10 yr without any appreciable damage. Early rice varieties Bindeshwari, Chaite-2, and Chaite-4 had little or no disease.

In a survey of farmers' fields in Chitwan district (western Bl-prone area) 9 Jun 1988, a low level of leaf Bl and moderate level of neck Bl were observed in rice variety CH-45, a popular early variety.

More than 100 mm rainfall occurred in May 1988, compared to less than 35 mm in May 1987. The rainfall also occurred more frequently. Thus, Bl races able to attack the early varieties are prevalent in nature and cause serious yield losses in years of early rainfall. □

Isolation of *Pseudomonas fuscovaginae* with a semiselective medium (KBS)

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P. fuscovaginae, the causal agent of bacterial sheath brown rot of rice and first described in Japan, is now reported in several tropical countries (Burundi, Latin America, Madagascar). Symptoms are similar to those produced by other pathogens: grain discoloration, sheath necrosis, and spikelet sterility.

Isolation of *P. fuscovaginae* is difficult, particularly on older or deteriorated sampies, because of the presence of other bacteria commonly isolated from rice samples. We developed a semiselective medium (KBS) that can be used to isolate *P. fuscovaginae* on different rice samples.

Composition of the KBS medium is detailed in Table 1. Basal medium is King's medium B (KB), but the source of peptone has been changed. Proteose peptone n°3 is replaced by casamino acids. This is important because the pigment produced by some strains (particularly from Madagascar) fluoresced only weakly or not at all in ultraviolet light when bacterial growth occurred on KB medium containing proteose peptone n°3, bactopeptone, or casitone (Difco).

Plating efficiencies of 4 reference strains of *P. fuscovaginae* on KBS medium ranged from 5 to 100% after 3 d of incubation, and from 60 to 100% after 6 d of incubation at 28 °C (Table 2). Other fluorescent pseudomonads and a few other bacterial species grew on KBS medium, but development of most saprophytic bacteria and fungi was inhibited.

We used different media to isolate *P. fuscovaginae* on several hundred rice samples. KBS medium was the most useful, especially when laboratory facilities are limited. □

Table 1. Composition of KBS medium.

Basal medium:	
Casamino acids (Difco)	20 g
Glycerol	15 ml
K_2HPO_4	1.5 g
$MgSO_4, 7H_2O$	1.5 g
Agar	15 g
Distilled water	1l

pH 7.0-7.2 adjusted with NaOH before autoclaving for 15 min at 121°C.

Components added to the melted basal medium at 45°C:	
Cetyltrimethylammonium bromide (= Cetrimide, Labosi)	5 ml of a distilled water stock solution (20 mg/ml)
Trimethoprim (Sigma)	20 mg
Penicillin G (Sigma)	50 mg
Bacitracin (Sigma)	20 mg
Cycloheximide (=Actidione, Labosi)	50 mg

The last 4 components were mixed in 4 ml of 70% ethanol.

Table 2. Plating efficiency on KBS medium of *Pseudomonas fuscovaginae* from distilled water suspensions.

Strain	Source	Plating efficiency[a] (%)
GR 2	Madagascar	100[b]
HMB 264	Burundi	100[b]
6801	Japan	5
		60[c]
BCE 32	Colombia	100[b]

[a] Plating efficiency = colony-forming units recovered on KBS + colony-forming units on KB × 100. [b] After 3 d incubation at 28°C. =After 6 d incubation at 28°C.

Insect management

Morphometric comparison of stridulating organs of brown planthopper (BPH) infesting rice and *Leersia grass*

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BPH *Nilaparvata lugens* (Stål) males and females communicate prior to copulation, by means of acoustic courtship signals emitted by specialized stridulating organs located at the junction of the metathorax and abdomen on each side of the body. Each organ comprises a sclerotized meta-coxata and a petal-like abdominal sclerite extended in front of the third sternopleuron.

As a calling adult slightly vibrates its abdomen in a dorsoventral direction, the sclerite rubs against the top of the coxata, emitting discrete sound pulses, or clicks. The wave patterns, pulse repetition frequencies, and sonic spectra of acoustic signals have been found to differ significantly in BPH infesting rice and BPH infesting the weed grass *Leersia hexandra* Swartz.

To find out why acoustic signals differ in the two populations, we compared the stridulating organs (length, width, number of chitinous scales on coxata and sclerite) of males and females from each population.

We used an aspirator to collect 20 brachypterous males and 20 females from a BPH population maintained on TN1 rice plants and from a population reared on *Leersia* plants. The insects were prepared for morphological examination as follows: 1) boil in 95% ethyl alcohol in a water bath for 5 min; 2) macerate in 10% lukewarm NaOH for 15 min; 3) wash with 95% ethyl alcohol and boil in chloral-phenol (1:1 part chloral hydrate and phenol crystals) for 20 min; 4) orient and mount left and

right stridulating organs on glass microslides using Hoyer's medium. Morphometric measurements were made at the 100x objective of a phase contrast microscope fitted with a linear, graduated ocular micrometer. Calibrated micrometer units were converted into microns.

The petal-like sclerites were smaller in males than in females in both rice- and weed-infesting BPH, but the rice insects possessed significantly shorter and wider sclerites than those on *Leersia* (see table). The number and length of chitinous scales in males and the length of chitinous scales in females of both rice BPH and *Leersia* BPH differed significantly. Males had significantly fewer and smaller chitinous scales than females.

Thus, variations in acoustic signals between the two sympatric populations of BPH can be attributed to morphometric differences in their stridulating organs.□

Dimensions of petal-like sclerite, and the number and size of chitinous scales on the sclerite in males and females of *N. lugens* infesting rice (RBPH) and *L. hexandra* plants (LBPH).[a] IRRI, 1988.

Sex	Sclerite dimension						Chitinous scales on petal-like sclerite								
	Length (μ)			Width (μ)			Number			Length (μ)			Width (μ)		
	RBPH	LBPH	Difference	RBPH	LBPH	Difference	RBPH	LBPH	Difference	RBPH	LBPH	Difference	RBPH	LBPH	Difference
Male	103 b	112 b	-9**	57 b	49 b	8*	117 b	99 b	18**	11 b	10 a	1**	6 b	5 b	1 ns
Female	141 a	133 a	8**	72 a	61 a	11**	125 a	125 a	0 ns	13 a	10 a	3**	7 a	6 a	1 ns

[a]Av of 20 specimens of each sex. In a column, means followed by a common letter are not significantly different at the 5% level by DMRT. **, *, and ns = significant at 1% level, 5% level, and no significant differences by LSD test.

Carbofuran-induced rice leaff older (LF) resurgence

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LF (*Cnaphalocrocis medinalis*) is a major pest of rice in the Sambalpur district of Orissa. We evaluated five insecticides against this pest in a field trial during the 1988 wet season. Susceptib1e Jaya was transp1anted in 20-m^2 plots at 20- × 15-cm spacing in a randomized block design with 4 replications. Locally recommended chemical fertilizers were applied at 10 and 50 d after transplanting (DT).

LF damage was high at heading. At 85 DT, leaves with at least one-third of the leaf area damaged were removed from random-selected 20 hills in each plot. Plots treated with carbofuran had higher leaf damage than the check plot (see table), perhaps indicating LF resurgence. All other treatments had lower LF damage. Cartap was most effective in controlling LFs.□

Effect of insecticides on LF control in rice.[a] Sambalpur, Orissa, India, 1988 wet season.

Insecticide	Rate (kg ai/ha)	Damaged leaves (no./plant)	Grain yield (t/ha)
Cartap 4G	1.5	1.5	4.6
Carbofuran 3G	1.0	33.0	3.6
Ethoprofos 10G	1.0	10.9	4.0
Decamethrin + buprofezin (Dadeci 5.9 EC)	0.09	5.8	4.2
Phosalone 35 EC	0.5	9.2	3.8
Untreated check	–	20.4	3.5
LSD (0.05)		11.2	0.6

[a]Mean of 4 replications.

Incidence of two grain suckers in irrigated and upland rice

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Of the insect pests that attack rice in West Africa. internal stem feeders (lepidopterous and dipteran stem borers) cause the most damage; grain sucking bugs are next in importance.

Among the 15 species of grain suckers known, *Aspavia armigera* F. (Pentatomid) and *Stenocoris claviformis* Ahmad (Coreid) are important. Damaged grains have diffuse brown spots at the point of feeding. Heavily damaged grains are either empty or only partially filled.

The adult *Aspavia* is brown with a yellow spot at each comer of the triangular shield. Its prothoracic plate has a pointed projection at each side of the dorsal side. The *Stenocoris* is similar in appearance to the Asian grain sucking bug *Leptocorisa*.

We studied the relative abundance of these two species in irrigated and upland rice.

For irrigated rice, 21-d-old seedlings of ITA212 were transplanted at 20- × 20-cm spacing in a 50- × 50-m plot. For upland rice, ITA235 was dibbled at 4-5 seeds spaced 25 × 25 cm. Plot sue was 50 m^2. Both crops were planted in mid-Jun 1986. Management practices followed standard recommendations. Sampling with 10 net sweeps per plot at 10 d intervals started at 50 d after transplanting (DT) and continued to 100 d.

In irrigated rice, more *Stenocoris* were found up to 80 DT (see figure). At 90 and 100 DT, the *Aspavia* population