Parasitoid *Trichogramma* sp. nr *kalkae* Schulten & Feijen (Hymenoptera: Trichogrammatidae) caused 50–65% mortality in SEF eggs deposited on seedlings in nursery beds.

Management implications are that egg parasitization in nursery beds should be assessed before any treatment. No treatment is needed if deadhearts are visible—the damage is already done. Applying insecticides may actually be detrimental because parasitoids are highly susceptible to them. □

Effect of high temperatures on the survival and fecundity of brown planthopper (BPH) *Nilaparvata lugens* Stål

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High midsummer temperatures affect the survival and fecundity of BPH. Averages of 31 °C during mid-Jul to early Aug usually cause the highest BPH mortality in subtropical rice areas such as Hangzhou and Xiaoshan, China.

We observed survival of BPH nymphs and fecundity of adults at 31, 35, 38, and at check 26 °C, under a light/dark = 12/12 h, and 70–85% relative humidity in LRH-250-G illuminating incubators.

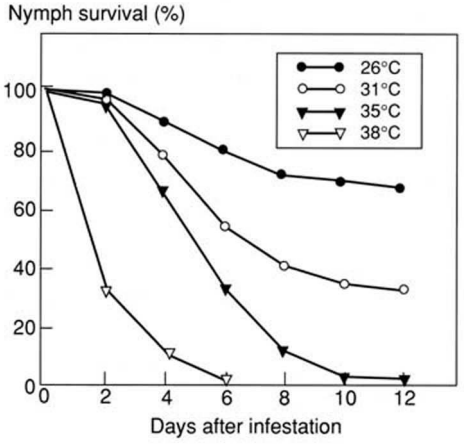
Guangliuai No. 4 seedlings were transplanted (one plant/pot) 30 d after sowing. Each pot was infested I5 d after transplanting with ten 5th-instar nymphs. BPHs were counted every 2 d after this.

To determine number of eggs laid, a pair of newly emerged BPHs was placed in open-ended glass tubes that stood in 2 cm of water and contained one plant each. Tube ends were covered with nylon mesh. Plants were replaced every 4 d. Eggs were counted by dissecting the plants.

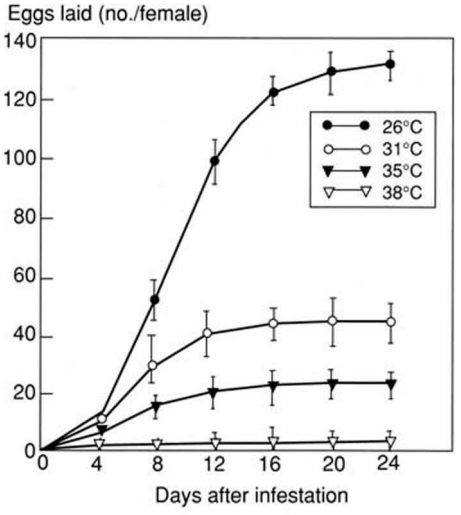
Survival of BPH nymphs at 31, 35, and 38 °C was significantly lower than that at 26 °C (Fig. I). The longer the time after infestation, the higher were the differences in survival at various temperatures.

BPH females laid up to 140 eggs after 12 d at 26 °C. Fecundity decreased rapidly as temperature increased (Fig. 2).

Results indicate that average ricefield temperatures of more than 31 °C would have obvious inhibitory effects on the survival and fecundity of BPH. □



1. Survival of 5th-instar BPH nymphs at various high temperatures, Hangzhou, China, 1990.



2. Number of eggs laid by BPH adults at various high temperatures, Hangzhou, China, 1990.

Rice brown planthopper (BPH) immigrants in Japan change biotype

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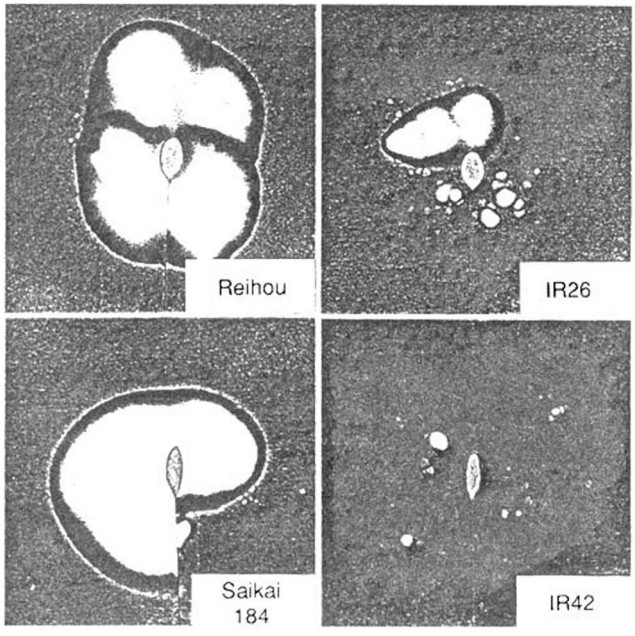
BPH immigrates to Japan annually from tropical and subtropical breeding habitats by monsoonic wind systems. These immigrant BPHs did not infest resistant rice varieties until recently.

Hopperburn symptoms were observed for the first time on japonica type, BPH-resistant rice breeding line Saikai 184 in experimental fields of Kyushu National Agricultural Experiment Station, Chikugo, Fukuoka, in 1990. Saikai 184 has the *Bph 1* gene from IR2061-214-3.



Relative amounts of honeydew excreted on Reihou (susceptible japonica variety), Saikai 184 (resistant japonica breeding line. *Bph 1* gene), IR26 (*Bph 1* gene), and IR42 (*bph 2* gene) by female immigrants in Japan in 1990. Honeydew was collected on the BCG-impregnated pH indicator paper.

The breeding line did not suffer any visible damage during the 1987 outbreak when typical hopperburn appeared on susceptible japonica variety Reihou.

Honeydew measurements with pH indicator paper and parafilm sachet methods revealed that 1990 and 1991 BPH immigrants fed equally as much on Saikai 184 as on susceptible Reihou. They have improved their ability to feed on indica variety IR26 (with *Bph 1* gene), but not on IR42 (*bph 2* gene) (see figure).

Breeding experiments with potted plants similarly showed that recent BPH immigrants reproduced as prolifically on Saikai 184 as on Reihou and other breeding lines (such as Saikai 190 and Nankai 111) with the *Bph 1* gene. Reproductive performance on IR26 was not yet equivalent to that on Reihou. BPH produced few (if any) progeny on IR42.

Findings indicate that BPH immigrants in Japan are significantly changing from biotype 1 to biotype 2. This change may correspond to a possible biotype shift occurring recently in northern Vietnam and southern China BPH populations. □

Effect of rice stage and tungro (RTD) intensity on the infectivity of green leafhopper (GLH) in fields

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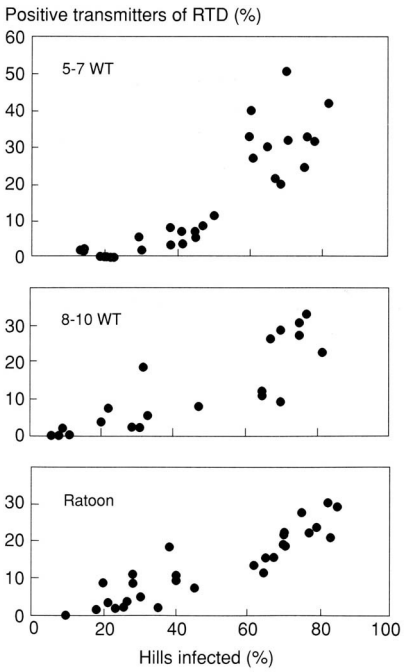
The epidemiological role of RTD-infected ricefields as the virus source depends on whether an infective vector population is produced. GLH is an abundant and efficient RTD transmitter. We studied the infectivity of GLH adults collected in rice and ratoon fields at different RTD intensity levels by using the transmission test.

We collected insects by sweeping mainly in 1987-90 wet seasons at 79 selected sites planted to GLH-susceptible cultivars. RTD intensity at the sweeping site was estimated by a starch-iodine test of 100 sample leaves.

Sixty insects per site were individually allowed 1-d inoculation access to Cisadane seedlings in test tubes. The seedlings were transplanted in screen cages and treated with insecticide to prevent contamination from hatchings. Diagnosis was based on visual symptoms and confirmed by starch-iodine test made 3 wk after inoculation.

The percentage of positive RTD transmitters increased with the percentage of infected hills in all three rice stage categories (see figure). The relation appeared to be curvilinear 5-7 and 8-10 wk after transplanting (WT). The rank correlation coefficient was significant at the 0.1% level (r_s = 0.897 for 5-7 WT, 0.923 for 8-10 WT, and 0.914 for ratoon). Infectivity of GLH in severely infected fields (>60% hills infected) was highest 5-7 WT (see table).



Relation of the infectivity of *N. virescens* adults to the incidence of RTD in rice and ratoon fields. Indonesia. 1987-90

Effect of rice stage and disease intensity on the percentage of infective *Nephotettix virescens* adults in fields.[a] Indonesia, 1987-90.

Rice stage	Hills infected in fields	
	<60%	>60%
5-7 WT	10.20 a	34.21 a
8-10 WT	8.45 a	27.28 b
Ratoon	13.23 a	26.81 b

[a]In a column, means (arc sin transformed) followed by the same letter are not significantly different at P = 0.05 by DMRT.

Results suggest that ricefields severely infected during early growing stages are virus sources in asynchronous rice planting areas. □

Wind tunnel for measuring rice plant attraction to insect predators and parasitoids

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Increasing evidence exists that plant odor, color, shape, texture, or infrared radiation may help guide parasitoids and predators to successfully locate their host or prey, colonize, and use crop habitat. A potentially fruitful approach for managing rice pests is to select varieties that resist pests and simultaneously provide a favorable habitat for the pests' natural enemies.

We devised the wind tunnel as a way to measure the attraction of natural enemies to different rice genotypes (Fig. 1, 2). The tunnel has four main parts: air source, mixing chamber, air conduction box, and flight chamber. The air source is a 120-V ventilating fan with variable voltage regulator that controls speed. A galvanized iron tube connected to the mixing chamber houses the fan. Charcoal and cheesecloth filter the air entering the chamber.

The mixing chamber, made of galvanized iron sheeting, conveys air from the fan to the conduction box. An aluminum screen and two filters (nylon mesh and charcoal) help to reduce turbulence and clean the air.

The flight chamber is a plexiglass box with two open ends. The end opposite the fan has a detachable nylon mesh cover.