Section VI.
Biological and Cultural Control

EFFICACY OF *BEAUVERIA BASSIANA* FOR CONTROL OF LYGUS BUGS IN ALFALFA SEED FIELDS

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Lygus bugs (primarily *Lygus hesperus*) are the most important insect pests of alfalfa grown for seed in Idaho. They extensively feed on developing flower buds and seeds, reducing viable seed yields. Feeding by older nymphs and adults is responsible for most economic damage. Current lygus bug management relies principally on chemical pesticides. However, this management strategy is becoming increasingly difficult due to resistance development and limited pesticide availability for alfalfa seeds. The currently registered pesticides do not effectively control the adult stage. Thus, alternative lygus bug control strategies should be investigated for reliable resistance management. Any lygus management strategy must minimize impact on the alfalfa pollinator *Megachile rotundata* and native lygus bug predators such as *Geocoris*, and *Nabis* species.

In our previous bioassay, the entomopathogenic fungus *Beauveria bassiana* effectively killed lygus fifth instar and adults in laboratory conditions (see our 1996 report). However, our first year of field trials using small plots showed no impact of *B. bassiana* on lygus bug populations throughout the alfalfa growth season (see our 1997 report). The probable reason for the ineffective control is inadequate climatic conditions for *B. bassiana* to survive and conduct the disease. This paper reports our second year's *B. bassiana* field trials against lygus bugs.

OBJECTIVE

To investigate impact of *B. bassiana* on lygus bug and its predator populations during the alfalfa growth season in southern Idaho.

MATERIALS AND METHODS

Small alfalfa plots (8 x 10m, n = 45) were used to investigate the efficacy of *B. bassiana* to control lygus populations in Parma, ID from June to August 1997. 1.5m-wide corridors were created between plots by mowing to minimize lygus adult movements across plots. A completely randomized block design was used in which the field was divided into 5 blocks. Each block contained 9 plots consisting of every combination of three prebloom and three bloom treatments (*B. bassiana*, chemical pesticide, water). *B. bassiana* conidia formulated in oil-water emulsion (Mycontrol, GHA strain, Mycotech Corp., Butte, MT) were sprayed at the rate of 1.16 L / ha (2.47×10^{13} conidia / ha) using a CO_2 (40 PSI) hand sprayer (R&D Sprayers Inc., Opelousas, LA). *B. bassiana* treatments consisted of three prebloom sprays, with 5-6 d intervals between the applications, and three bloom sprays with the same intervals. The chemical pesticide treatments consisted of one pre-bloom spray with Capture® at the rate of 468ml / ha and one bloom spray with MS-R® at 2.25L / ha. All *B. bassiana* applications were conducted between 7 and 10pm. Lygus bugs and their predators (*Geocoris* and *Nabis* spp.) were sampled weekly by three 180° sweeps / plot. Analysis of variance followed by Tukey's studentized range tests were used to detect significant treatment effects at each sampling date.

RESULTS

1) Prebloom (June) trial

One application of Capture significantly reduced nymphal lygus bug populations but did not affect adult populations (Fig. 1). In comparison, three applications of *B. bassiana*, though less effective than Capture, reduced early and late instars after the second and third sprays respectively. Lygus bug adults were not significantly reduced from the control population by either *B. bassiana* or Capture treatments.

All three lygus bug predators were significantly reduced by the Capture application (Fig. 2). Damsel bugs appeared to be particularly impacted for a prolonged time period since densities of bigeyed bugs and minute pirate bugs recovered in three weeks after the application whereas damsel bug density was still significantly lower than the control population after three weeks. In contrast, *B. bassiana* applications did not affect any of the lygus bug predators.

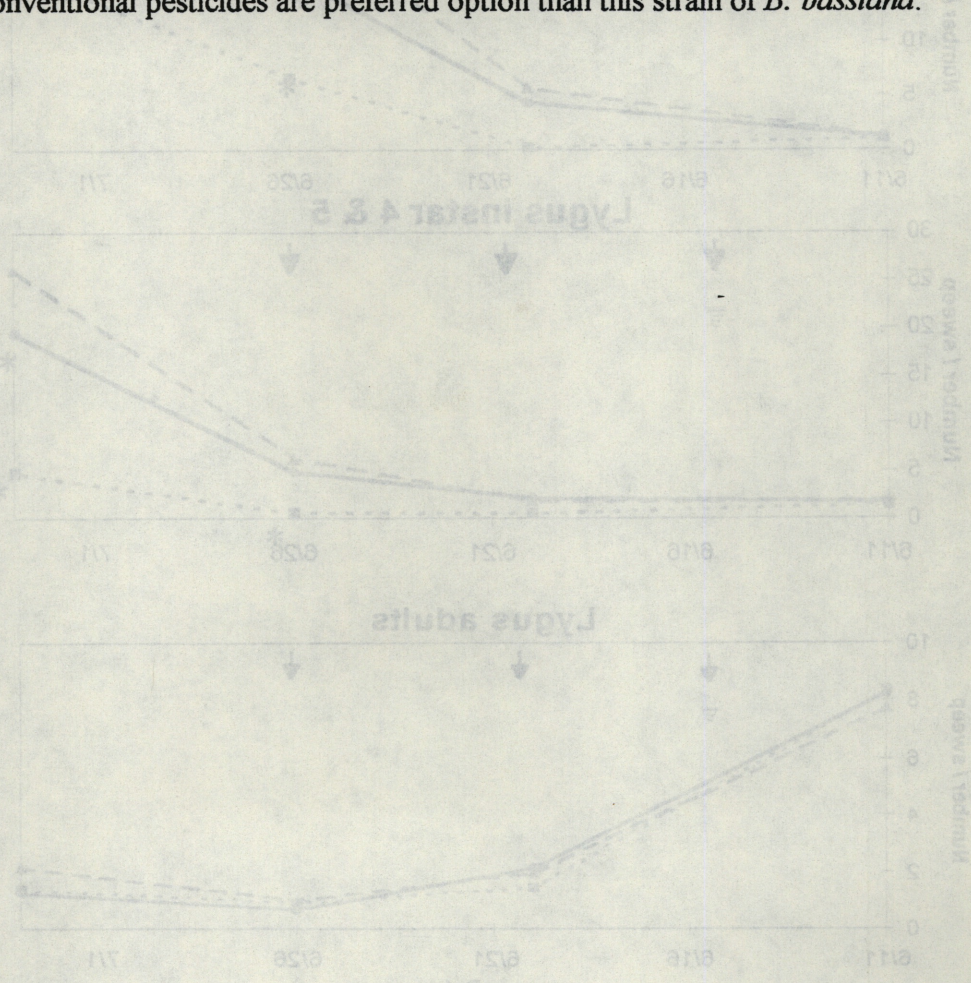
2) Bloom (July) trial

One application of MSR significantly reduced immature lygus bugs whereas three *B. bassiana* applications did not affect them (Fig. 3). Neither MSR nor *B. bassiana* reduced lygus bug adults.

Bigeyed bugs, which became abundant in July, were significantly reduced by the MSR application (Fig. 4). No Predators were affected by *B. bassiana* applications.

CONCLUSIONS

Three applications of *B. bassiana* had some impact on reducing lygus bug nymphs in June, but were not effective in July. The reduced control efficacy in July may be due to warmer temperatures more adverse to survival and disease induction by *B. bassiana* (see 1997 report). Lygus predators were not affected by *B. bassiana* throughout the alfalfa growth season but were highly susceptible to Capture applied in June. Bigeyed bugs were also susceptible to MSR. Lygus adults were not affected by either microbial or chemical pesticides. Both in terms of control efficacy and cost, conventional pesticides are preferred option than this strain of *B. bassiana*.



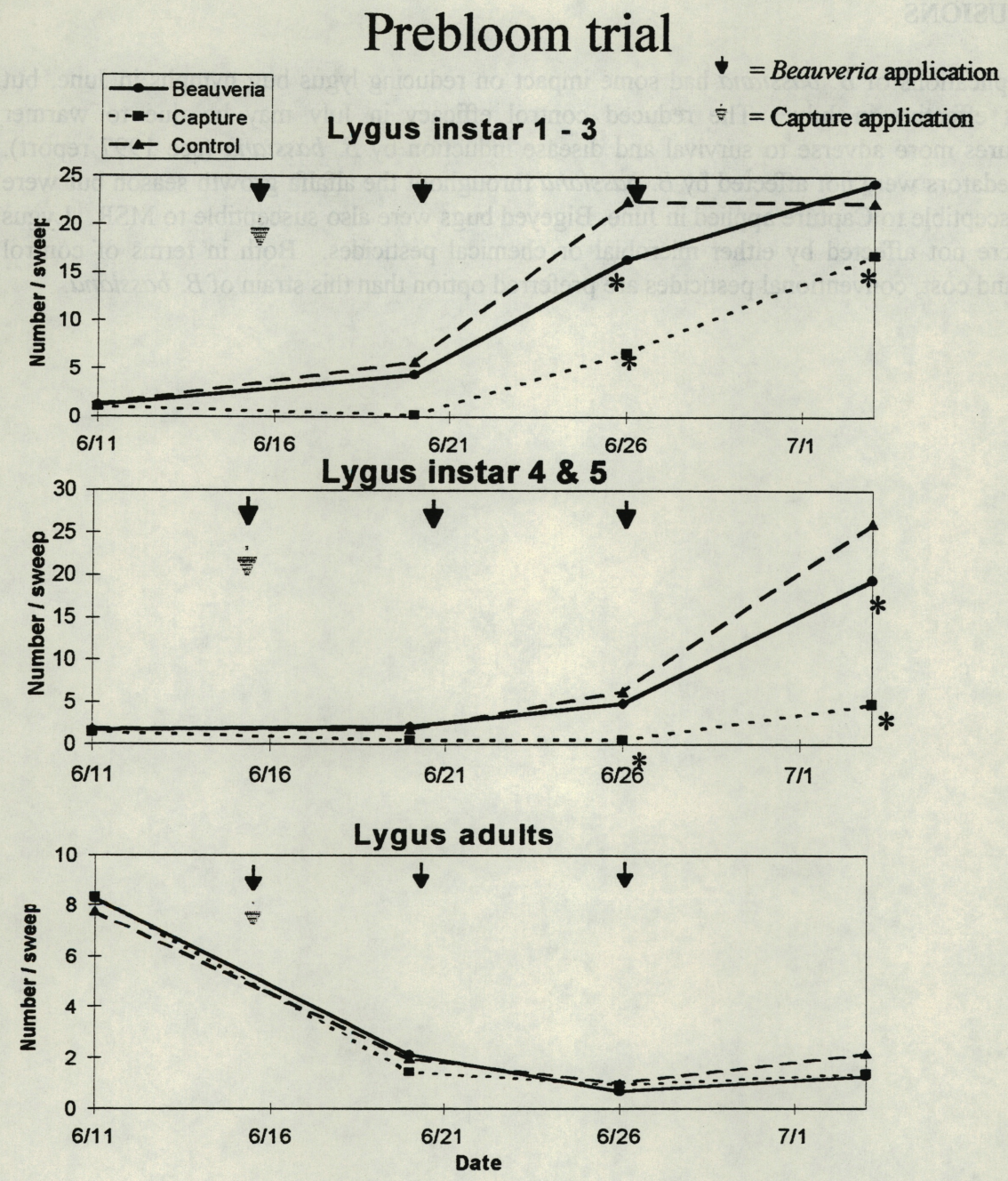


Fig. 1. Effect of *Beauveria bassiana* applications on lygus bugs in an alfalfa seed field in comparison with Capture and water (control) sprays. *Beauveria* was sprayed three times (6/15, 20, and 26) and Capture was sprayed once on 6/15. Significant reduction from a control population is indicated by * (Tukey test, a = 0.05).

Prebloom trial

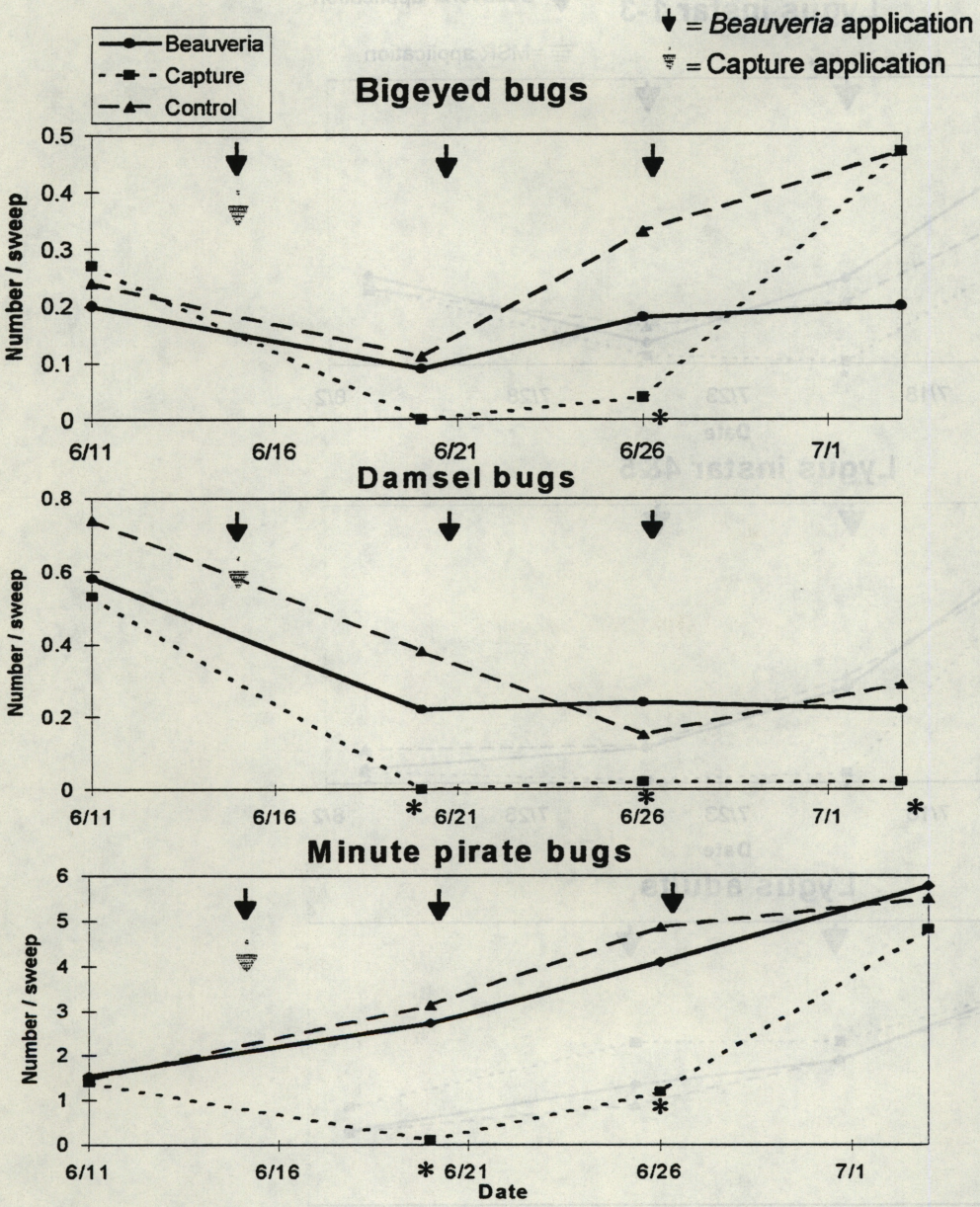


Fig. 2. Effect of *Beauveria bassiana* applications on *Lygus* predators in an alfalfa seed field in comparison with Capture and water (control) sprays. *Beauveria* was sprayed three times (6/15, 20 and 26) and Capture was sprayed once on 6/15. Significant reduction from a control population is indicated by * (Tukey test, $\alpha = 0.05$).

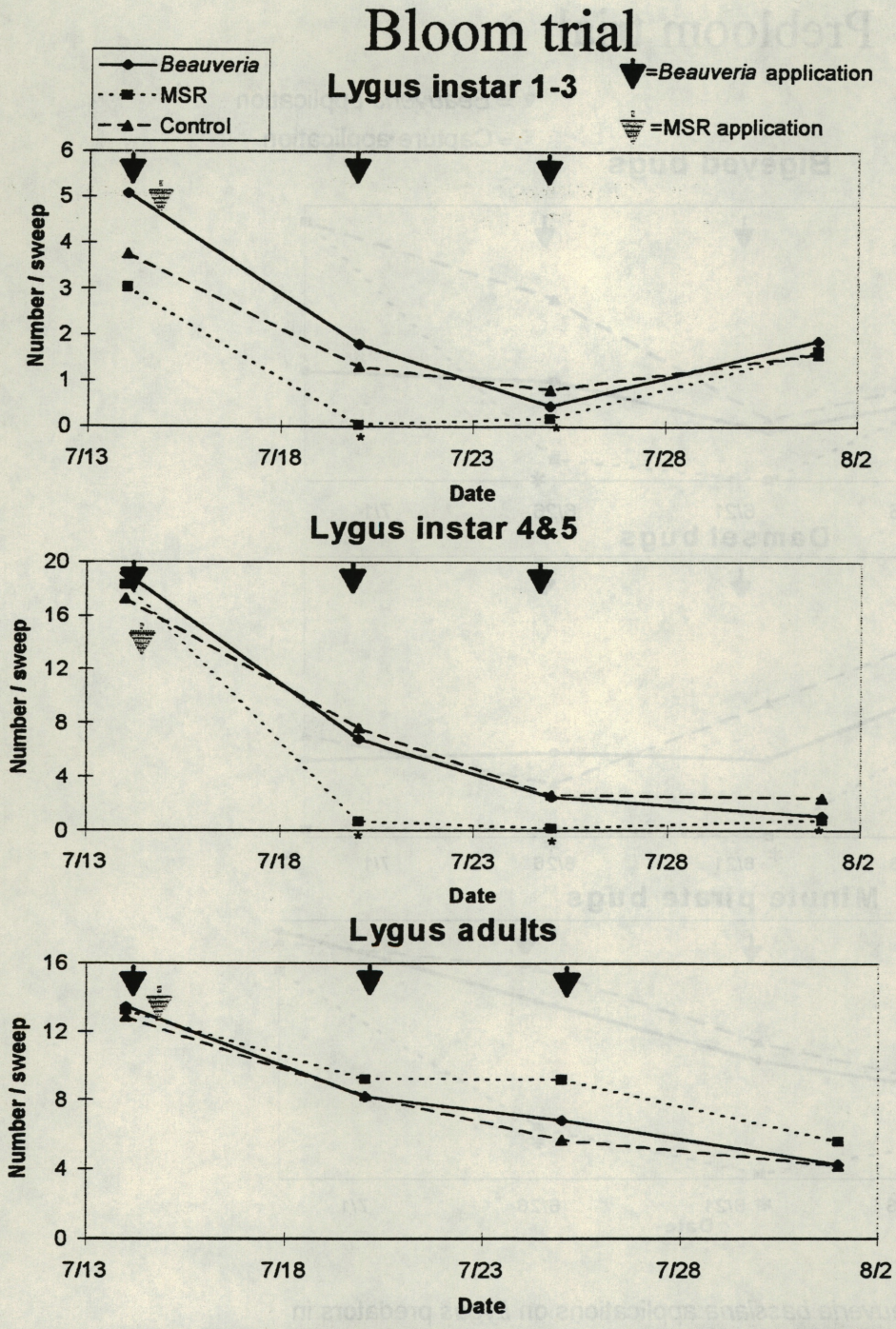


Fig. 3. Effect of *Beauveria bassiana* applications on lygus bugs in an alfalfa seed field in comparison with MSR and water (control) sprays. *Beauveria* was sprayed three times (7/14, 20, and 25) and MSR was sprayed once on 7/16. Significant reduction from a control population is indicated by * (Tukey test, a = 0.05).

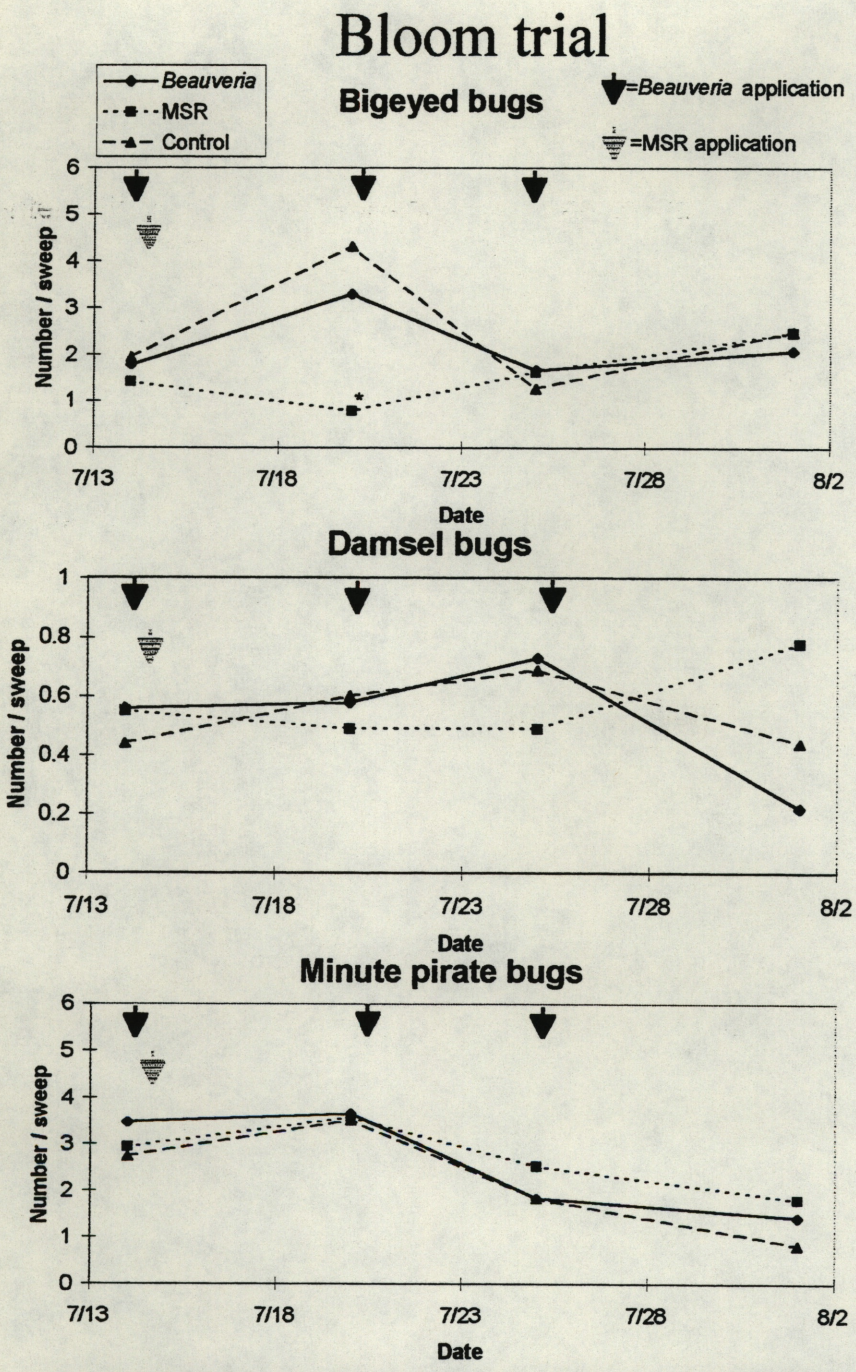


Fig. 4. Effect of *Beauveria bassiana* applications on *Lygus* predators in an alfalfa seed field in comparison with MSR and water (control) sprays. *Beauveria* was sprayed three times (7/14, 20 and 25) and MSR was sprayed once on 7/16. Significant reduction from a control population is indicated by * (Tukey test, $\alpha = 0.05$).