

schoenobii Ferriere were the only egg parasites obtained from 193 egg masses (1,070 eggs) of *S. incertulas* (see table). Although *Telenomus* sp. caused a higher percentage of parasitization than *T. schoenobii* in all four generations (*S. incertulas* completes two generations each cropping season in Sri Lanka), the difference was not significant. □

Parasitization of *S. incertulas* eggs by *Telenomus* sp. and *T. schoenobii*. Maha Illuppallama, Sri Lanka, May and Jul, 1982.

Generation	Eggs (no.)	Parasitization (%)		
		<i>Telenomus</i> sp.	<i>T. schoenobii</i>	Total
1st	208	27.0	17.3	44.3
2d	195	27.4	16.0	43.4
3d	345	36.3	24.5	60.8
4th	322	35.3	23.3	58.6

Diluted quinalphos and fenthion and control of whitebacked planthopper (WBPH)

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Two experiments with two insecticides (quinalphos and fenthion) were conducted to evaluate diluted insecticides in controlling WBPH *Sogatella furcifera* at Bhupindra Rice Research Substation, Rauni, 1985 wet season.

Recommended rate (0.5 kg ai/ ha) of quinalphos and fenthion was diluted with water to apply 250, 375, and 500 liters/ha. A randomized block design with four replications for quinalphos and three for fenthion was used. Plot size was 300 m².

WBPH counts at 2 and 8 d after application for quinalphos and 2 d after application for fenthion showed no significant differences among treatments (see table). □

Effect of diluted insecticides on WBPH incidence. Punjab, India, 1985.

Treatment	WBPH ^a (adults + nymphs)/10 hills		
	Pre-treatment ^b	2 d after application	8 d after application
Quinalphos 25 EC			
250	174 a	11 a	80 a
375	171 a	9 a	84 a
500	174 a	4 a	101 a
Control	184 a	200 b	273 b
Fenthion 1000 EC			
250	211 a	11 a	—
375	189 a	9 a	—
500	175 a	10 a	—
Control	182 a	294 b	—

^aFor each group of insecticide treatments, means in a column followed by a common letter do not differ significantly at the 5% level by DMRT. ^b30 Aug for quinalphos and 5 Sep for fenthion.

***Nisaga simplex* caterpillar on rice in western Orissa**

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Hairy caterpillar *Nisaga simplex* Wlk. (Eupterotidae: Lepidoptera) regularly damages upland and medium ricefields in various locations of Kalahandi and Koraput districts in the wet season Jun-Dec. Moths emerged in Jun with the onset of the monsoon and oviposit on weedy growth of scrubby jungles and on adjoining ricefields. Incubation lasted 7-9 d. In the laboratory, 8 larval instars were completed in 68-76 d. Pupation took place in soil. Caterpillars fed

voraciously on the leaf lamina, leaving only the midrib.

In its natural habitat, the pest pupated in loose lateritic soil, often as deep as 30 cm, in Oct and overwintered to the following Jun. The caterpillars shunned water and did not migrate to lowland fields. The moths are poor fliers.

Weedy fields attracted higher populations than weeded fields. The caterpillars also attacked maize, sorghum, finger millet, sugarcane, and these weed species: *Brachiaria mutica*, *Cynodon dactylon*, *Dactyloctenium aegyptium*, *Digitaria ciliaris*, *Echinochloa colona*, *E. crus-galli*, *E. glabrescens*, *Eleusine indica*, *Ischaemum rugosum*, *Leersia hexandra*, *Leptochloa chinensis*, *Panicum repens*, *Paspalum conjugatum*, *P. clisticum*, and *P. scrobiculatum*. □

Rice leaffolder (LF) infestations in West Bengal

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Rice LF generally appears as a minor pest of rice in West Bengal. However, it

infested over 67,000 ha in 11 districts in 1986, causing appreciable damage to standing wet season rice. All the districts experiencing massive infestation were located on the south and southwest sides of the river Ganges.

Cnaphalocrocis medinalis (Guenée) was the most dominant LF species;

Leaves damaged by LF, maximum and minimum temperatures, and rainfall in different months.^a West Bengal, India.

Month	Damaged leaves (%)	Mean monthly temperature (°C)		Rainfall (mm)
		Maximum	Minimum	
May	3.6	34.5 (−1.9)	22.3 (−2.7)	178.8 (+63.4)
Jun	5.5	34.3 (+0.4)	26.6 (+1.1)	278.6 (+30.0)
Jul	12.6	31.5 (−0.2)	25.9 (+0.2)	249.5 (−40.2)
Aug	31.3	32.7 (+1.4)	26.3 (+0.6)	98.2 (−404.4)
Sep	73.6	31.4 (−0.1)	25.1 (−0.4)	750.0 (+513.5)
Oct	31.9	30.6 (−0.4)	22.1 (−0.8)	104.3 (−8.0)

^aMean of 20 samples. Figures in the parentheses indicate deviations from normal.

however, *Marasmia exigua* (Butler) also caused damage. Their relative proportion was 80:20.

Wet season rice usually is transplanted Jul–Aug and harvested in Nov. But an unusual drought in Aug–Sep caused setbacks. Stray incidences of LF were observed in May on broadcast rice seedlings sown in Apr. Gradually the pest population built up. Percentages of damaged and folded leaves/m² of sample plots were recorded May–Oct 1986. The sample was 20 randomly selected plots in each district. Data with rainfall, temperature, and deviations from normal are presented in the table.

Four overlapping LF broods were observed. *Cotesia* sp. and *Temelucha philippinensis* (Ashm.) were the common larval parasites.

It appears the unusual dry conditions combined with other bioecological factors favored the outbreak. After superabundant rain 22 Sep–8 Oct (a record 503 mm rainfall was recorded in 12 d at Chinsurah), the infestation gradually waned. □

Biochemical changes in rice plants infested with mealybug

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We studied the contents of reducing and nonreducing sugars, total phenols, and amino acids in healthy rice plants and those infested with mealybug *Brevinnia rehi* Lindinger. Fifty mealybugs were placed on each tiller of 20-d-old IR20 seedlings, and allowed to feed 40 d. Samples were drawn 60 d after treatment from healthy and infested seedlings with three replications.

A 10-g sample of plant material was plunged into boiling 80% ethyl alcohol and extracted for 10 min. The extract was decanted, the tissues ground with a pestle and mortar and reextracted with another aliquot of ethanol, then strained through cheesecloth. Extracts were pooled to make up a desirable volume

Effect of mealybug infestation on biochemical contents of rice.^a Coimbatore, India.

Biochemical constituent	Content (mg/g dry weight)		Change (%)
	Healthy	Infested	
Total phenol	3.9	4.0	+ 2.6
Total sugar	16.9	32.6	+ 92.9
Reducing sugar	6.4	12.9	+101.6
Nonreducing sugar	10.5	19.7	+ 87.6
Total N	10.7	6.8	– 36.7
Amino acid (mg/100 g dry weight)			
Histidine	28	34	+ 21.4
Lysine	54	62	+ 14.8
Serine	25	29	+ 16.0
Tyrosine	199	221	+ 11.1
Alanine	–	8	+ 11.3
Glycine	47	60	+ 27.7
Tryptophan	127	142	+ 11.8
Arginine	29	37	+ 27.6
Isoleucine	31	87	+180.6
Proline	52	140	+169.2
Threonine	37	39	+ 5.4
Hydroxyproline	202	297	+ 47.0
Total	838	1156	37.9

^a Mean of 3 replications.

to use in estimating total and reducing sugars and total phenols and for chromatographic estimation of individual amino acids.

The amino acids were separated unidimensional descending chromatographic technique for qualitative analysis and estimated quantitatively by Demetriades’ method. The nitrogen was estimated on dry

plants by Humpries’ method.

Feeding injury by mealybugs resulted in a marginal increase in total phenolic content (see table). Total sugar, reducing sugar, nonreducing sugar and total amino acid contents increased phenomenally. Among the amino acids, isoleucine and proline contents increased more. □

Pest Control and Management
WEEDS

Effect of frequent cultivation on *Rottboellia cochinchinensis* density

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Rottboellia cochinchinensis (Lour.) W.D. Clayton (syn. *R. exaltata*) is a major weed in upland rice, maize, sugarcane, and legumes in the Philippines. We tested the effect of cultivation frequency (every 2, 3, and 5 wk) on *R. cochinchinensis* emergence in a fallow field at IRRI Aug 1983 - Jul 1985. Weeds were counted monthly in two 50- × 50-cm random quadrats per 48-m² (6 × 8 m) plot.

Initial weed density was 285 plants/m², with *R. cochinchinensis* comprising 30% of the population. After 1 yr, *R. cochinchinensis* population declined substantially (see figure). Reduction was associated with more frequent cultivation. By the end of the second year, *R. cochinchinensis* had been practically eliminated with cultivation every 2-3 wk; only a few plants grew in plots cultivated every 5 wk. This indicates that seeds of this weed either have very short dormancy or no dormancy or are short-lived.

Decline in the *R. cochinchinensis* population was not necessarily accompanied by an overall reduction in