Field efficacy of NSB, NSKE, or an insecticide on mungbean insect pests and yield and benefit:cost ratio at Imbunia, Jaen, Nueva Ecija and Baloc Santo Domingo, Nueva Ecija, Philippines.[a] Jan-Mar 1988.

Treatment	Leaves folded[b] (no./m^2)		Pods damaged[c] (%)		Grain yield (kg/ha)		Difference[d] (kg/ha) (T-C)		Value of increased yield ($)		Cost of treatment ($)		Benefit: cost ratio	
	Imbunia	Baloc	Imbunia	Baloc	Imbunia	Baloc	Imbunia	Baloc	Imbunia	Baloc	Imbunia	Baloc	Imbunia	Baloc
NSB, 5000 ppm	18 a	24 b	11 a	22 b	817 b	589 b	103	244	73	173	6	8	12:1	22:1
NSKE, 3%	15 a	11 a	11 a	20 ab	853 b	643 b	139	298	99	212	16	20	6:1	11:1
Monocrotophos, 0.3 kg ai/ha	23 a	21 b	14 a	16 a	1001 a	1110 a	287	765	204	543	34	44	6:1	12:1
Water (control)	35 b	24 b	22 b	34 c	714 b	345 b	–	–	–	–	–	–	–	–

[a]In a column, means followed by the same letter are not significantly different at the 5% level by DMRT. Av of 6 replications. [b]By *Sylepta* sp. and *Lamprosema* sp. of LFs. [c]By *Etiella* sp., *Maruca* sp., and *Heliothis* sp. of pod borers. [d] T = treatment, C = control.

and *Heliothis* sp. was assessed at two priming stages.

At Imbunia, LF damage was reduced significantly in plots treated with NSB, KSKE, and insecticide (see table). At Baloc, NSKE treatment was significantly superior to NSB or insecticide. Pod borer damage was significantly reduced by NSB, NSKE, and insecticide at both Imbunia and Baloc.

Mungbean grain yield was highest in plots treated with insecticide, followed by those in neem-treated plots. The benefit:cost ratio was highest for treatment with NSB. □

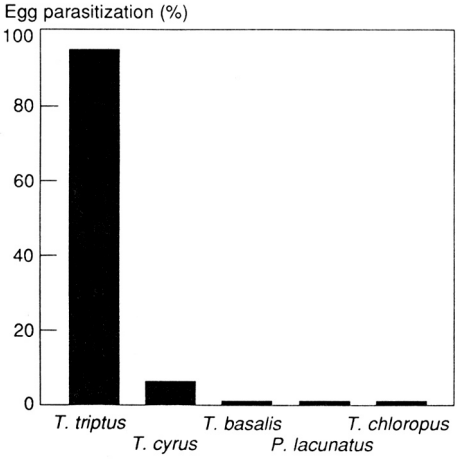
Parasitization of the Malayan black bug (MBB) by five species of egg parasitoids

G. S. Arida, B. M. Shepard, and V. A. Perez, IRRI

The ability of a parasitoid to cause high parasitization in the presence of competing species may determine its effectiveness as a natural control agent. At Palawan National Agricultural College (PNAC), Aborlan, Palawan, we studied the control of MBB *Scotinophara coarctata* by the indigenous egg parasitoid *Telenomus triptus* and four introduced species: *T. cyrus, Trissolcus basalis, Psix lacunatus,* and *T. chloropus*.

One gravid female of each parasitoid species was introduced into individual 11- × 55-cm mylar cages with potted plants bearing a female MBB with 1 egg mass. After 24 h, the egg masses were removed and held in 1.5- × 15-cm test tubes plugged with cotton until parasites or MBB nymphs emerged. The experiment was replicated 20 times.

More than 90% of the parasites that emerged were the indigenous *T. triptus* (see figure). □



Parasitization of MBB eggs by 5 species of egg parasites. IRRI, 1988.

Effect of conidia germination on infection of brown planthopper (BPH) by insect fungi

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

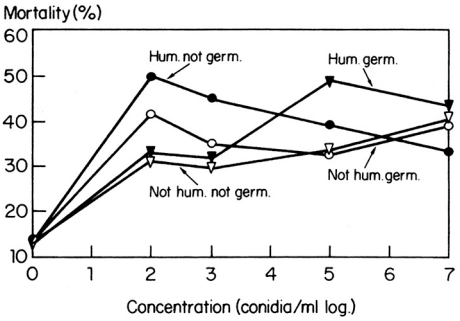
Conidia of insect fungi actively invade BPH. After a conidium lands on the insect cuticle, germination takes about 8 to 16 h, depending on the temperature and relative humidity.

After the germination tube is formed, the conidium produces specific chitinase enzymes to dissolve the insect cuticle. This a11ows the fungus to enter the insect body cavity, where further fungus growth occurs. At the end of the infection cycle, the mycelium sporulates on the outside of the insect.

Conidia produced on the cadaver can infect healthy BPH initiating epizootics of the fungus.

We tested whether germination of conidia bejore application will hasten the infection process, and increase BPH mortality. We also tested whether incubation of insects at saturated relative humidity (RH) for 2 h directly after application aids germination and increases BPH mortality.

A strain of the fungus *Beauveria bassiana* (Bals.) Vuil1.—ARSEF 714, isolated from BPH—was grown on Sabouraud Dextrose agar. After 2 wk of incubation at 25-28°C, conidia were washed off the plate in a 0.02% Tween 80 solution and counted by standard hemocytometer techniques. Dextrose at



Mortality of BPH *Nilaparvata lugens* due to treatments with increasing doses of germinated (germ.) and nongerminated (not germ.) *B. bassiana* conidia, IRRI, 1988. In one treatment (hum.), cages were incubated at 100% relative humidity before transfer to the greenhouse.

1 g/ 100 ml was added to 50% of the suspension (dextrose stimulates conidia germination). The dextrose suspension was incubated at 25 °C; the suspension without dextrose, at 15 °C for 10 h. More than 90% of the conidia with dextrose and less than 5% of the conidia without dextrose germinated. Serial dilutions of 10^2, 10^3, 10^5, and 10^7 conidia/ ml of both suspensions were prepared.

To test infection, 50 adult alate BPH were used per treatment. Insects were dipped in the conidia solution for about 60 s and transferred to filter paper to drain. Control insects were dipped in Tween 80 solution. Insects were incubated on potted rice plants in mylar cages. Half the cages were covered with plastic bags for 2.5 h immediately after fungi application to raise RH to saturation. All pots were kept in a greenhouse at 25-30 °C (day) and 15-20 °C (night) for 5 d. Live and infected (dead and fungi-covered) insects were counted. Mortality due to fungus infection was calculated as

$$\text{mortality (\%)} = 100\% \times (\text{no. infected insects}) \div (\text{no. infected insects} + \text{no. living insects}).$$

The results (see figure) show lessening, but not significantly different mortality with increasing fungus conidia treatment. Pregermination of the fungus *B. hassiana* conidia and 2 h incubation at saturated RH did not increase BPH infection. □

Managing other pests

Weaverbirds, pests of rice in Badeggi, Niger State, Nigeria

E. O. Bright, National Cereals Research Institute, Badeggi, Niger State, Nigeria

We surveyed weaverbird infestation Jun 1983-May 1984 in Badeggi ricefields (9°45'N, 6°7'E). (Rice in this locality is an irrigated crop on a floodplain referred to as the "Fadama.")

Mist nets were used to trap birds for 2 wk every month. Eleven species caused varying degrees of damage to rice (see table). Yield loss on some randomly selected fields ranged from 0.7 to 23.2%. □

Weaverbirds in ricefields, Badeggi, Nigeria, 1983-84.

Species	Food habits	Damage		Pest status	Relative occurrence (%)
		Crop stage	Severity		
Red-headed quelea *Quelea erythrops* (Hartlaub)	Picking, consumption of maturing and ripe grains	Sowing-late maturity	Severe	Major	70
Village weaverbird *Ploceus cucullatus* (Muller)	Picking, consumption of maturing and ripe grains	Sowing-late maturity	Severe	Major	70
Black-headed weaver *Ploceus melonocephalus* (L)	Picking, consumption of maturing and ripe grains	Sowing-late maturity	Severe	Major	90
Bush sparrow *Petronia* sp.	Picking, consumption of maturing and ripe grains	Sowing-late maturity	Moderately severe	Minor	5-10
Grey-headed sparrow *Passer griseus* (Vieillot)	Picking, consumption of maturing and ripe grains	Sowing-late maturity	Moderately severe	Minor	40-50
Yellow crowned bishop *Euplectes afer* (Gmelin)	Puncturing and consumption of maturing and ripe grains	Milky-maturing	Moderately severe	Minor	40-50
Red bishop *Euplectes orix* (L)	Puncturing and consumption of maturing and ripe grains	Milky-maturing	Moderately severe	Minor	40-50
Bronze manikin *Lonchura cucullatus* (Swainson)	Puncturing and sucking	Milky early dough	Moderately severe	Minor	40-50
Senegal fire-finch *Lagonosticta senegala* (L)	Puncturing and sucking	Milky early dough	Moderately severe	Minor	5-10
Black-rumped waxbill *Estrilda troglodytes* (Lichtenstein)	Puncturing and sucking	Milky early dough	Moderately severe	Minor	5-10
Zebra waxbill *Amndava subflava* (Vieillot)	Puncturing and sucking	Milky early dough	Moderately severe	Minor	5-10