Field efficacy of certain chemicals in the control of bacterial blight of rice in the Punjab

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Bacterial blight of rice caused by *Xanthomonas oryzae* (Uyeda and Ishiyama) Dowson is a major disease in the tropics. In a field trial during kharif 1976, seedlings of Jaya were inoculated with a virulent isolate of *X. oryzae* 3 wk after transplant. Chemicals were sprayed four times at fortnightly intervals starting 72 hours after inoculation at the rate of 2 liters/plot. Observations for bacterial blight were recorded 10 days after the last spray (see table).

Less disease was recorded in plots sprayed with copper oxychloride and with Agrimycin-100 + copper sulfate than in the unsprayed check. Agrimycin-100 alone and streptocycline showed little effect. There were no significant differences in yields with the various treatments. The yield of the inoculated control was 25.9% less than that of the uninoculated check.

Relative efficacy of various chemicals in controlling bacterial leaf blight of rice.

Treatment	Concentration	Disease incidence[a] (%)[b]	Yield (t/ha)
Agrimycin-100	200 ppm a.i.[c]	33.85 (31.0)	4.80
Streptocycline	200 ppm a.i.[c]	33.95 (31.2)	4.85
Agrimycin-100 + Copper sulfate	200 ppm a.i.[c] + 100 ppm a.i.[c]	31.23 (26.9)	4.95
Copper oxychloride	0.2% (Commercial)	29.70 (24.6)	5.05
Inoculated control (water spray)		36.02 (34.6)	4.85
Uninoculated control	–	–	6.55

[a]Average of six replications.

[b]C.D. at 5% level = 4.21; C.D. at 1% level = 5.74. Figures in parentheses indicate percent disease index. Others are transformed values and C.D. applies to these only.

[c]a.i. = active ingredients.

Antibiotics for control of sheath blight of rice

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Sheath blight of rice caused by *Corticium sasakii* (Shirai) Matsumoto is increasing in severity in certain parts of Tamilnadu because of the introduction of rice strains that are high yielding and responsive to heavy fertilization.

A field trial of eight antibiotics was conducted during the kuruvai (June–September 1975) and the thaladi (October 1975 – January 1976). During its maximum tillering stage the susceptible rice variety ADT-31 was sprayed twice with a 1,000-ppm concentration of Agrimycin-500, Streptocycline, Blasticidin, Polyoxin, Aureofungin, Tetracycline, Kasumin, or oxytetracycline. All of the treatments reduced the disease incidence; the antifungal antibiotic Aureofungin was highly effective. Increased yield was also recorded from the plots treated with it.

Fungicidal control of sheath blight of rice

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The fungicides Benlate, Dexon Wet, Ceresan, Daconil, Dithane Z-78, Dithane D-14, Kitazin, Hinosan, N.F. 48, Brassicol, Brestan, El-273, thiram, and Demosan in 2% solutions were tested for the control of sheath blight of rice caused by *Corticium sasakii* (Shirai) Matsumoto. They were sprayed twice during the maximum tillering stage of the susceptible variety ADT-31. Compared with the untreated control, all the test fungicides minimized disease incidence. Benlate, Demosan, Hinosan, Kitazin, and Daconil were found to be highly effective. The treated plots also had significantly higher grain yield than the untreated control.

Root-lesion nematode damage in upland rice

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Observations indicate the potential of the polyphagous nematode *Pratylenchus indicus* as a pest of rice in uplands and in soils where crop rotations with susceptible cereal and fodder grass crops are adopted. In recent surveys on the Central Rice Research Institute farm, the prevalence of the nematode was observed. Direct-seeded rice showed patches of yellowing plants within 15 days of germination. In the following week, leaves wilted and dried up. Mortality was complete at 40 to 50 days after germination (see photograph).

Roots of infested plants showed surface lesions with necrotic cells in the cortex. All the stages of *P. indicus* were observed inside roots. The nematode population increased with plant age and peaked in October 1975 when the crops were heading. The symptoms at that stage were yellowing of leaves in patches, and partial earhead exsertion.

Mortality of nematode-infested upland rice at Cuttack, India, 4 to 50 days after germination.

Surveys of other rotation crops in rice soils under upland conditions showed the infestation of ragi, wheat, and sorghum in that order. Some grasses in and around rice fields *(Echinochloa colona, Cyperus* sp., *Alternanthera sessilis, Eragrostis pilosa, Eleusine aegyptica,* and *Cynodon dactylon)* were found to be suitable hosts for this nematode. In rice followed by the fodder grass crop *Pennisetum pedicillatum,* nematode infestation resulted in 12 to 17% yield loss. A preliminary survey of areas in Kerala, Gujarat, Orissa, West Bengal, and Assam confirmed the prevalence of *P. indicus* in association with rice culture.

Some granular insecticides tested against rice brown spot disease

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To explore their potential for controlling brown spot disease of rice, monocrotophos 5 G, MIPC 4 G, quinalphos 5 G, and AC 92100 5 G, mixed with 20 ml potato-dextrose-agar, were bioassayed against the disease pathogen *Helminthosporium oryzae* Breda de Haan in vitro.

The growth of *H. oryzae* was inhibited by all the granular formulations (see table) even at the lowest test dose. It was completely inhibited by monocrotophos and MIPC at the dose of 50 ppm, by quinalphos at 250 ppm, but by AC 92100 5 G only at 1,000 ppm. Granular formulations of the above insecticides may be useful in the control of rice brown spot disease. However, more detailed investigations are needed to prove their potential against *H. oryzae* in the field.

Colony diameter (mm) of mycelial growth of *H. oryzae* 7 days after inoculation[a] (mean of three replicates).

Treatment	Colony diameter (mm) at insecticide doses of				
	1000 ppm	500 ppm	250 ppm	100 ppm	50 ppm
Monocrotophos 5 G	–	–	–	–	–
MIPC 4 G	–	–	–	–	–
Quinalphos 5 G	–	–	–	18.3	20.0
A.C. 92, 100	–	15.0	15.6	24.0	30.0
Check	65.0	65.0	65.0	65.0	65.0

[a] 8 mm.

Pest management and control

INSECTS

Rice surveillance in India

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India is beginning to associate surveillances of rice pests with control measures and research. Among several surveillance programs is a pilot program of the Directorate of Plant Protection, Quarantine, and Storage (DPPQS) to monitor rice, potatoes, sugarcane, and wheat from Central Surveillance Stations in 12 districts in 9 states. Each station has a surveillance officer and six field reporters. Each field reporter collects data weekly from 20 fixed fields of the selected block in which he works with sampling equipment, meteorological equipment, and light traps. He also makes a weekly roving survey of a portion of the block. State governments use the surveillance information, along with economic threshold values supplied by the All India Coordinated Rice Improvement Project, to determine need for pest control measures and type of control needed. Sampling methods and the type of information sought are being modified with experience. The process of station-establishment needs improvement, and states and farmers need to become better prepared to undertake control measures in large areas on short notice.

DPPOS also organizes roving surveys during kharif in Punjab, Uttar Pradesh, Bihar, Assam, Orissa, Madhya Pradesh, and West Bengal, chiefly to monitor populations of the tungro vector *Nephotettix virescens.* DPPQS processes the data and issues weekly bulletins. When *N. virescens* counts reach two or three insects per rice hill, state governments are advised to begin control measures. Control alerts are also provided for other pests and diseases. It is planned to extend these roving surveys together areas and other rice seasons.

Following an epidemic in Kerala, DPPQS and the State have also organized a special surveillance program for the brown planthopper. In many cases it now is possible to provide timely warning of upcoming pest problems, although not always possible to institute timely control measures.

Proposed integrated studies of pest control problems

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A study is planned to evolve an integrated picture of the interactions among the pests, pesticides, and nontarget organisms involved in rice culture.

The first part of the study will investigate the action of different organochlorine, organophosphorous, and carbamate pesticides on such nontarget organisms as goats, sheep, rats, frogs, fish, and invertebrates (e.g. mollusks and earthworms). The second part will emphasize the mode of action of the pesticides in important rice pests *(e.g. Tryporyza* sp. and *Chilo* sp.) and the pests' relative sensitivity to different pesticides. Changes in soil chemistry also will be studied.

Several biochemical parameters of target and nontarget organisms, such as