



Texas Imported Fire Ant Research and Management Project

Progress Report - June 2002

***Beauveria bassiana* as a Biocontrol Agent Against the Red Imported Fire Ant**

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Progress Report:

A UV-inducible, Green Fluorescent Protein (GFP)-encoding gene has been cloned into a fungal vector under the control of a fungal promoter. This construct is being transformed into the entomopathogenic fungus *Beauveria bassiana*. This GFP reporter construct should allow us to readily detect *B. bassiana* mycelia by shining a hand-held UV lamp into a dead insect, such as an ant killed by the fungus.

β -glucuronidase-harboring *B. bassiana* is fully capable of killing red imported fire ants in independent laboratory bioassays. This transformed *B. bassiana* strain carries the first marker gene to be inserted in the fungus.

Red imported fire ant colonies are being challenged by *B. bassiana* delivered on wooden craft sticks in a field trial near Proctor Lake in cooperation with Forrest Mitchell, Ph. D., Texas A&M Agricultural Experiment Station, Stephenville. Weather has been very dry since the initiation of the trial (13 June 2002). After 10 weeks, no significant differences in mound ratings have been detected between fungal and control treatments.

Laboratory bioassays have proven that at least three native ant species are significantly susceptible to wild and to β -glucuronidase strains of *B. bassiana*. This finding confirms earlier trials and emphasizes the importance of delivery techniques that target only *S. invicta* to protect native species.

Laboratory observations confirm that pellet formulations of *B. bassiana* are retrieved by *S. invicta* foragers. Pieces of pellets appear in the guts of fourth-stage larvae. Because fourth-stage larvae are considered "food processors" for colonies and materials are shared within the colony by stomodeal and proctodeal feeding, we will observe the mortality of larvae and adults caused by the fungus. Also, we plan to extract partially digested pellets from larval guts to determine

the viability of the fungus after exposure to gut enzymes.

Publications

Bextine, Blake R., and H. G. Thorvilson. 2002. Monitoring *Solenopsis invicta* (Hymenoptera: Formicidae) foraging with peanut oil-baited, UV-reflective *Beauveria bassiana* alginate pellets. Southwest. Entomol. 27: 31-36.

Bextine, Blake R., and H. G. Thorvilson. 2002. Field applications of bait-formulated *Beauveriabassiana* alginate pellets as a biological control of the red imported fire ant (*Solenopsis invicta*). Environ. Entomol. (in press)

Thorvilson, H., and B. Rudd. 2001. Are landscaping mulches repellent to red imported fire ants? Southwest. Entomol. 26: 195-203.

Thorvilson, H., D. Wheeler, B. Bextine, and M. San Francisco. 2002. Development of *Beauveria bassiana* formulations and genetically marked strains as a potential biopesticide for imported fire ants. Southwest. Entomol. (in press)

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Agricultural Communications – Texas Tech University

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\$16,800 for one year period

Summary of Work to be Done:

The major purpose of the agricultural communications project at Texas Tech University is to assist researchers in communicating information about the project to the general public as well as specific populations. The following agricultural communications activities are proposed during the 2001-2002 years:

1. Assist Texas A&M agricultural communications personnel in conducting various communications activities regarding project activity and results.
2. Work with other principal investigators at Texas Tech University to prepare articles for release through various outlets identified by Texas A&M personnel.
3. Assist principal investigators in preparation of media presentations for use in disseminating results or presenting information about the Texas Tech University initiative.

4. Utilize current agricultural literacy web site within the Center for Agricultural Technology Transfer at Texas Tech University to present information about the Texas Tech University initiative.
5. Serve as a liaison between media and Texas Tech University principal investigators.
6. Serve as an archivist of the overall Texas Tech University initiative.
7. Complete a needs assessment of Fire Ant activities in county extension programs.

Major accomplishments to date (Sept. 1, 2001 through June 30, 2002)

1. Texas Tech RIFA web page. Site is currently under re-development. Per suggestions of Bart Drees, a new Image link will be added so interested parties can use photos from Texas Tech.
2. Maintained photo library of research being conducted at Texas Tech.
3. Placed fire ant research related articles in major Texas publications.
4. Created student learning opportunities. Students developed press releases, video news releases and articles to promote the Texas Imported Fire Ant Research and Management plan.
5. Participated in fire ant related meetings.
6. Maintained working relationship with Texas A&M agricultural communications counterparts.
7. Currently gathering data from extension agents and IPM specialists in the quarantined counties to complete the needs assessment of fire ant activities.
8. The purpose of the study is to provide an accurate assessment of the Texas Cooperative Extension educational programming efforts as it relates to fire ant control.
9. Objectives of the descriptive study include:
 - a. Determining the demographic characteristics of the selected counties
 - b. Determining the level of fire ant awareness of the agent/specialist
 - c. Determining the common fire ant control practices of the counties
 - d. Determining what programming efforts are being conducted in the counties and outcomes of the programs
 - e. Determining the educational material needs for future programming
10. Response rate of the pilot test was 70%. Since validity and reliability ($r = .87$ to $.98$) of instrument was established, the instrument was sent to the sample population.
11. Continuing data collection through July.
12. Data analysis will begin in August.

Goals Achieved:

1. Increased public awareness of Texas Tech fire ant research activities
2. Maintained working relationship with Texas A&M counterparts

Relevance to the Texas Imported Fire Ant Research and Management Project:

Communication among principal investigators in the Texas Tech fire ant initiative group and among researchers at other universities and state agencies is vital. Of even greater need are communications with the general public and university administrators. However, assessment of activities is also necessary in order to evaluate the effectiveness of the communication/education initiative.

All of the accomplishments listed above are directly related to the project objectives described by the agricultural communications project plan of the Texas Tech Red Imported Fire Ant research initiative.