

Section IV.  
Biological & Cultural Control

EFFICACY OF *BEAUVERIA BASSIANA* FOR CONTROL OF LYGUS BUGS

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Lygus bugs (primarily *Lygus hesperus*) are the most damage-causing insect pest in Idaho alfalfa seed production. Their control is becoming increasingly difficult due to resistance development. The last instar (5th) and adults are the most destructive stages. No currently registered insecticides are effective in killing lygus adults. We will test the entomopathogenic fungus *Beauveria bassiana* in the alfalfa seed field to control lygus bugs during pre-bloom and bloom seasons next summer.

In this preliminary experiment, *B. bassiana* conidia were sprayed directly on adult and 5th instar lygus bugs to evaluate their efficacy to reduce lygus populations and to estimate  $LC_{50}$  and  $LC_{95}$ . Twice-5 times the  $LC_{95}$  will be used as the field application rate in plot studies during summer 1996.

Two commercially available strains of *B. bassiana* conidia were obtained from Mycotech Corp. (Butte, MT) and Troy Biosciences (Phoenix, AZ). The Mycotech conidia were suspended in water mixed with 0.04% silwet just before application, and the Troy Biosciences product, Naturalis-L, contained oil-suspended conidia. Late 5th instar and newly emerged *L. hesperus* adults were obtained from Biotactics (Riverside, CA). Twenty-four 10cm-petri dishes with filter paper on the bottom were filled with 30 bugs each. Four doses of each *B. bassiana* formulations were prepared in 10-fold water dilution series. Each treatment was replicated 3 times. A spray tower was constructed in which the sprayer (air brush, Budger 250-5) was fixed at 75cm above the insect-containing petri dish. During the spray operation, 1ml of *B. bassiana* solution was injected into the air brush while air was delivered into the air brush from the compressor can. Each treatment was replicated 3 times. After spraying, each treatment population was caged separately and provided with green beans for 10 days. Mortality of each replicate was recorded daily. To verify *B. bassiana* infection, dead bugs were removed from the cage, surface-sterilized in bleach-ethanol solution, and placed on water agar plates to allow fungi to sporulate from dead bugs. Probit analysis (POLO-PC) was used to estimate  $LC_{50}$  and  $LC_{95}$ . Only mortality associated with *B. bassiana* infection was considered in this analysis.

Both formulations of *B. bassiana* effectively killed lygus within 10 days (Fig. 1). Most lygus mortality associated with *B. bassiana* infection was observed between day 3 and 6 post-application. After day 6, only a few lygus died of infection. Higher 5th instar  $LC_{50}$  and  $LC_{95}$  over those for adults in both formulations (Table 1) indicated that 5th instar lygus may be more resistant to *B. bassiana* infection than adults. We speculate that lygus nymphs may escape from pathogenic infection after molting when conidia are left on the shed exoskeleton. Many 5th instar lygus used in this experiment molted to adults within 3 days of post-application.

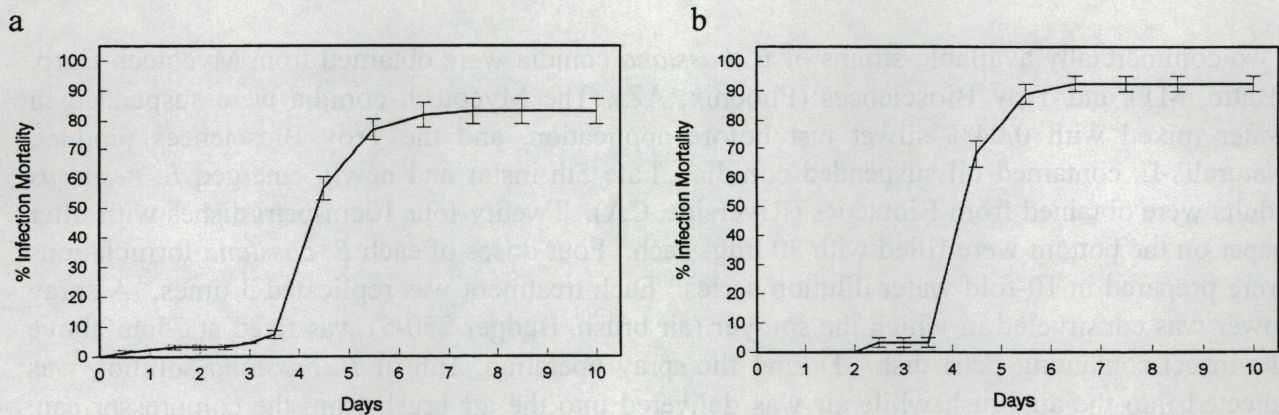


Fig. 1. Cumulative mortality of *L. hesperus* adults after sprayed with *B. bassiana*. a) Mycotech product,  $2.5 \times 10^5$  conidia / cm<sup>2</sup>. b) Naturalis-L,  $1.1 \times 10^5$  conidia / cm<sup>2</sup>.

Table 1. Concentration-mortality data for *B. bassiana* spray application to adult and 5th instar Lygus bugs in the laboratory.

<i>B. bassiana</i> product	Lygus stage	Slope ± SE	Intercept ± SE	LC <sub>50</sub> <sup>a</sup> (95% CL)	LC <sub>95</sub> <sup>a</sup> (95% CL)	X <sup>2</sup>
Mycotech	Adult	0.95 ± 0.11	-4.14 ± 0.53	2.40 x 10 <sup>4</sup> (7.65 x 10 <sup>3</sup> , 5.57 x 10 <sup>4</sup> )	1.32 x 10 <sup>6</sup> (4.24 x 10 <sup>5</sup> , 1.20 x 10 <sup>7</sup> )	22.04
	5th instar	1.02 ± 0.13	-5.46 ± 0.71	2.15 x 10 <sup>5</sup> (1.24 x 10 <sup>5</sup> , 3.68 x 10 <sup>5</sup> )	8.70 x 10 <sup>6</sup> (3.65 x 10 <sup>6</sup> , 3.38 x 10 <sup>7</sup> )	8.73
Naturalis-L	Adult	1.31 ± 0.16	-5.03 ± 0.64	7.07 x 10 <sup>3</sup> (3.46 x 10 <sup>3</sup> , 1.34 x 10 <sup>4</sup> )	1.28 x 10 <sup>5</sup> (5.28 x 10 <sup>4</sup> , 6.87 x 10 <sup>5</sup> )	17.42
	5th instar	0.69 ± 0.15	-3.70 ± 0.65	2.21 x 10 <sup>5</sup> (5.56 x 10 <sup>4</sup> , 1.41 x 10 <sup>7</sup> ) <sup>b</sup>	5.22 x 10 <sup>7</sup> ( - - ) <sup>c</sup>	23.19

<sup>a</sup> In number of conidia / cm<sup>2</sup>.

<sup>b</sup> 90% confidence level.

<sup>c</sup> Not able to be estimated.