# Control of *Lygus hesperus* on alfalfa with *Beauveria bassiana*

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**Justification and Problem Statement**

The Western tarnished plant bug, *Lygus hesperus* is a major pest of cotton in the San Joaquin Valley and a closely related species, *L. lineolaris*, is quickly becoming the primary pest of cotton in the Southeast US. Research in the past few years aimed at developing a control strategy that targets the pest species and sustains natural enemy populations, which would otherwise be killed by chemical pesticides that are currently used. *Beauveria bassiana* is a fungal pathogen that infects a wide range of insect hosts including *Lygus* bugs. Commercial formulations of this fungus are available for pest control around the world.

Alfalfa is a favorite host of *Lygus* bugs and serves as a source of infestation on cotton. Previous research evaluated California and Mississippi isolates of this fungus in comparison with the commercial isolate on small scale field studies on alfalfa. We found that application of *B. bassiana* causes significant levels of infection in *Lygus* bug populations and the infection is carried over to cotton with populations migrating from alfalfa. We wanted to test the efficacy of *B. bassiana* in a large scale operation to evaluate its true potential for practical use.

**Procedures:**

Experiments were conducted at J.G. Boswell Company's alfalfa fields in Kings Co. Commercial formulation of *B. bassiana* (Mycotrol O® at 1 pt/ac = $1X10^{13}$ spores/ac) was compared with chemical treatment that had a mixture of Warrior (3.84 oz/ac), Thionex 3EC (2 pts/ac) and Capture 2EC (6.4 oz/ac). Each treatment was applied to three plots that were 2640' long x 360' wide (Fig. 1). Plots within each treatment were placed together. Fungus treatment was applied to a total of five plots, using the middle three for observations and one on either side as a buffer. Treatments were administered by fixed-wing aircraft around 2200 h. To facilitate thorough suspension of the fungal spores, Silwet L-77, a wetting agent, was mixed at a pint per acre with Mycotrol.

Observations were made in two locations within each plot before administering the treatments and again on 3, 7 and 9 days after to monitor populations of *Lygus* bugs and beneficial insects. On each observation day, insects from 50 sweep net samples were collected to estimate population trends. Additionally 20 *Lygus* bugs were also collected and maintained on cut beans in plastic vials for 10 days to monitor fungal infection.

**Results and Discussion**:

*Lygus* bug populations were high (1-2 per sweep) and consisted mostly of adults when the test was started. Plots were also infested with thrips. There was a general reduction in adult *Lygus* bug populations in both treatments by the third day following application (Fig. 2). However, plots receiving fungus had significantly higher numbers of Lygus than plots receiving chemicals. Numbers of thrips as well as beneficial insects like minute pirate bug and assassin bug also showed a significant decline in plots treated with chemicals compared with plots treated with fungus. Plots treated with fungus had significantly more nymphs than plots treated with chemicals but natural enemy populations were higher in fungus treated plots. Although daily high temperatures ranged from 37 to 41°C (99 to 106° F) in the first three days after the treatment, 91% of the field-collected *Lygus* bug adults were killed by *B. bassiana* when incubated in the laboratory (Fig. 3).

This study demonstrated that *B. bassiana* is effective in causing high levels of infections under practical field conditions even when the temperatures are high.

Although *B. bassiana* was ineffective against nymphal stages that contributed to the population build up, it did not adversely affect natural enemy populations. Identifying an appropriate time to target the adults with *B. bassiana* before they reproduce or combining fungus with chemical treatments that impact nymphs might provide a practical solution for controlling the pest species while maintaining natural enemy populations.

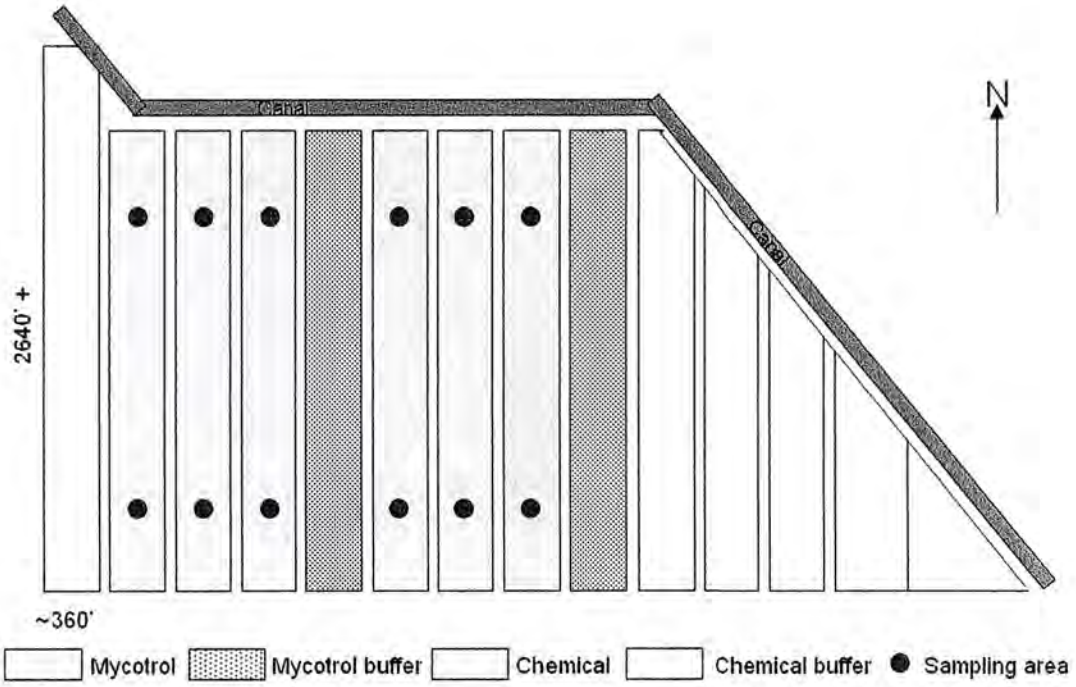


Fig. 1. Field plan of alfalfa at J. G. Boswell Ranch, Corcoran, Kings Co

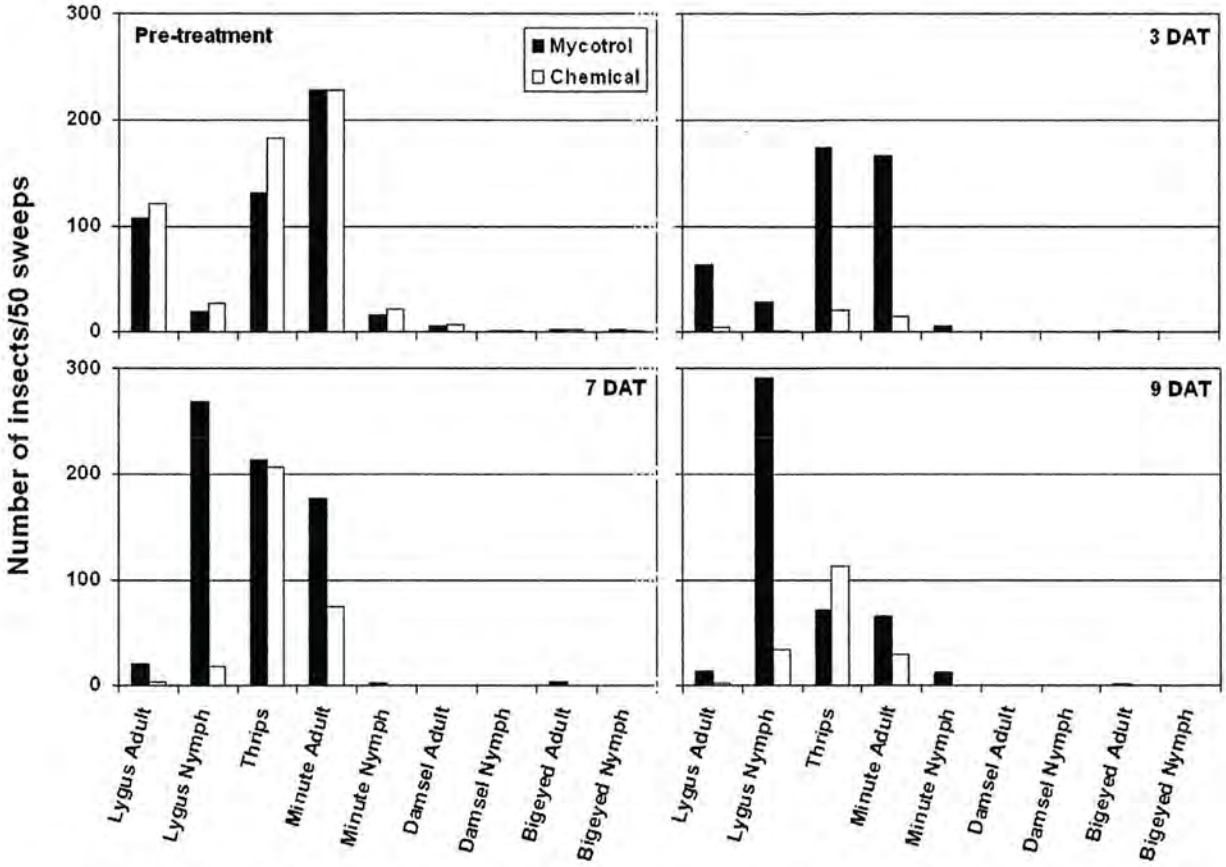


Fig. 2. Effect of chemical and *B. bassiana* (Mycotrol) applications on insect populations in alfalfa 3, 7 and 9 days after treatment (DAT).

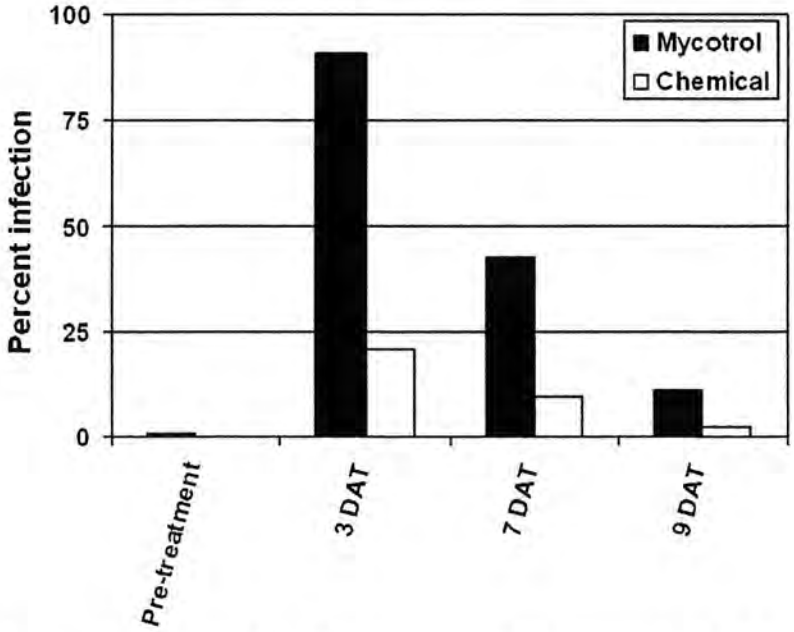


Fig. 3. Infection caused by *B. bassiana* in field-collected adult *Lygus* bugs that were incubated in the laboratory.