after transplanting with a hand-operated sprayer.

Thrips populations were counted with 5 sweeps/plot using a plastic bat 20 cm in diameter, 48 h after spraying. All treatments significantly reduced thrips intensity (see table). Neem oil at 2% was as effective as insecticides in controlling rice thrips. □

Infection of brown planthopper (BPH) with insect fungi in the laboratory

R. M. Aguda, Entomology Department, IRRI; M. C. Rombach, Insect Pathology Resource Center, Boyce Thompson Institute for Plant Research, Tower Road, Ithaca, NY 14853-0331, USA; and B. M. Shepard, Entomology Department, IRRI

The BPH *Nilaparvata lugens* (Stål) is commonly infected with insect fungi (Deuteromycotina; Hyphomycetes) in the field and in insect rearing cages. The fungi can be isolated on artificial media and mass-produced in liquid fermentation media. To select the most virulent fungus species or strain for BPH control on rice, we bioassayed selected isolates.

We tested infection of BPH by *Beauveria bassiana* (Bals.) Vuill., *Metarhizium anisopliae* (Metsch.) Sorokin, *M. flavoviride* var. *minus* Rombach, Humber and Roberts, and *Hirsutella citriformis* Speare (see table).

Fungi isolated from insects were grown on Emerson's YpSs agar (Ma, Mfm), and Sabouraud dextrose agar (Bb, Hc). Conidia were washed off plates in a 0.02% Tween 80 solution after 2 wk of incubation at 25-28 °C. Conidia were counted by standard hemocytometer techniques, and suspensions of 10^2 to 10^8 conidia/ml prepared by serial dilution in the Tween 80 solution.

Each treatment had 50 BPH alates. Insects were dipped in conidia suspension in Tween 80 (0.02%), submerged for 60 s, and transferred to filter paper to drain off liquid. Insects of the control treatment were dipped in pure Tween 80 (0.02%) solution before transfer. The insects were kept on potted rice plants in mylar cages in a greenhouse at 25-30 °C (day) and 15-20 °C (night), with humidity near saturation.

After 5 d of incubation, live and infected (dead and covered with fungus) insects were counted and mortality calculated:

Mortality (%) = 100 × ((no. infected insects)/(no. infected insects + no. living insects))

Mortality in the fungus treatments was corrected for control mortality (8%) by Abbott's formula.

Results showed mortality increased with increasing dosage, but did not differ among fungi. □

Abbreviations of fungal species and strains.

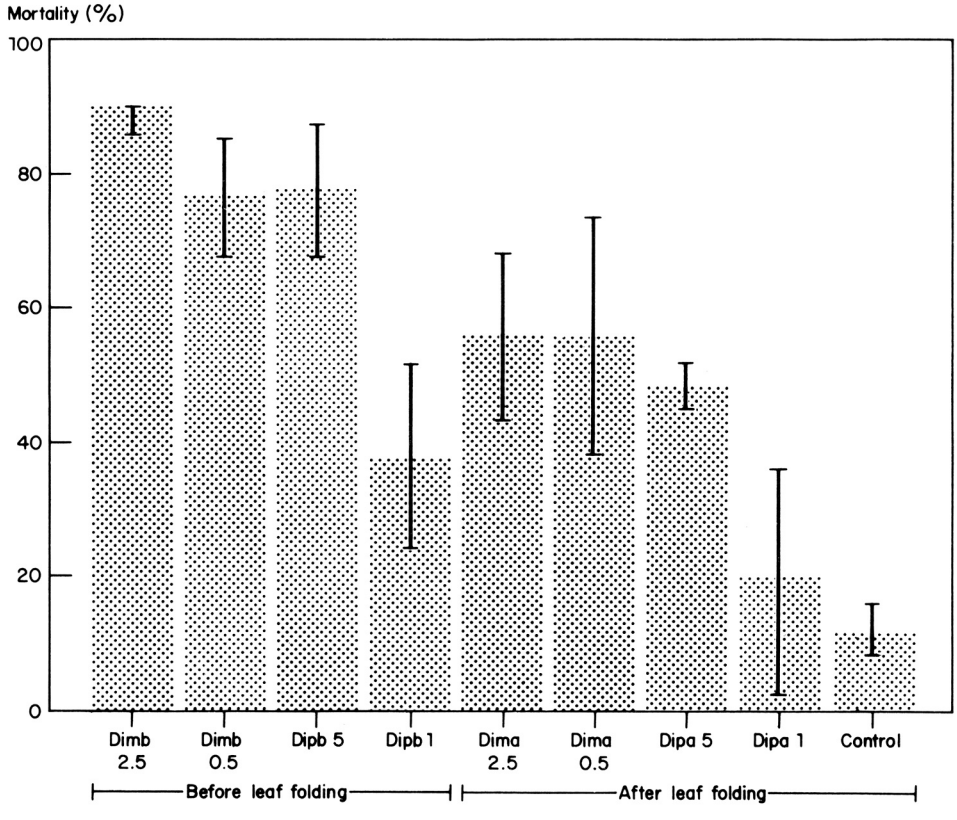
Fungus species	Strain
Beauveria bassiana	BbE
Metarhizium anisopliae	Ma12
	Ma16
M. flavoviride var. *minus*	Mfmll
	Mfm16
Hirsutella citriformis	Hc490

Effect of Dimilin (R) and Dipel (R) on leaffolder (LF) larvae

R. M. Aguda, Entomology Department, IRRI; M. C. Rombach, Insect Pathology Resource Center, Boyce Thompson Institute for Plant Research, Tower Road, Ithaca, NY 14853-0331, USA; and B. M. Shepard, Entomology Department, IRRI

Rice LF (Pyralidae: Lepidoptera) infests irrigated rice in Southeast Asia. Broad-spectrum insecticides sprayed to control LF larvae can also kill such natural enemies as predators (mainly spiders) and parasites. That can lead to outbreaks of secondary pests, such as brown planthopper *Nilaparvata lugens* (Stål).

Selective insecticides kill only target pests. We tested Dimilin(R), containing diflubenzuron, a chitin inhibitor, and the *Bacillus thuringiensis* product Dipel (R)



Mortality of LF *Cnaphalocrocis medinalis* populations caused by Dimilin (Dim) and Dipel (Dip) treatments, IRRI, 1988. Vertical lines on bars represent standard deviations.