School of Genetics, Tamil Nadu Agricultural University, Coimbatore 641003, India

Anther culture techniques can shorten the time required to develop a rice variety and may cost less to use than conventional breeding methods. Tamil Nadu Agricultural University initiated anther culture studies in 1980.

F_1 and F_2 of crosses ASD8/Vaigai, ASD8/Amaravathi, ASD8/Bagavathi, and ASD8/Zhinjan responded to anther culture by producing calluses after 35 to 42 days of incubation in darkness at 24-26ºC (Table 1).

Potato extract medium and N6 medium supplemented with 2 mg 2,4-D/liter were used. Anther response in callus production varied from 2 to 10% and was best in N6 medium. Anther response of ASD8/Bagavathi was best (9.51%). ASD8/Zhinjan had minimum response (2.38%) (Table 1).

Table 1. Anther response of selected Tamil Nadu Agricultural University rices, 1980.

Medium	Cross	Anthers inoculated (no.)	Anther response no.	Anther response %	Av time for response (days)
N6	ASD8/Vaigai (F_1)	540	22	4.07	42
Potato extract	- do -	460	18	3.91	40
N6	ASD8/Amaravathi (F_1)	648	47	7.25	40
Potato extract	- do -	505	25	4.95	42
N6	ASD8/Bagavathi (F_2)	536	51	9.51	35
Potato extract	- do -	485	39	8.04	38
N6	ASD8/Zhinjan (F_1)	443	14	3.16	38
Potato extract	- do -	420	10	2.38	40

When 3 to 4 mm long anther calluses were subcultured in auxin-free regeneration medium, plantlets formed within 15 to 20 days, and were albino or normal. Of the calluses plated from ASD8/Amaravathi, 16% produced green plants, and ASD8/Bagavathi formed 22% green plants. ASD8/Vaigai produced only albinos and ASD8/Zhinjan regenerated only roots (Table 2). □

Table 2. Regeneration of plants from anther calluses of Tamil Nadu Agricultural University rices, 1980.

cross	Anther calluses subcultured (no.)	Green plantlets (%)	Albinos (%)	Roots alone (%)	No differentiation (%)
ASD8/Vaigai (F_1)	40	–	25	48	27
ASD8/Amaravathi (F_1)	72	16	–	64	20
ASD8/Bagavathi (F_2)	90	22	–	49	29
ASD8/Zhinjan (F_1)	24	–	–	68	32

Pest management and control DISEASES

Effect of slow-release nitrogen fertilizers on rice brown spot disease

P. Vidhyasekaran, K. Ranganathan, S. P. Palaniappan, and S. Ramasamy, Tamil Nadu Rice Research Institute, Aduthurai-612 101, India

Brown spot (BS) *Helminthosporium oryzae* Breda de Haan is becoming a serious disease of high yielding rice varieties in Tamil Nadu. Heavy nitrogen fertilizer application increases BS incidence.

A field trial in kuruvai (Jul-Oct) with the short-duration (105–110 day) variety TKM9 measured the effect of slow-release nitrogen fertilizer on BS incidence. Commercial urea, sulfur-coated urea, and urea supergranule (1-g size) were applied at 29, 58, 87, and 110 kg N/ha in a randomized block design with 3 replications. Urea was applied in two equal split doses: at transplanting and panicle initiation. Sulfur-coated urea was incorporated at transplanting. Urea supergranule was spot applied, one granule for every 4 hills, 15 days after transplanting. Phosphorus and potassium were applied at 50 kg/ha to all plots. Disease incidence was assessed at growth stage 9, using the Standard Evaluation System for Rice.

No application and heavy application of urea caused heavy BS incidence. Application of sulfur-coated urea or urea supergranule appreciably reduced disease incidence (see table). These two fertilizers can be applied at levels from 87 to 110 kg N/ha with good reduction in disease incidence. Sulfur-coated urea performed better than urea supergranule. □

Effect of different forms of urea on BS incidence in rice.

Treatment	Disease intensity[a] at nitrogen levels				
	0	29 kg N/ha	58 kg N/ha	87 kg N/ha	110 kg N/ha
Commercial urea	–	5.1	5.0	4.6	5.0
Sulfur-coated urea	–	4.7	2.4	2.9	1.9
Urea supergranule	–	4.0	4.3	2.7	3.3
No nitrogen	5.6	–	–	–	–

[a]Based on 1980 Standard Evaluation System for Rice. Least significant difference at 5% level = 1.4.

Response of two rice varieties to *Rhynchosporium oryzae* infection.

M. D. Thomas, senior research officer, and S. A. Raymundo, UNDP/FAO/IITA plant pathologist, Pathology Section, Rice Research Station (RRS), Rokupr, Sierra Leone

Earlier qualitative observations have indicated that in Sierra Leone narrow-leaf rice varieties were less affected by rice leaf scald fungus *Rhynchosporium oryzae* Hashioka & Yokogi than broadleaf varieties. During 1979 and 1980 wet seasons (May-Oct), field experiments compared the response of ROK 16 (broadleaf) and PN623-3 (narrow-leaf) to *R. oryzae* infection either with or without benomyl fungicide. Experiments were at

Table 1. Response of 2 rice varieties to *Rhynchosporium oryzae* infection in Sierra Leone.[a]

Experimental site	Treatment	Leaf area infected (%)	
		ROK16	PN623-3
1979			
Sendugu-NP	Benomyl	0.9	0.8
	Untreated	3.4*	2.8*
Makassa-NP	Benomyl	2.2	2.5
	Untreated	5.2*	4.2*
1980			
Masorie-NP	Benomyl	0.5	1.5
	Untreated	5.9	7.0
Sendugu-NP	Benomyl	0.4	0.3
	Untreated	1.6	1.3
Kenema-EP	Benomyl	0.1	0.1
	Untreated	0.2	0.3

[a]Values are means from the 4 top leaves in 1979 and from the 3 top leaves in 1980. NP = Northern Province, within 8 km from RRS; EP = Eastern Province, 360 km from RRS. ROK16 and PN623-3 have broad-droopy and narrow-erect leaves, respectively. For 1979, *denotes significant difference between benomyl-treated and untreated values; differences between varieties are not significant, $P = 0.05$. For 1980, LSD ($P = 0.05$) are 1.2 (Masorie), 0.7 (Sendugu), 0.1 (Kenema). Untreated plants were artificially inoculated at Masorie.