

Integrated pest management— insects

Effects of *Beauveria bassiana* Vuill. and *Metarhizium anisopliae* Sorok. on brown planthopper (*Nilaparvata lugens* Stål) in Vietnam

Pham Thi Thuy, Nguyen Thi Bac, Dong Thanh, and Tran Thanh Thap, National Plant Protection Research Institute (NPPRI), Chem, Tulle, Hanoi, Vietnam

Beauveria bassiana Vuill. and *Metarhizium anisopliae* Sorok. fungi were collected at different locations in Vietnam and studied at NPPRI from 1990 to 1992 to determine their effects on brown planthopper (BPH).

Fungi were isolated and multiplied using crapek (sacharosa, NaNO₃, KH₂PO₄, MgSO₄, FeSO₄, and agar [pH = 6]) and saburo (glucoza, peptone, agar [pH = 5]) media. Results with saburo medium were better than with crapek medium for *Beauveria*. Saburo medium supplemented with 1 g/liter each of MgSO₄·7H₂O and KH₂PO₄, however, produced the best overall results. Up to 4.8 x 10⁸/g *Beauveria* spores and 5.6 x 10⁸/g *Metarhizium* spores were produced. Locally available materials, including maize powder (30%), rice bran (30%), soybean powder (25%), and sugar (15%), also served as satisfactory media.

Optimum growth of the two fungi was at 25-32 °C and 70-85% relative humidity. Filter spores were applied in the greenhouse and field with conventional spray equipment; a hemocytometer was used to determine concentrations.

Results from laboratory and greenhouse experiments on BPH showed that suspension with a spore concentration of 5 x 10⁸ spores/ml was optimum and caused a 70% mortality rate for BPH. A higher spore concentration is needed, however, in the field. Suspensions at 6.5 x 10¹³ spores/ha were used to control BPH in sticky rice at NPPRI, with *Beauveria* killing 57.9% of BPH and *Metarhizium* killing 42.2% 10 d after treatment (DAT).

Effect of *Beauveria bassiana* Vuill. and *Metarhizium anisopliae* Sorok. on BPH. Mortality (%) at different locations in Vietnam. ^a NPPRI, 1990-92.

Fungus	Location	Days after treatment						
		3	5	7	10	12	15	18
<i>Beauveria</i>	NPPRI, Hanoi	18.7	30.5	38.8	57.9	47.3	58.8	32.5
	Tien Giang	13.6	16.3	15.6	58.3	41.1	40.0	27.1
	Minh Hai	5.3	17.5	24.1	35.4	36.7	35.2	18.8
<i>Metarhizium</i>	NPPRI, Hanoi	15.0	32.3	37.8	42.2	52.3	56.2	28.5
	Tien Giang	4.5	26.7	42.9	67.2	51.4	53.3	59.2
	Minh Hai	12.2	23.9	28.8	36.5	35.5	36.1	

^a Control efficiency calculated based on Henderson-Tillton formula (1955).

In experiments in Tien Giang Province using variety TG29, we observed that *Beauveria* killed 58.3% and *Metarhizium*

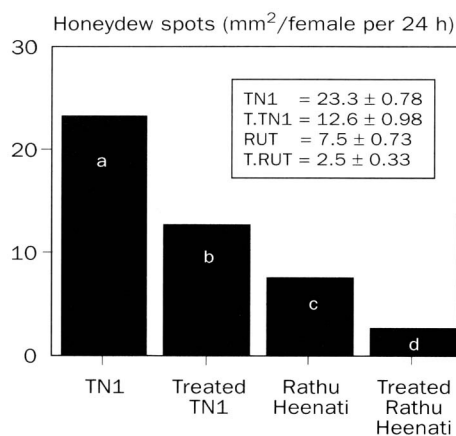
killed 67.20% of BPH 10 DAT (see table). ■

Whitebacked planthopper feeding on rice seedlings treated with uniconazole

Guangjie Liu, China National Rice Research Institute (CNRI), Hangzhou 310006, People's Republic of China

Uniconazole is a new plant growth regulator that is being applied widely to rice, wheat, and rape. Rice seedlings are shorter and stronger when seeds are soaked in uniconazole before sowing. The treated seedlings are more tolerant of low temperature, drought, and salinity. We determined the effect of uniconazole on whitebacked planthopper (WBPH) feeding by measuring honeydew excretion on seedlings from treated seeds.

Seeds of resistant variety Rathu Heenati and susceptible variety TN1 were soaked in uniconazole solution at 100 ppm for 2 d. Unsoaked seedlings served as the control. Roots of 30-d-old seedlings were washed in preparation for use in the feeding chambers. Filter paper disks, pretreated with 0.5% bromocresol green in ethanol, were placed around the base of each seedling inside the chambers. Two newly emerged macropters, starved but water-satiated for 3-4 h, were introduced into a chamber, representing a replicate. The filter papers were collected after insects had fed for 24 h. The honeydew spots on the papers were measured using a transparent sheet marked with a 1-mm² grid. Each treatment was replicated 10 times. Data were analyzed using least significant difference test (P = 0.05).



Areas of honeydew excreted by *Sogatella furcifera* on 30-d-old seedlings of resistant variety Rathu Heenati and susceptible variety TN1 untreated and treated with uniconazole by seed soaking at 100 ppm.

^a Columns with the same letters are not significantly different by LSD, P = 0.05. Mean ± SE.

Regardless of variety susceptibility, honeydew excretion of WBPH was significantly lower on the uniconazole-treated seedlings than on the control within a variety (see figure). Honeydew excretion was reduced on treated Rathu Heenati seedlings by 66.7% and on TN1 seedlings by 45.9% compared with untreated seedlings.

Resistance of rice seedlings to WBPH seems to be improved after being treated with uniconazole by seed soaking, which could possibly encourage the reduction of insecticide applications at seedling stage. ■