26.5% tillers were damaged – much more than in the previous 2 years. But a shortage of rain in that area in October greatly reduced the overwintering gall midge population.

In Trad province, eastern Thailand, the population increased, especially on rice variety RD1. Although the percentage of galls on RD1 was relatively low, the plants were heavily stunted and yields were greatly reduced. Gall midge survival in the area was probably high because of low parasitization by *Platygaster* spp. (Table 2). For the first time, a gall midge outbreak was reported in Chantaburi. About 175 ha of local rice varieties in Bau district were heavily infested.

Table 2. Survival of the rice gall midge at various locations in Thailand, 1979 wet season.

Location	Galls observed (no.)	Survival (%)	Mortality (%) caused by			
			P. oryzae	*P. folsteri*	*N. gracillius*	Unknown
Lam-Ngob, Trad	103	80.6	0	0	18.4	1.0
Ban Ta Kak, Trad	117	70.9	0	0	24.8	4.3
Bau, Chantaburi	123	48.0	17.1	0.8	30.0	4.1
Ban Don Chik, Ubonratchatani	126	22.2	3.2	0	68.3	6.3
Ban Pa Rauk, Chiengrai	137	46.8	36.5	10.2	2.9	3.6

The abundance of wild host plants favors the survival of overwintering populations in the northern and eastern areas. ■

Gall midge occurrence in Uttar Pradesh, India

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Gall midge in serious proportions was observed in more than 2,000 ha in Faizabad district of U.P. in kharif 1978. The pest was observed only once earlier – in kharif 1971 – in the state. Most of the area infested in 1978 was contiguous; in some pockets the incidence was as high as 65%. The late-planted crop of Saket 4, Jaya, and IR8 were affected most. At the MasodhaRice Research Station, IET2232, IR24, Reshmi, NP5136, FH1, FH109, Satna, Belar, Ranga, FRG2, and FRG19 were also found severely affected by the pest. The incidence was observed from late August to mid-October. ■

Parasitization of BPH eggs in rice treated with foliar insecticide

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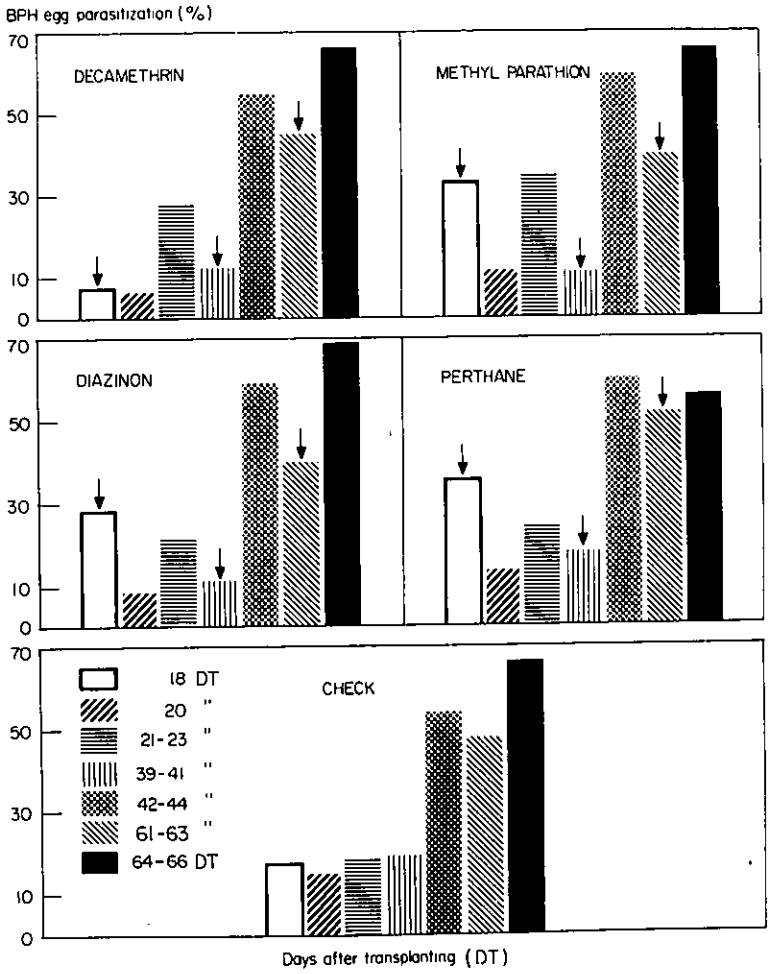
Sprays of the insecticides decamethrin, methyl parathion, and diazinon have caused resurgence of brown planthopper (BPH) in IRRI fields; Perthane spray has not. Laboratory studies indicated that those insecticides stimulate BPH reproduction, but their role in causing field resurgence by suppressing natural enemies has not been determined. Thus, a study was conducted to determine the effect of the insecticides on BPH egg parasitization, using the technique of Otake.



Percentage of parasitization of brown planthopper (BPH) eggs on rice sprayed with foliar insecticides. Arrows indicate days after transplanting (18, 39, 61 DT) when the insecticides were sprayed. IRRI, 1979 dry season.

Taichung Native 1 (TN1) seedlings were planted in clay pots (15 cm diam) at the rate of 4 seedlings/pot. When the plants were 30 to 40 days old, 20 gravid BPH were released into cylindrical mylar film cages covering each pot. Twenty-four hours later, the hoppers

were removed and the potted plants with hopper eggs were randomly placed in field experimental plots growing IR22 at the rate of 3 pots/plot. Each plot measured about 30 m^2. Insecticides were sprayed on the field plots at 18, 39, and 61 days after transplanting (DT). Potted plants with eggs were exposed to field parasitization after the 1st spraying at 20 and 21–23 DT, after the 2d spraying at 42–44 DT, and after the 3d spraying at 64–66 DT. The plants with BPH eggs were exposed to parasitization for two days and brought back to the greenhouse.

From each pot, three tillers, together with roots, were removed. The roots were washed and the plants transferred to 20-cm-long, 2.5-cm-wide glass tubes with 2.5 cm water at the bottom to soak the roots. The tube was plugged with cotton wool.

The number of nymphs hatching from each set of tillers was assessed daily, and the nymphs were removed. Most nymphs hatched 7 to 10 days after oviposition. Two species of egg parasites – *Anagrus* sp. and *Oligosita* sp. – emerged later. The parasites moved upward in the tubes and were trapped in the cotton wool. When all parasites had emerged they were counted with the aid of a stereoscopic microscope. The two species could easily be distinguished by morphological differences. The tillers were later dissected under a stereoscopic microscope and the parasitized and the healthy, unhatched eggs laid in each group of plants and the percentage of parasitization by the two parasite species were assessed. That gave a relative picture of the activity of egg parasites in field plots treated with insecticides.

Anagrus sp. was more abundant than *Oligosita* sp. Parasitism by *Anagrus* sp. reached 65% from 64 to 66 DT; parasitism by *Oligosita* sp. was 23%. Parasitization of eggs in field plots treated with decamethrin at 18 DT was reduced significantly. Two days after spraying, parasitization in all the insecticide treatments was generally reduced but the level increased between 21 and 23 DT. Despite 2 more spray applications at 39 and 61 DT the percentage of parasitism generally increased in all treatments. As indicated in the figure, parasitism was high (50–70%) in all insecticide treatments and in the untreated check. The results of this experiment indicate that BPH resurgence in rice treated with decamethrin, methyl parathion, and diazinon apparently is not caused by an adverse effect on the BPH egg parasites *Anagrus* and *Oligosita* sp. ■

Evaluation of lethal concentration of different insecticides against the brown planthopper

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Twelve insecticides at different concentrations were tested for LD_{50} (lethal concentration required to kill 50% of test insects) values against brown planthopper adults (Table 1). Thirty-day-old potted plants of TN1 were sprayed until runoff stage with an atomizer. The plants were then kept under natural climatic conditions for 24 hours. Then insects were released on them. Mortality was determined after 24 hours. Diazinon was used as the standard for comparison.

Phosphamidon was three times as toxic as diazinon; monocrotophos and carbofuran were more than twice as toxic. Chlorpyrifos, quinalphos, carbaryl, and endrin were 1.4–1.9 times as toxic as diazinon. ■

Relative toxicity values of some insecticides against brown planthopper adults.[a] CRRI, India.

Insecticide	LD_{50}[b]	Relative toxicity
Diazinon	0.0105	1.0
Carbofuran	0.0052	2.0
Chlorpyrifos	0.0055	1.9
Carbaryl	0.0073	1.4
Quinalphos	0.0072	1.5
Lindane	0.024	0.4
Mephosfolan	0.0676	0.2
Phosphamidon	0.0034	3.1
Endosulfan	0.0305	0.3
Monocrotophos	0.00404	2.6
Endrin	0.0077	1.4
Chlorfenvinphos	0.0128	0.8

[a]Max temp = 32.3°C, mean max temp = 29.0°C. Min temp = 14.2°C, mean min temp = 17.4°C. Mean RH = 69%. [b]Lethal concentration required to kill 50% of the insects.

Insecticide evaluation for whorl maggot control

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Several insecticides were applied as granules and as foliar sprays to identify those most effective in controlling the whorl maggot *Hydrellia sasakii.* The insecticides tested and the methods and rates of application are listed in the table.

Foliar spraying was done twice – 3 and 15 days after transplanting (DT) – with a knapsack sprayer at 300 liters of water/ha per application. Cypermethrin was sprayed with an ultra-low volume (ULV) applicator at 2 liters/ha.

Soil incorporation was done 1 day before transplanting; the paddy water broadcast was done at 3 DT.

Whorl maggot damage was assessed weekly, from 10 to 31 DT on a scale of 1–9. The results (see figure) indicate that carbofuran soil incorporation was

Insecticides, application methods, and rates for whorl maggot control, IRRI.

Insecticide (common name)	Application method[a]	Rate (kg a.i./ha)
Carbaryl	F	0.75
Phosphamidon	F	0.75
Endosulfan	F	0.75
Azinphos ethyl	F	0.75
Diazinon	F	0.75
Triazophos	F	0.75
Monocrotophos	F	0.75
Fensulfothion	F	0.75
Cypermethrin	ULV spray	0.02
Carbophenothion	F	0.75
Carbofuran	SI	0.75
Miral	SI	0.75
Ethoprop	SI	0.75
Monocrotophos	SI	0.75
Carbofuran	F	1.00
Miral	B	1.00
Ethoprop	B	1.00
Monocrotophos	B	1.00
Diazinon	B	0.75
Control	–	–

[a]F = foliar spray, ULV = ultra-low volume, SI = soil incorporation, B = broadcast.