Effect of fungicides on B1 incidence and rice yield, Punjab, Pakistan.[a]

Fungicide	Formulation (g/litre water)	One spray			Two sprays			Three sprays		
		% B1 incidence	Yield (t/ha)	Benefit-cost ratio[b]	% B1 incidence	Yield (t/ha)	Benefit-cost ratio	% B1 incidence	Yield (t/ha)	Benefit-cost ratio
Phthalide 30 WP	1.5	33 a	1.4 a	3.0:l	23 b	2.0 b	10.0:1	14 a	2.4 bc	10.4:l
Phthalide 30 WP	2.5	29 a	1.4 a	3.5:1	8 a	2.5 a	11.5:l	4 a	3.2 a	12.1:l
Kasugamycin 2 WP	1.5	48 b	1.3 a	1.2:l	30 b	1.9 b	8.4:1	23 b	2.2 c	8.7:1
Kasugamycin 2 WP	2.5	46 b	1.4 a	2.1:l	16 ab	2.1 ab	8.4:1	10 a	2.9 ab	9.8:l
Check	–	59 c	1.2 a	–	68 c	1.2 c	–	65 c	1.2 d	–
Cd_1	–	11	0.2	–	14	0.4	–	9	0.6	–

[a] Av of 4 trials. In a column numbers followed by common letters are statistically identical at 95% level of confidence. [b] Benefit-cost ratios were calculated by dividing extra benefits attained from the enhanced yield by the extra costs incurred for each treatment. The costs included fungicide price at $l0/kg, application costs ($2.25/spray). Benefits included the price of enhanced yield over that of the check @ $6/40 kg paddy.

farmers' fields in Sheikhupura District.

Basmati 370 was transplanted in 25.5-m^2 plots the first week of August. One, 2, or 3 sprays of 250 litres fungicide/ ha were applied in 3 replications. Phthalide 30 WP and kasugamycin 2 WP at 1.5 and 2.5 g/litre water were compared with the check. A single fungicide spray was applied 60 d after transplanting (DT). In trials with 2 or 3 applications, the first application was at 45 DT, with succeeding applications at 15-d intervals.

Leaf B1 incidence was recorded 10 d after the last spray by counting and calculating percentages of leaves with B1 lesions from five randomly chosen plants from each plot. Internodal and nodal Bl incidence was recorded at crop maturity from 2 randomly selected 1-m quadrats in each plot.

All treatments significantly reduced B1 incidence (see table). One spray did not significantly increase yield over that of the check, but two and three sprays did. Two and three applications had higher benefit-cost ratio than one application.

Chemical control of sheath blight (ShB)

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ShB caused by *Thanatephorus cucumeris* (Frank) Donk. is spreading in major rice growing areas in Thailand. There are few resistant varieties; therefore chemical controls are needed. In 1984, we tested 13 fungicides for ShB control at Bangkhen Rice Experiment Station. Susceptible RD7 was planted in 1.5- × 3-m plots in a randomized complete block design. Plants were inoculated at tillering by inserting a pack of mycelia grown on sterilized rice grain. Fungicides were sprayed 3 and 10 d later. Disease intensity was recorded 3 wk after inoculation by measuring lesion length on leaf sheaths of each tiller.

All fungicides significantly reduced disease intensity. Pencycuron 25% WP, Jingunmycin 5% liquid, validamycin 3% liquid, carbendazim 60% WP, and mepronil 75% WP, were most effective (see table).

Effectiveness of certain chemicals against ShB of rice.

Fungicide	Application rate (g ai/ha)	Lesion length (cm)
Pencycuron 25% WP	315	29.2 a
Jingunmycin 5% liquid	50	29.6 a
Validamycin 3% liquid	45	29.8 a
Carbendazim 60% WP	600	32.5 a
Mepronil 75% WP	1225	33.7 a
Iprodione 50% WP	500	39.5 b
Propiconazole 25% EC	250	41.3 b
Thiophanate-methyl 50% ULV	500	44.1 bc
Thiabendazol 90% WP	900	48.6 cd
Polyoxin + IBP 42% WP	630	49.7 d
Polyoxin Z 2.2% WP	33	56.9 e
Polyoxin D 2% WP	30	60.0 ef
Furmecyclox 40% WP	600	63.7 f
Control	0	73.5 g

CV = 7.0%

Sclerotia distribution of *Rhizoctonia solani* and its relation to sheath blight (ShB) in Arkansas rice fields

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We studied the relationship between inoculum density and ShB development and the factors that influence sclerotia distribution and density in rice fields.

Rice production fields with a history of severe ShB inzcidence were selected for sclerotia distribution studies. One-litre soil samples were taken 2-3 wk after rice emerged, but before permanent flooding, at 114-cm intervals and 1.5-cm depth.

Samples were air-dried in open pots and suspended in 2.5 litres of water for 5 min. The supernatant was washed through a 4-mm mesh sieve over 0.50-mm mesh sieve. The process was repeated with the material left in the pot, but with only 3 min suspension.

Sclerotia number per litre surface soil and diseased plants per 0.3 m^2 from fields with a history of ShB infection in Arkansas.

Variety	Year	Field	Position[a]	Samples (no.)	Sclerotia/litre			Diseased plants[b]/0.3 m^2		Field elevation (cm)
					Minimum	Maximum	Average	Maximum	Average	
STBN	1980	1		53	1	81	16.7	18	6.8	
STBN		2		40	4	29	12.8	28	8.7	
STBN		3		96	3	33	12.3	20	2.0	36
STBN		4		30	7	66	21.5	20	7.8	
STBN	1981	1		80	5	46	21.0	14	0.7	
STBN		2		50	0	22	7.0	10	0.6	
Mars		3		80	2	36	20.6	10	1.2	30
Mars		4		80	0	22	5.7	18	2.0	72
Mars		5		60	0	7	1.5	0	0	
STBN		6		80	0	85	32.2	33	14.7	90
STBN	1982	1	a	45	5	56	25.5	28	4.4	
STBN		1	b	45	0	20	4.1	28	4.4	

[a] = sclerotia in soil sample; b = sclerotia floating in water; STBN = Starbonnet. [b] Minimum no. was zero.

Material retained in the 0.50-mm mesh sieve was removed to a 250-ml plastic beaker, flooded onto another 0.50-mm mesh sieve, and washed and collected on filter paper in a Buchner funnel. Sclerotia were separated from debris and other fungal sclerotia by size, color, shape, and texture.

In 1982, floating sclerotia also were collected with all floating material within a 0.3-m^2 area using a fine-mesh screen. The material was poured onto filter paper and examined for presence of sclerotia.

When rice headed, disease incidence for each sample site was determined by counting the plants with ShB symptoms within 0.3 m^2.

Sclerotia population per litre of soil and number of diseased plants per 0.3 m^2 are in the table. In all fields surveyed in 1980 and 1982, higher sclerotia populations matched field margins. Three of four fields in 1980 and four of six in 1981 had more sclerotia at lower elevations.

Similarly, sites with many diseased plants had many sclerotia per 0.3- m^2 area. There were some exceptions, however. In 1980, one field with many sclerotia at a low elevation site had high disease incidence at high elevation but within the field edges. In 1981, a field with many sclerotia at a high elevation site had high disease incidence at low elevations.

When the number of diseased plants per 0.30 m^2 was regressed on the number of sclerotia per litre of soil for individual fields, no relationship was detected. However, when a regression was calculated among fields (with an average for each field), correlation coefficient was 0.15 in 1980 and 0.45 in 1981. No relationship was detected in 1982 when diseased plants per 0.30 m^2 was regressed with floating sclerotia per litre of soil and floating sclerotia per 0.3-m^2 water surface area.

Distribution of *Rhizoctonia solani* sclerotia and diseased rice plants followed a general pattern. There were more sclerotia and diseased plants at low elevations in each field. Because water flows from high to low elevation within fields and from levee gates to the whole length and width of bays during first flooding, it may be that the flow pattern carries sclerotia to low elevations and field margins. Spring storms and temporary flooding for soybean cultivation could cause similar results.

Soil was sampled before permanent flooding, and disease was rated at 2-cm internode elongation. Therefore, floating sclerotia could have moved in floodwater, thus resulting in the lack of relationship between average sclerotia per litre of soil and average diseased plants per 0.3 m^2. It may be for the same reason that there is no relationship between number of floating sclerotia and diseased plants. The fact that some fields had high inoculum concentration and few infected plants and vice versa may be due to differences in biotic and abiotic factors among fields.

Standardized test tube inoculation for bakanae disease (Bak)

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We attempted to standardize test tube inoculation for rapidly screening rice varieties for resistance to Bak caused by *Fusarium moniliforme.* Susceptible BR1 was used in two experiments to standardize spore concentration and seed-soaking duration. A sterile-water control was maintained in both experiments.

Twelve spore concentrations were evaluated (Table 1). Seeds were soaked

Table 1. Effect of spore concentration of *Fusarium moniliforme* on shoot and root elongation in rice, Joydebpur, Bangladesh.

Spore conc (thousand/ml)	Mean shoot length (cm)	Mean root length (cm)
0.0	6.4 e	4.5 ab
0.6	6.2 e	4.6 ab
1.2	6.4 e	4.9 a
1.8	6.4 e	4.5 ab
2.5	6.6 e	4.3 ab
3.0	7.1 de	4.9 a
6.0	8.5 d	4.8 a
31.0	10.7 c	5.5 a
62.0	12.5 b	5.0 a
125.0	15.2 a	4.5 ab
250.0	15.3 a	3.4 b
500.0	11.5 bc	0.9 c
LSD at 5%	1.3	1.2
CV (%)	8.1	17.0