



Texas Imported Fire Ant Research and Management Project

Final Progress Report - October 2001

Regulation of queen abundance in colonies of the red imported fire ant

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\$54,000 for two years (Year 1 = \$27,000)
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Major accomplishments to date (Sept. 1, 1999 – Aug. 31, 2001):

- Bioassays were developed to test the chemical basis for the production of queens and the regulation of their numbers.
- Experiments were conducted to test the indirect role that queens play in worker execution of queens and sexual larvae. Other experiments were conducted to examine patterns of adoption of foreign queens by colonies.
- A queen pheromone that induces workers to kill sexual larvae was successfully extracted.
- Chemical properties of the pheromone and the gland in which the compound is stored were determined.

Goals achieved:

- The role of pheromones in the killing of queens and sexual larvae by workers was demonstrated experimentally.
- We discovered that the pheromone inducing workers to kill sexual larvae is not produced by alate queens, but is produced by dealated queens regardless of whether or not the queens are fertilized.
- The pheromone was extracted with no loss of biological activity, and some of its chemical properties were characterized.

Relevance to the Texas Imported Fire Ant Research Management Project:

The primary goal of research funding from the Management Plan is to create and improve technology for suppressing and controlling *Solenopsis invicta*. Our research directly addresses the goal as it involves understanding and exploiting the communication system of *S. invicta* to induce self-destruction of colonies.

Refereed publications:

Deslippe, R.J. and Y.J. Guo. 2000. Venom alkaloids of fire ants in relation to worker size and age. *Toxicon* 38:223-232.

Deslippe, R.J. In press. The killing of nestmate queens in ant colonies. *Southwestern Entomologist*.

Klobuchar, E. and R.J. Deslippe. In preparation. A queen pheromone induces workers to kill sexual larvae in colonies of the red imported fire ant (*Solenopsis invicta*).

Deslippe, R.J. and Y.J. Guo. In preparation. The execution of queens by workers in fire ant colonies.

Guo, Y.J. and R.J. Deslippe. In preparation. Cuticular lipids of fire ants (*Solenopsis invicta*): profiles within and across polygyne colonies.

Thesis:

Klobuchar, E. 2001. Pheromonal control over worker execution of sexual larvae in fire ants (*Solenopsis invicta*). M.Sc. Thesis. Texas Tech University. 65 pp.

Proceedings articles:

Deslippe, R.J. 2001. Pheromonal control of queen executions in fire ant colonies. Conference Proceedings of the Annual Imported Fire Ant Research Conference. Abstract.

Presentations:

Salazar, J., Y. Guo and R.J. Deslippe. 1999. Execution of queens by workers in colonies of the red imported fire ant. Annual Meeting of the Entomological Society of America. Atlanta, GA. December.

Melvin, W.D. and R.J. Deslippe. 2000. Control of the red imported fire ant with lipid-consuming microbes. Southwestern Branch Meeting of the Entomological Society of America. Fort Worth, TX. February.

Salazar, J., Y.J. Guo and R.J. Deslippe. 2000. Execution of queens by workers in fire ant colonies. Southwestern Branch Meeting of the Entomological Society of America. Fort Worth, TX. February.

Guo, Y.J. and R.J. Deslippe. 2000. Variation in the alkaloidal components of fire ant venom. Southwestern Branch Meeting of the Entomological Society of America. Fort Worth, TX. February.

Salazar, J., Y.J. Guo and R.J. Deslippe. 2000. Execution of queens by workers in fire ant colonies. 2000 Imported Fire Ant Conference. Chattanooga, TN. April.

- Melvin, W.D. and R.J. Deslippe. 2000. Control of the red imported fire ant with lipid-consuming microbes. 2000 Imported Fire Ant Conference. Chattanooga, TN. April.
- Klobuchar, E. and R.J. Deslippe. 2001. Pheromonal control over worker execution of sexual larvae in fire ants (*Solenopsis invicta*). Southwestern Branch Meeting of the Entomological Society of America. San Antonio, TX.
- Melvin, W.D. and R.J. Deslippe. 2001. Microbial induced desiccation in the red imported fire ant. Southwestern Branch Meeting of the Entomological Society of America. San Antonio, TX.
- Deslippe, R.J. 2001. Pheromonal control of queen executions in fire ant colonies. Fire Ant Symposium Session of the Annual Imported Fire Ant Research and Management Conference. San Antonio, TX.

Featured interviews

- "Researchers study queen pheromones to combat fire ants." - International Center for Arid and Semiarid Land Studies - Vol 32, No. 1. 2000.
- "Locals battle fire ants as West Texas invasion intensifies." Lubbock Avalanche Journal: June 24, 2000.
- "Fire ant research tries to help ecology." The University Daily. March 22, 2001.
- "A Tale of Matricide: An Exiled Queen is Executed." TTU Video Release. Televised on news stations across the United States. March 6, 2001.
- "A Tale of Matricide: In the Insect World, an Exiled Queen is Executed." TTU Press Release. March 6, 2001