

# The Alabama Fire Ant Management Program



## PROGRESS REPORT FY 2002



**Entomology &  
Plant Pathology**

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## Introduction

### Activities and Accomplishments of The Alabama Fire Ant Management Program FY-2002

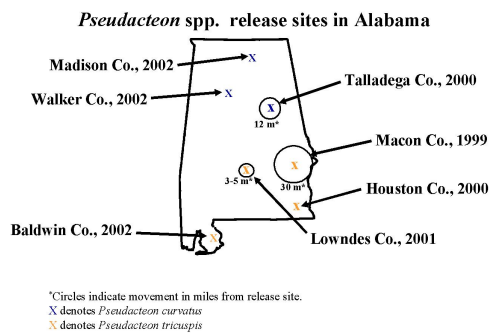
**Evaluation of Integrated Pest Management (IPM) Methods for Imported Fire Ants:** Imported fire ants are found in every county in Alabama and affect the lives of every household. Recent studies estimate the annual loss to households in Alabama to be over \$175 million dollars. These estimates are only for households and do not reflect other affected entities such as agriculture, businesses, airports, golf courses, schools, utilities, and others. Effects of imported fire ants on domesticated and wild animals and plants are reported but are difficult to estimate.

In conjunction with the Alabama Cooperative Extension System (eight AL county agents are participating in the decapitating fly project), the Tuskegee Cooperative Extension System, and the USDA-ARS, the Alabama Fire Ant Management Program and Alabama A&M have made seven releases of phorid flies in Alabama as a biological control agent for imported fire ants.

*Pseudacteon tricuspis* was released in Macon County in the spring of 1999, in Houston County in September 2000, and in Lowndes County in 2001. As of summer 2002, the flies are established in Houston County. In Lowndes County, they have spread 3 to 5 miles from the release site. Most impressive, however, are the Macon County flies. Three years after their initial release, they have spread approximately 30 miles, reaching the Alabama/Georgia state line. *Pseudacteon curvatus* was released in Talladega County in the spring of 2000 and has spread approximately 12 miles from the release site. This is the first successful release of this species in the United States. This year, *P. tricuspis* was released in Baldwin County in April and *P. curvatus* was released in Walker and Madison counties in August and September.

Fire ant baits were evaluated in three trials. Bait products were tested for Valent Biosciences Corporation at the Auburn-Opelika Robert G. Pitts Airport and for Aventis Environmental Science in two trials at Moton Field Municipal Airport in Tuskegee, AL.

**Imported Fire Ant Education and Outreach:** Not only did the Alabama Fire Ant Management Program's educational exhibit participate in the Alabama National Fair and the Southeastern Agricultural Exposition, but it also appeared at Dothan's 59<sup>th</sup> Annual National Peanut Festival. The exhibit also traveled to Washington, D.C. for the Fifth Annual Food and Agricultural Science Exhibition and Reception sponsored by the National Association of State Universities and Land-Grant Colleges (NASULGC) on March 5, 2002. On July 14, the exhibit participated in the Annual Oxbow Meadows Insect Festival in Columbus, GA. At the Southeastern Ag Expo, the booth was voted the best of the Auburn University Exhibits. The exhibits include informational posters, publications, videos, CD-ROMs, children's activity books, preserved specimens, live fire ants, a live decapitating fly demonstration, and casts of fire ant tunnel systems which spark curiosity in the 8,000 - 10,000 passers-by. Approximately 1,500 publications and 12,000



activity books were distributed this year. These exhibits give us a chance to explain basic fire ant biology to children as well as offer management strategies to their parents.

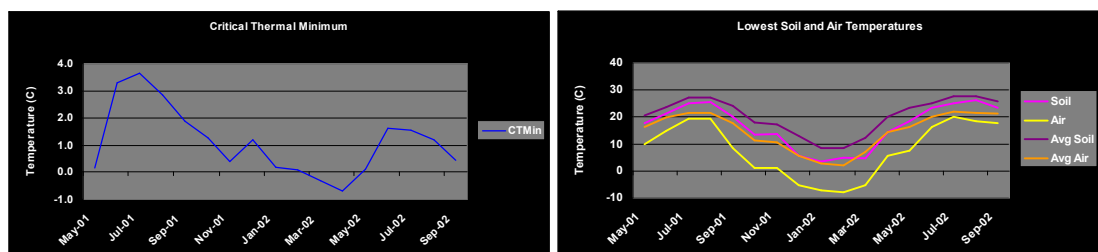
The Science of Fire Ants workshop targets middle school science teachers. The workshop includes hands-on fire ant science projects that teachers can pass down to their students to increase their students' knowledge of science, math, and fire ants. Projects explore division of labor in the colony, food preferences, the life cycle of the fire ant, and ant identification using keys. They require observations, data collection, data analysis, and a summary of results. At the close of the workshop, teachers are given a science project pack providing handouts and materials to conduct fire ant experiments in their own classrooms and schoolyards. **The workshop has trained 180 Alabama teachers and 50 undergraduate education majors from 35 counties across Alabama since 2000.**



The SARE Professional Development Program has matched funds with the Alabama Fire Ant Management Program to provide training on sustainable, site specific management of imported fire ants. A tiered training approach is being used. In 2000, 40 county agents were trained in fire ant management. In 2001, 25 county agents were trained and educational aids were developed with input from these county agents. For 2002, we wanted to train the next tier of trainers, who we are calling fire ant management advisors. Between January 1, 2002 and December 31, 2002, 812 trainers participated in 26 trainer-oriented workshops. 202 members of the general public participated in 7 other workshops. Twelve county agents and two specialists participated in training fire ant management advisors. This year, 25 county agents signed up for the fire ant Extension team project. Each agent has given, or plans to give, at least one fire ant workshop in their county. Master Gardeners, Master Cattle Producers, pesticide dealers, turfgrass managers, environmental biology students, city employees, botanical garden directors, horticultural inspectors, pest control operators, and NRCS personnel were the target audience. **By teaching those who are likely to pass on their knowledge, we multiply our training efforts and dollars.** The county agents use the educational aids on fire ant management that were developed in 2001: slide sets, PowerPoint presentations, videotapes, posters, mound models, publications, and ant specimens and can be viewed on the new Extension fire ant web site, <http://www.aces.edu/dept/fireants/>.

Two fire ant bait demonstrations were established in Dothan, in 2002. Extension personnel conducted surveys for fire ant activity before application of fire ant baits. Six weeks later, fire ant activity was significantly reduced.

**Seasonal Effects of Temperature on Red Imported Fire Ants:** Many imported fire ants are observed dying on disturbed mounds and on bare soil during hot, dry weather. Experiments are being conducted to determine the effects of hot, cold and arid conditions on fire ant mortality. The data indicate that changes in the fire ants' temperature tolerances are a result of changes in environmental temperatures. **The findings will be incorporated into future management plans for imported fire ants.**



**Gene Manipulation as a Tool for Imported Fire Ant Control:** Isolation, characterization, and genetic manipulation of the gene(s) involved in development and reproduction will provide useful information for developing additional strategies for control of the imported fire ant. Results suggest that three genes (the vitellogenin gene, putative pheromone binding gene, and cytochrome P450 expression) play a role in growth and reproduction of the fire ant. Understanding the molecular basis of development, reproduction, and caste differentiation of the fire ant could lead to the development of novel strategies to manage the fire ant. It will also provide a solid framework for designing future experiments on gene regulation in growth, reproduction, and caste differentiation. **This work is the first attempt to manipulate the fire ant genome.**

**Fire Ants in Crops:** Imported fire ants are efficient and voracious predators of most major insect pests in crops. Fire ants preferred to forage for predators on aphid-infested plants. Data suggest that fire ants increase aphid survival through predator interference. Future work will determine if the increase in cotton aphids is enough to reduce yield

**Fire Ant IPM Implementation in Public Schools:** Three workshops were conducted in Mobile and Jefferson counties for school administrators, the general public and master gardeners on fire ant management in school yards. An education workshop was presented on general school IPM, including fire ant management, for 52 landscape workers, teachers, pest control personnel and school managers from three schools in Mobile County (Vigor) in an effort to reduce pests and pesticide use in schools and provide a safe environment for students.

**What else we accomplished:**

Two members of the Alabama Fire Ant Management Program, Kathy Flanders and Art Appel, were selected to serve on the peer reviewer committee for the Texas Imported Fire Ant Research and Management Plan that has been extended through 2010 and receives \$2.5 million annually.

Publications	18	Presentations	42
Mass Media	21+	Displays	6



## Alabama Fire Ant Management Program Personnel and Cooperators

**Auburn University**  
**Department of Entomology**  
**and Plant Pathology**



### Advisory Committee

Michael L. Williams, Ph.D. and Department  
Chair

Arthur G. Appel, Ph.D.

Kathy L. Flanders, Ph.D.

L.C. "Fudd" Graham, Ph.D.

Beth Guertal, Ph.D. – Department of  
Agronomy and Soils

Micky D. Eubanks, Ph.D.

Ping Hu, Ph.D.

Nannan Liu, Ph.D.

Kathy S. McLean, Ph.D.

Vicky Bertagnolli

Chad Harvey

Ian Kaplan

Marla Tanley

### Alabama Cooperative Extension System

Danny Cain

Larry J. Craft

Ken W. Creel

David Lee Daniel

Henry D. Dorough

Marla Faver

Rickey G. Hudson

Richard W. Murphy

Michael N. Oglesby

Reafield Vester



### Tuskegee Cooperative Extension System

George Hunter

### Alabama Agricultural Experiment Station

### Alabama A & M

#### Department of Plant and Soil Science

Ken Ward, Ph.D.

Rufina Ward, Ph.D.



### USDA-ARS

Sanford D. Porter, Ph.D.

Anne Marie Calcott

J. T. Vogt, Ph.D.



### Local Cooperators

Joe Carothers - Houston County

Jim Davis - Lowndes County

Mike Duke - Talladega County

Tim & Susan Gaasch - Macon County

Dorman Grace – Walker County

Beth Guertal - Lee County

Robert Harris - Montgomery County

Dean & Harold Humphries - Macon County

George Hunter - Lowndes County

Mark Kaiser & Hillandale Farms – Baldwin  
County

Pyron Keener - Montgomery County

John McDaniel - Houston County

Greg Myrick - Talladega County

Sarah & David Spivey - Baldwin County

Joe Touchton - Lee County

Carol & Michael Williams - Macon County

Todd Storey & Auburn-Opelika Robert G.  
Pitts Airport

Col. Roosevelt "Ro" Lewis (Ret.) - Moton  
Field Municipal Airport

### Acknowledgements

Dennis Shepard, Ph.D. - Syngenta

Joe Chamberlin - Valent Biosciences Corp.

Mel Garbett – Ambrands, Inc.

Jim Merrick – Aventis Environmental Sci.

Doug VanGundy – Wellmark International

*Sincere apologies to anyone inadvertently omitted from this list.*



## Educational Materials, Presentations, Publications

### Publications

- Drees, B. M., C. L. Barr, S. B. Vinson, R. E. Gold, M. E. Merchant, N. Riggs, B. Hickman, P. Nester, D. Kostroum, B. Sparks, D. Pollet, D. Shanklin, K. Loftin, K. Vail, K. Flanders, P. Horton, D. Oi, P. Koehler, and R. Wright. 2002. Managing imported fire ants in urban areas. B-6043 revised. Texas Cooperative Extension Service.
- Eubanks, M.D. 2001. Complex trophic interactions and the impact of fire ants on biological control. Proceedings of the 2001 Imported Fire Ant Research Conference, San Antonio, Texas.
- Eubanks, M.D. 2001. Estimates of the direct and indirect effects of red imported fire ants on biological control. *Biological Control* 21:35-43.
- Eubanks, M.D. 2001. The effects of red imported fire ants on insect pests and beneficial arthropods in Alabama cotton. Pp. 3-4, 2000 Cotton Research Report, Research Report Series, Volume 18, K.S. McClean and D.L. Monks, eds. Alabama Agricultural Experiment Station, Auburn University, Auburn, Alabama.
- Eubanks, M.D., S.A. Blackwell, C.J. Parrish, Z.D. DeLamar, and H. Hull-Sanders. 2002. Intraguild predation of beneficial arthropods by red imported fire ants in cotton. *Environmental Entomology* 31:1168-1174.
- Eubanks, M.D. and I. Kaplan. 2002. Potential economic benefits and costs of the red imported fire ant in southeastern cotton. Proceedings of the 2002 Beltwide Cotton Conference, Atlanta, Georgia.
- Flanders, K. L. 2002. Update on fire ant control materials. Timely information sheet 1/9/02.
- Flanders, K. L., L. C. Graham, K. E. Ward, R. N. Ward, and K. M. Creel. 2002. Teaching materials for imported fire ant training programs, p. 64. *In* Proceedings of the 2002 Imported Fire Ant Conference, Athens, Georgia.
- Graham, L. C. 'Fudd', Sanford D. Porter, Roberto M. Periera, Henry D. Dorough, and Amber T. Kelley. Submitted. Field releases of the decapitating fly *Pseudacteon curvatus* (Diptera: Phoridae) for control of imported fire ants (Hymenoptera: Formicidae) in Alabama, Florida, and Tennessee. *Florida Entomol.*
- Graham, L. C., S. D. Porter, K. L. Flanders, A. T. Kelley, H. D. Dorough and R. G. Hudson. 2001. Introduction of phorid flies for biological control of fire ants in Alabama, pp.151-152. *In* Proceedings of the 2001 Imported Fire Ant Research Conference, San Antonio, Texas.
- Graham, L. C., V. E. Bertagnolli, S. D. Porter, H. D. Dorough and A. T. Kelley. 2002. Establishment of the phorid fly, *Pseudacteon curvatus*, in Alabama for biological control of imported fire ants, pp. 104-105. *In* Proceedings of the 2002 Imported Fire Ant Conference, Athens, Georgia.
- Kaplan, I. and M.D. Eubanks. 2002. Disruption of cotton aphid (Homoptera: Aphididae)-natural enemy dynamics by red imported fire ants (Hymenoptera: Formicidae). *Environmental Entomology* 31:1175-1183.
- Kaplan, I. and M.D. Eubanks. 2002. Higher-order predation by red imported fire ants and its impact on cotton aphid populations. Proceedings of the 2002 National Fire Ant Conference, Athens, GA.
- Kaplan, I. and M.D. Eubanks. 2002. The effect of red imported fire ants on cotton aphid outbreaks in Alabama cotton. p. 4, 2001 Cotton Research Report, Research Report

- Series, Number 22, K.S. McLean and D.L. Monks, eds. Alabama Agricultural Experiment Station, Auburn University, Auburn, Alabama.
- Kaplan, I., and M.D. Eubanks. In Press. The effects of an ant – aphid mutualism on biological control: fire ants protect cotton aphids from predation. (Accepted by Environmental Entomology July 2002)
- Liu, N. Isolation and characterization of two cytochrome P450 genes in the red imported fire ant, *Solenopsis invicta*. Insect Biochem. Mol. Biol. (submitted).
- McLean, K. S., and L. C. ‘Fudd’ Graham. Submitted. The Science of Fire Ants: A workshop for middle school teachers. Amer. Entomol.
- McLean, K. S., and F. Graham. 2002. The science of fire ants: a workshop for science teachers, pp. 106-107. In Proceedings of the 2002 Imported Fire Ant Conference, Athens, Georgia.
- Stewart, S. D, L. C. Graham, M. J. Gaylor and L.A. Vanderberg. 2001. Combining exclusion techniques and larval death-rate analyses to evaluate mortality factors of *Spodoptera exigua* (Hübner) (Lepidoptera: Noctuidae) in cotton, *Gossypium hirsutum* (L.). Florida Entomol. 84: 7-22.
- Zhang, L. and N. Liu. Differential gene expression between Queens and Workers in the red imported fire ant, *Solenopsis invicta*. (In preparation).

### **Presentations**







- Bertagnolli, V. E., L. C. Graham, A. T. Kelley, and R. Lumpkin. 2002. An IPM pilot project in the Auburn City School System: A model for the state of Alabama. Poster presented at the 76th annual meeting of the Southeastern Branch of the Entomological Society of America, Little Rock, Arkansas.
- Bertagnolli, V.E., L.C. Graham, A.T. Kelley, and R. Lumpkin. An IPM pilot project in the Auburn City School System: A model for the state of Alabama. Annual Meeting Entomol. Soc. Amer. December 2001.
- Eubanks, M.D. Complex interactions involving fire ants and specialist natural enemies: disentangling a trophic mess. Symposia on the Interactions between Generalist and Specialist Natural Enemies, Annual Meeting, Entomological Society of America, San Diego, California, December 2001.
- Eubanks, M.D. Pervasive invasives and complex trophic interactions: fire ants and biological control. Department of Entomology, Clemson University, December 3, 2001.
- Eubanks, M.D. Pervasive invasives and complex trophic interactions: direct and indirect effects of fire ants in managed systems. Department of Biology, University of Southern Mississippi, October 18, 2002.
- Eubanks, M.D. Complex trophic interactions and biological control: Is the real world too complex to predict? Symposium on the Ecological Basis of Insect Pest Management, Mississippi Entomological Association, October 29, 2002.
- Eubanks, M.D. and I. Kaplan. Potential economic benefits and costs of the red imported fire ants in Southeastern cotton. 2002 National Beltwide Cotton Insect Conference, Atlanta, Georgia, January 2002.
- Flanders, K. L. Fire Ants! Oglethorpe Elementary School Bug Out, October 23, and October 25, 2001, Auburn, AL.
- Flanders, K. L. Fire Ant Biology and Management, In-Service Training for Nursing Home Administrators, October 30, 2001, Dothan, AL.



- Flanders, K. L. Stop Chasing Those Fire Ants Around. Alabama Urban Forester's Association Annual Meeting, November 1, 2001, Mobile, AL.
- Flanders, K. L. Managing Imported Fire Ants. Training Session for Certified Crop Advisers, December 17, 2001, Auburn, AL.
- Flanders, K. L., L. C. Graham, K. W. Ward, R. N. Ward, and K. M. Creel. 2001. We can do something about fire ants: training professionals and developing teaching materials in sustainable fire ant management. Annual Meeting Entomol. Soc. Amer. December 2001.
- Flanders, K. L. 2002. Fire ant control products, Huntsville, AL, Lawn and landscape care personnel from municipal governments, Feb. 19, 2002.
- Flanders, K. L. 2002. Fire Ant Control. East Team Technical Training Session, NRCS, May 16, 2002, Shocco Springs, AL.
- Flanders, K. L. 2002. Fire ant and Japanese beetle management. Turf/Vegetable Field Day, Sand Mountain Research and Extension Center, Crossville, AL.
- Flanders, K. L. 2002. Fire Ant Management Display. ALFA Commodity Conference, Cotton and Feed Grains Tour. Tennessee Valley Research and Extension Center, Aug. 3, 2002, Belle Mina, AL.
- Flanders, K. L. 2002. Fire Ant Management Display. Aug. 24, 2002, Winfield Agorama. Upper Coastal Plain Research Center, Winfield, AL.
- Flanders, K. L. 2002. Fire Ant Control. 41st Annual Turfgrass Conference and Tradeshow, Alabama Turfgrass Asso., Auburn, AL, Sept. 2002.
- Flanders, K. L. 2002. Imported fire ant biological control. 4th Annual Meeting, Horticultural Inspection Society, Gulf Shores, AL, Sept. 2002.
- Flanders, K. L. 2002. Fire ant biology and control. 2-part lab and lecture for Environmental Biology class, Tuskegee University, Tuskegee, AL, Nov. 2002, 4 lab sections.
- Flanders, K. L. 2002. Imported fire ant biology & management seminar. 2002 Restricted Use Pesticide Dealer Meetings. Cullman, Montgomery, and Headland, AL.
- Flanders, K. L., L. C. Graham, K. E. Ward, R. N. Ward, and K. M. Creel. 2002. Teaching materials for imported fire ant training programs. Poster presented at the Imported Fire Ant Conference, Athens, Georgia.
- Graham, F. 2001. Fire Ant Management. 13<sup>th</sup> Annual Natural Resource Tour and Fish Fry, Montgomery County Natural Resources Planning Committee, Snowdoun, AL. (10/22/01).
- Graham, F. 2002. From six legs to four and back: an overview of research and experiences. Department of Entomology and Plant Pathology, Jackson, TN.
- Graham, F. 2002. From six legs to four and back: an overview of research and experiences. West Tennessee Experiment Station, Jackson, TN.
- Graham, F. 2002. Fire Ant Control in Horse Pastures. Alabama Horse Fair, Montgomery AL, (1/26/02, 1/27/02).
- Graham, F. 2002. Mr. Fire Ant goes to Washington. F. S. Arant Entomology Club, March 2002, Department of Entomology and Plant Pathology, Auburn University, Auburn, AL.
- Graham, F. and V. Bertagnolli. 2002. Fire ants and wow bugs, Dean Road Elementary School, Auburn, AL, June 18, 2002.
- Graham, L.C., S.D. Porter, H.D. Dorough, A.T. Kelley, and V.E. Bertagnolli. Establishment of the phorid fly, *Pseudacteon curvatus*, in Alabama for biological control of imported fire ants. Annual Meeting Entomol. Soc. Amer., December 2001.

- Graham, L. C., V. E. Bertagnolli, S. D. Porter, H. D. Dorrough and A. T. Kelley. 2002. Establishment of the phorid fly, *Pseudacteon curvatus*, in Alabama for biological control of imported fire ants. Poster presented at the Imported Fire Ant Conference, Athens, Georgia.
- Graham, L. C., V. E. Bertagnolli, S. D. Porter, H. D. Dorrough and A. T. Kelley. 2002. Establishment of the phorid fly, *Pseudacteon curvatus*, in Alabama for biological control of imported fire ants. Poster presented at the 76th annual meeting of the Southeastern Branch of the Entomological Society of America, Little Rock, Arkansas.
- Graham, F. and V. Bertagnolli, 2002, Fire ants and WOW bugs (2), Dean Road Elementary School, Auburn, AL. (June, 2002).
- Harvey, C. and M.D. Eubanks. Red imported fire ants: Positive contributors to biological control in cole crops. Annual Meeting, Southeastern Branch Meeting of the Entomological Society of America, Little Rock, Arkansas, March 2002.
- Kaplan, I., M. Patrick, and M.D. Eubanks. Consequences of aphid protection by red imported fire ants on cotton aphid-natural enemy dynamics. 48<sup>th</sup> Annual Meeting, Entomological Society of America, San Diego, California, December 2001.
- Kaplan, I. and M.D. Eubanks. Keystone mutualisms and the ecological consequences of manipulation: cascading effects of an ant-aphid interaction. 87<sup>th</sup> Annual Meeting, Ecological Society of America, Tucson, Arizona, August 2002.
- Kaplan, I. and M.D. Eubanks. Higher-order predation by red imported fire ants and its impact on cotton aphid populations. Annual Meeting, National Fire Ant Conference, Athens, GA, March 2002.
- Kaplan, I. and M.D. Eubanks. Ant-aphid mutualism disrupts biological control: red imported fire ants mediate population dynamics of cotton aphids. Annual Meeting, Southeastern Branch Meeting of the Entomological Society of America, Little Rock, Arkansas, March 2002.
- McLean, K. S., and F. Graham. 2002. The science of fire ants: a workshop for science teachers. Poster presented at the Imported Fire Ant Conference, Athens, Georgia.
- McLean, K. S., and F. Graham. 2002. The science of fire ants: a workshop for science teachers. Poster presented at the 76th annual meeting of the Southeastern Branch of the Entomological Society of America, Little Rock, Arkansas.
- Styrsky, J.D. and M.D. Eubanks. Differential effects of a higher order predator in two agroecosystems. 87<sup>th</sup> Annual Meeting, Ecological Society of America, Tucson, Arizona, August 2002.

### Mass Media

-  Terrell, C. 2002. Declaring war on fire ants. Gulf Coast Cattleman, Feb. 2002, p. 8,31,37-38.
-  Television interview, How to ward off fire ants safely, WSFA, Montgomery, AL, 4/04/02.
-  Television News Spot on IFA control. WTVM, Columbus, GA. 4/15/02.
-  Newspaper interview, Decatur Daily, Decatur, AL. 4/17/02.
-  Newspaper interview, Birmingham Post Herald, Birmingham, AL. 4/18/02.
-  Television News Spot on phorid release. For The Record, Alabama Public Television. Mobile, AL. 4/18/02.

- ☞ New weapons in fire ant war: Products offer easier, more effective control of pests  
*<http://www.decaturdaily.com/decaturdaily/news/020421/fireants.shtml>*, 4/21/02.
- ☞ Interview with Mark Anthony, Alabama Public Radio, 4/23/02.
- ☞ Newspaper interview, Mobile Baldwin Register, Mobile, AL, 5/01/02.
- ☞ Television News Spot on phorid release. WPMI, Mobile, AL, 5/02/02.
- ☞ Television News Spot on phorid release. WKRG, Mobile, AL, 5/03/02.
- ☞ Television News Spot on phorid release. FOX news 10, Mobile, AL, 5/03/02.
- ☞ Newspaper article, Attack of the phorid fly, Mobile Register, Mobile AL, 5/6/02.
- ☞ Newspaper feature, Fly vs. Ant, Birmingham Post-Herald, Birmingham, AL, 5/18/02.
- ☞ In battle between fire ant and flies, flies win big time  
*<http://web.gosanangelo.com/archive/02/june/2/2002060212.shtml>*, 6/02/02.
- ☞ Magazine article, Fire ants, Alabama Living, August 2002.
- ☞ Newspaper interview on phorid release in Baldwin Co, Mobile Register, Mobile, AL. 8/15/02.
- ☞ Television interview, Fire Ants, WAKA, Montgomery, AL, 10/31/02.

### **ACES Press Releases**

- ☞ Graham, F. and V. E. Bertagnolli. 2001. Heads will roll! Highlights of Agricultural Research, Alabama Agricultural Experiment Station, Auburn University. Vol. 48, No. 3, Fall 2001. *<http://www.aces.edu/dept/extcomm/newspaper/feb22a02.html>*, 2/22/02.
- ☞ Spring's challenge, choosing the right fire ant bait  
*<http://www.aces.edu/dept/extcomm/newspaper/march27b02.html>*
- ☞ Pesticide Safety Starts at Home  
*<http://www.aces.edu/dept/extcomm/health/march27a02.html>*
- ☞ Baldwin County Agent and Volunteers Reunite Two Bitter Enemies  
*<http://www.aces.edu/dept/extcomm/newspaper/june5a02.html>*

### **Educational Displays**

- ☞ Prepared and staffed educational booth on The Alabama Fire Ant Management Program at Alabama National Fair, (Oct. 4-14, 2001).
- ☞ Prepared and staffed educational booth on The Alabama Fire Ant Management Program at Sunbelt Agricultural Exposition in Moultrie, Georgia, (Oct. 16-18, 2001).
- ☞ Prepared and staffed educational booth on The Alabama Fire Ant Management Program at Ag Roundup on Auburn Campus, (Oct. 20, 2001).
- ☞ Prepared and staffed educational booth on The Alabama Fire Ant Management Program at the NASULGC Fifth Annual Food and Agricultural Science Exhibition and Capitol Hill Reception. Rayburn House Office Building, Washington, DC, (3/05/02).
- ☞ Tour of fire ant facilities for YES Camp. Auburn University College of Science and Mathematics, (6/26/02).
- ☞ Prepared and staffed educational booth on The Alabama Fire Ant Management Program at Oxbow Meadows Insectival Festival. Columbus State University, Columbus, Georgia, (7/14/02).

### Other Outreach Activities

- ☞ Flanders, K. L. 2001. Fire Ant Extension Team Project, ETP27d, Training Fire Ant Management Advisers. Twenty five county agents signed up for this activity in 2002.
- ☞ With the help of Paulette Didier, fire ant educational materials are on the web at <http://www.aces.edu/dept/fireants>.
- ☞ Plaster fire ant tunnel casts have been distributed to five counties, for county agents to use in their fire ant education programs.
- ☞ Flanders served as a peer reviewer for the Texas Imported Fire Ant Research and Management Plan, Oct. 2002.
- ☞ Alabama fire ant management program provides information to organizations who wish to provide training on fire ant management, such as to the Wesley Manor Retirement Center, for a regional nursing home training session in June 2002.

### Interstate Cooperation

- ☞ Our fire ant video was translated into Spanish by the Texas Imported Fire Ant Research and Management Plan.
- ☞ Two members of the Alabama Fire Ant Management Program, Kathy Flanders and Art Appel, were selected to serve on the peer reviewer committee for the Texas Imported Fire Ant Research and Management Plan that has been extended through 2010 and receives \$2.5 million annually.

### Field Demonstrations and Experiments

- ☞ April 2002 *P. tricuspis* released in Baldwin County.
- ☞ August 2002 *P. curvatus* released in Walker County.
- ☞ September 2002 *P. curvatus* released in Madison County.
- ☞ Two fire ant bait trials were conducted for Aventis Environmental Science at Moton Field Municipal Airport in Tuskegee, AL.
- ☞ One fire ant bait trial was conducted for Valent Biosciences Corporation at the Auburn-Opelika Robert G. Pitts Airport.

### Honors and Awards

- ☞ The fire ant education program was featured as a profiled program for the 2001 Alabama IPM Program Annual Report.
- ☞ The exhibit at the Southeastern Ag Expo was voted the best of the Auburn University Exhibits. (Oct 16-18, 2001).
- ☞ C. Harvey won the President's Prize, best talk in Behavior and Ecology, for Effects of red imported fire ants on caterpillar-parasitoid interactions. 48<sup>th</sup> Annual Meeting, Entomological Society of America, San Diego, California, December 2001.
- ☞ Selected as exhibitor in Agriculture and Food Science in the 21<sup>st</sup> Century, The Government-University Partnership at Work: A University Science Exhibition on Capitol Hill, sponsored by the National Association of State Universities and Land-Grant Colleges, March 5, 2002, Rayburn House Office Building, Washington, DC.
- ☞ Two members of the Alabama Fire Ant Management Program, Kathy Flanders and Art Appel, were selected to serve on the peer reviewer committee for the Texas Imported Fire Ant Research and Management Plan that has been extended through 2010 and receives \$2.5 million annually.

## **Development and Dissemination of Materials that Increase Public Knowledge of Fire Ant Biology and Management**

**Principal Investigators:** Kathy Flanders, Lawrence Graham, Kathy McLean, Department of Entomology and Plant Pathology, Auburn University; and Reafield Vester and Henry Dorough, Alabama Cooperative Extension System.

### **Objectives**

- 1) Provide the public with information about fire ants with exhibits at the Alabama National Fair, the Southeastern Ag Expo, and other events.
- 2) Conduct education programs for middle school teachers, master gardeners, and other teacher/trainers to develop a statewide base of fire ant "experts."
- 3) Increase public knowledge of fire ant biology and management using county-based demonstrations.

### **Fire Ant Educational Exhibit**

This exhibit at the Alabama National Fair in Montgomery was extremely popular. Most children were fascinated, rather than repelled by the fire ants. This gave us a chance to explain



the basics of fire ant biology to the children, and the basics of both fire ant biology and fire ant management to their parents. The booth was staffed for the duration of the fair by participants of the Alabama Fire Ant

Management Program. The exhibit also made its first appearance at Dothan's 59<sup>th</sup> Annual National Peanut Festival.



The exhibit at the Southeastern Agricultural Exposition in Moultrie, GA was voted the best of the Auburn University Exhibits. It drew crowds of people to look at the decapitating flies as they attacked fire ants. On July 14, the exhibit participated in the Annual Oxbow Meadows Insect Festival in Columbus, GA.



The exhibit traveled by invitation (see letter on page 14) to Washington, D.C. for the Fifth Annual Food and Agricultural Science Exhibition and Reception sponsored by the National Association of State Universities and Land-Grant Colleges (NASULGC) on March 5, 2002. The exhibit represented the State of Alabama at a reception for congressmen and their staff in the Rayburn House Building near Capital Hill.




The exhibits include informational posters, publications, videos, CD-ROMs, children's activity books, preserved specimens, live fire ants, a live decapitating fly demonstration, and casts of fire ant tunnel systems which spark curiosity in the 8,000 - 10,000 passers-by. Approximately 1,500 publications and 12,000 activity books were distributed this year.



**NASULGC** National Association of State Universities and Land-Grant Colleges

**MEMORANDUM**

**TO:** Exhibitors, 2002 Agriculture Science and Education Exhibition

**FROM:** Eddie G. Gouge  
Associate Director, Federal Relations – Food and Agricultural Sciences 

**DATE:** January 17, 2002

**SUBJECT:** **Fifth Annual Food and Agricultural Science Exhibition and Capitol Hill Reception**

**AGRICULTURE AND FOOD SCIENCE IN THE 21<sup>ST</sup> CENTURY, The GOVERNMENT-UNIVERSITY PARTNERSHIP AT WORK: *A University Exhibition and Reception on Capitol Hill***, the fifth annual food and agricultural science exhibition and reception on Capitol Hill, is set to take place on **March 5, 2002**. On behalf of the National Association of State Universities and Land-Grant Colleges (NASULGC), I would like to congratulate you on being selected to participate in this exhibition.

The exhibition's announcement, scheduling and logistical information, registration form, and supplementary information form are enclosed for your reference and use.

Please do not hesitate to contact me whenever I can be of any assistance.

Enclosures

1307 New York Avenue, N.W., Suite 400 • Washington, DC 20005-4722 • (202) 478-6040 • Fax (202) 478-6046  
www.nasulgc.org



### **We can do something about fire ants: Training professionals and developing teaching materials in sustainable fire ant management**

Between January 1, 2002 and December 31, 2002, 812 trainers participated in 26 trainer-oriented workshops. Educational materials used included slide sets, videotapes, posters, mound models, and publications that were developed in 2001. The materials are presented on the new Extension fire ant web site, <http://www.aces.edu/dept/fireants/>. Master Gardeners, Master Cattle Producers, pesticide dealers, turfgrass managers, environmental biology students, city employees, botanical garden directors, horticultural inspectors, and pest control operators and NRCS personnel were trained in sustainable fire ant management. Over 200 members of the general public participated in 7 other workshops. Twelve county agents and two specialists participated in training fire ant management advisers.



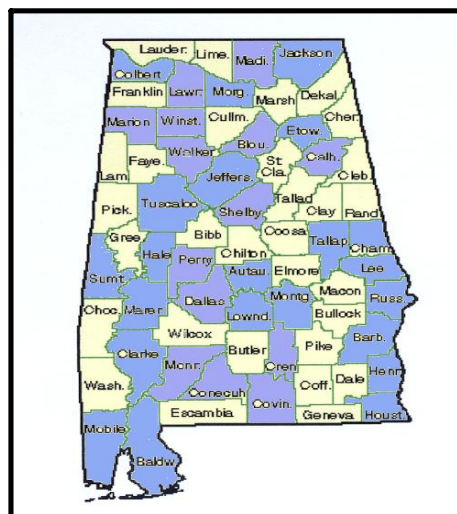
Eight county agents are participating in the decapitating fly project. This project, administered by the Alabama Fire Ant Management Program, involves releasing and monitoring the establishment and spread of a biological control agent of the fire ant. Two county agents conducted bait-based fire ant management demonstrations.

Funding from the Alabama Fire Ant Management Program was used to match a grant that has been received from the SARE Professional Development Program. Personnel from Auburn University (1862 land-grant), Alabama A&M (1890) and the Alabama Cooperative Extension System are participating in the project.

## The Science of Fire Ants, June 2002

The Science of Fire Ants is a workshop for middle school teachers based on the belief that hands-on experiences are most effective in learning. The two hour workshop models hands-on fire ant science projects that the teachers can take back to their classrooms to increase their students' knowledge of science, math, and fire ants. At the conclusion of the workshop, teachers are given some of the materials necessary to conduct the experiments in which they have participated. Teachers receive ant farms, graduated cylinders, aspirators, tests tubes, petri dishes, thermometer, flouon, magnified insect viewing lenses, insect boxes (complete with Madagascar hissing cockroaches), activity books, and handouts.

A total of 180 Alabama teachers and 50 undergraduate education majors from thirty-five counties across Alabama (shown in blue) have participated in the workshops. These teachers reach approximately 5,000 students annually. It is evident that the Science of Fire Ants is occupying an important niche in effectively reaching the middle school students in Alabama with information on fire ants.



### Community-wide fire ant education program, Houston County

Two fire ant bait demonstrations were established in Dothan in 2002. Extension personnel conducted surveys for fire ant activity before application of Distance and Amdro fire ant baits. Six weeks later, fire ant activity was significantly reduced.

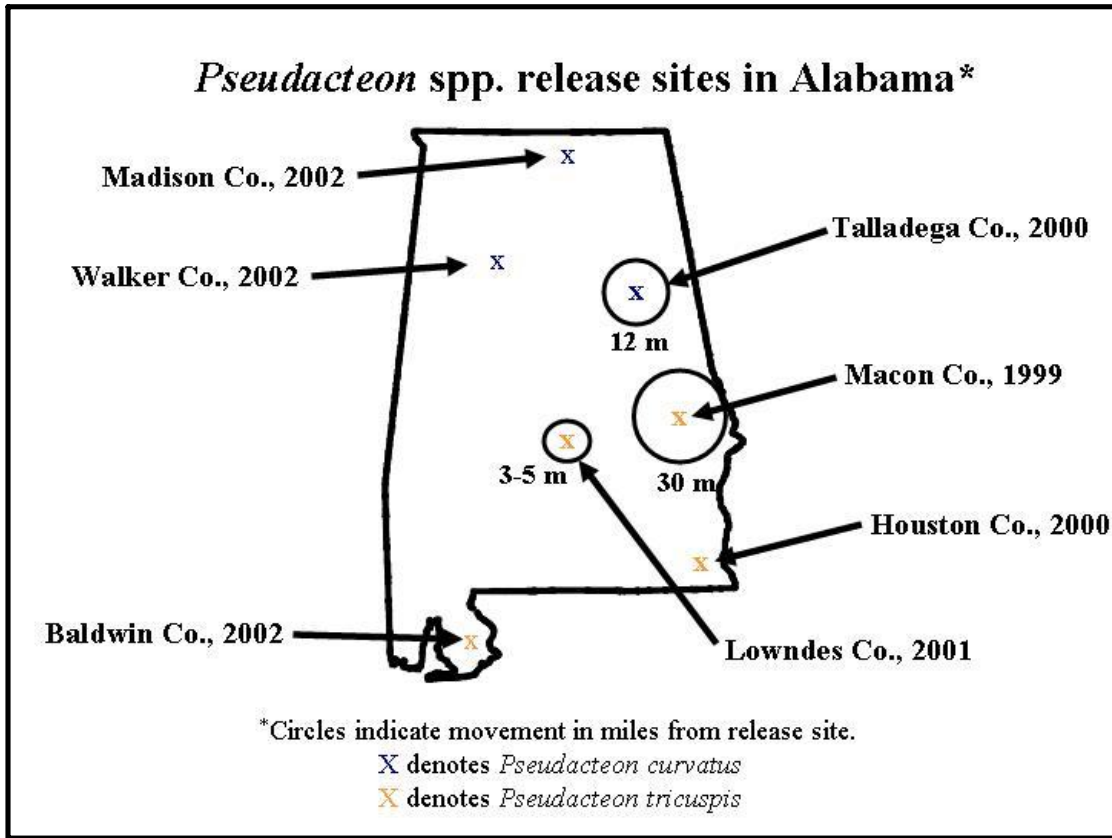
## Evaluation of Integrated Pest Management Methods for Imported Fire Ants in Alabama

**Principal Investigators:** Lawrence 'Fudd' Graham, Kathy Flanders, Henry Dorough, Rickey Hudson, Michael Oglesby, Marla Faver, Danny Cain, Alabama Cooperative Extension System, Ken Ward, Alabama A&M University, J. T. Vogt, USDA-ARS, Starkville, MS, Sanford Porter, USDA-ARS, Gainesville, FL.

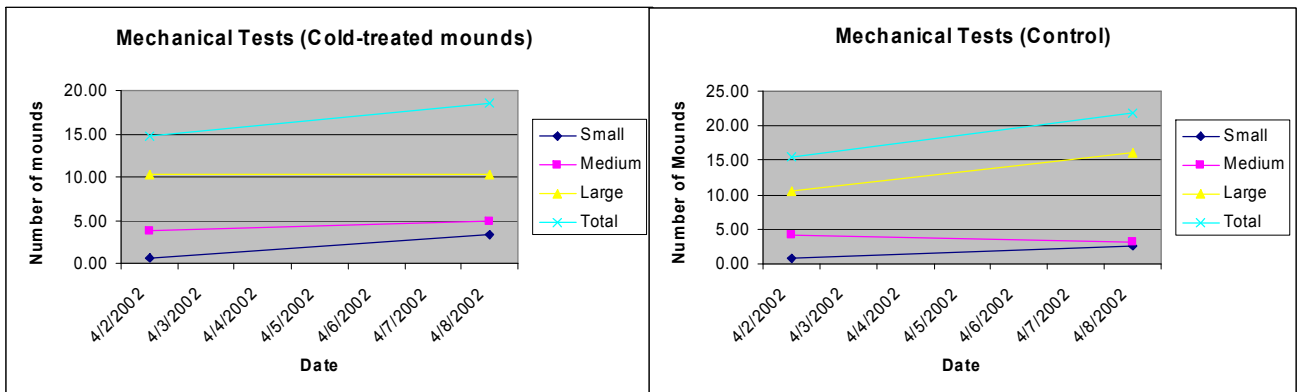
Two biological control agents of fire ants, known as phorid flies or decapitating flies, have now been released in seven counties in Alabama, and are established in four. *Pseudacteon tricuspis* has been successfully established in Macon County, Lowndes County, and Houston County. To date, flies have spread over 30 miles and 3 miles, respectively, from the Macon and Lowndes sites. Flies are present at the Houston County site, but movement of the flies from the release site has not been detected. A fourth release of *Pseudacteon tricuspis* was conducted in Baldwin County in May. Flies have not been seen at the site yet, but a thorough search will not be conducted until late spring/early summer. *Pseudacteon curvatus* is successfully established in Talladega County and flies have spread over 12 miles from the release site. Two new releases of this species were conducted in 2002. The first release of *Pseudacteon curvatus* was by Ken Ward and Rufina Ward of Alabama A&M near Huntsville in Madison County in late July and early August. The second release of this species was in late August and early September in Walker County.

The release in Baldwin Co. generated good publicity for the program, with four television news spots, two newspaper articles, and two ACES press releases. Press coverage was also good at the Huntsville release and the Walker County release.

Data are collected twice yearly in cooperation with the USDA in Gainesville, FL, Biloxi, MS and Starkville, MS. A poster on change in mound size and numbers was presented at the ESA meetings in Nov. A paper on the first successful release of *P. curvatus* in the United States has been submitted.



Results from the mechanical control test were mixed. Mounds in a pasture were disturbed just prior to a cold front (to simulate pasture dragging). While total numbers of mounds decreased somewhat, the difference was not significant. However, the number of large mounds in the field did significantly decrease when compared with large mounds in the control.



Sampling is currently underway monthly to determine the diurnal pattern of phorid activity at both the Macon Co. site (*P. tricuspis*) and the Talladega site (*P. curvatus*). Preliminary data seem to suggest that *P. tricuspis* are more active midday while *P. curvatus* have a bimodal activity period, being active early in the day and later in the afternoon. This would provide a longer attack period on fire ants, and further reduce foraging by IFA, if this pattern holds and the populations overlap.

To date, the best sampling method for phorids in the field seems to be in containers. Ants are collected in the field (or colonies are transported from the lab) and placed into plastic rearing containers lined with fluon. Several dozen ants are crushed to elicit pheromone production, which attracts the flies.

In addition, 69 acres of fire ant bait trials were established in cooperation with Aventis Environmental Science and Valent Biosciences Corporation. Fire ant baits were evaluated in three trials. Bait products were tested for Valent Biosciences Corporation at the Auburn-Opelika Robert G. Pitts Airport and for Aventis Environmental Science in two trials at Moton Field Municipal Airport in Tuskegee, AL.





## Does Cotton Aphid Tending By Fire Ants Lead to Cotton Aphid Outbreaks?

**Principal Investigators:** Micky D. Eubanks

We found that fire ants preferred to forage on aphid-infested cotton plants ( $\bar{x} = 103 \pm 47$  ants per plant) compared with plants without aphids ( $\bar{x} = 5 \pm 3$  ants per plant). When on aphid-infested plants, fire ants frequently fed on the sugary secretion called honeydew that is produced by cotton aphids and protected the aphids from predation by ladybeetle and green lacewing larvae. In caged greenhouse experiments, fire ants reduced survival of lady beetle larvae by 92.9% and green lacewing larvae by 83.3% when aphids were on cotton plants. As a result, aphid survival almost doubled. In a field experiment, predator larvae were more abundant in cotton plots with experimentally suppressed densities of fire ants ( $0.62 \pm 0.11$  lady beetle larvae per sample;  $0.06 \pm 0.02$  lacewing larvae per sample) than in plots with high fire ant densities ( $0.23 \pm 0.06$  lady beetle larvae per sample;  $0.01 \pm 0.01$  lacewing larvae per sample). Conversely, cotton aphids were more abundant in high fire ant density field plots ( $\bar{x} = 6.83 \pm 0.03$  aphids per leaf) than in low fire ant density plots ( $\bar{x} = 4.04 \pm 0.03$  aphids per leaf). These data suggest that red imported fire ants increase cotton aphid survival and density in the field through predator interference. Future work will determine if larger populations of cotton aphids in the presence of ants results in reductions in cotton yield.



## Progress Report: Heat and Desiccation Tolerances and Water Budgets of Alate and Worker Red Imported Fire Ants

**Principal Investigators:** Arthur G. Appel and Lawrence 'Fudd' Graham

### Heat Tolerances: Results

Critical thermal maxima (CTMax) and critical thermal minima (CTMin) were determined for red imported fire ants in the laboratory over a 15-month period. Fire ants were collected monthly from a local field and tested within 6 h of collection in a specially designed, computer controlled temperature arena. Temperatures were increased or decreased at 1°C per minute to determine CTMax and CTMin. Both CTMax and CTMin fluctuated with seasonal temperatures (Figs. 1 and 2). Ant body mass was not related to either CTMax or CTMin at any test period. Ant temperature sensitivity varies with season and could be exploited during rapidly changing environmental conditions.

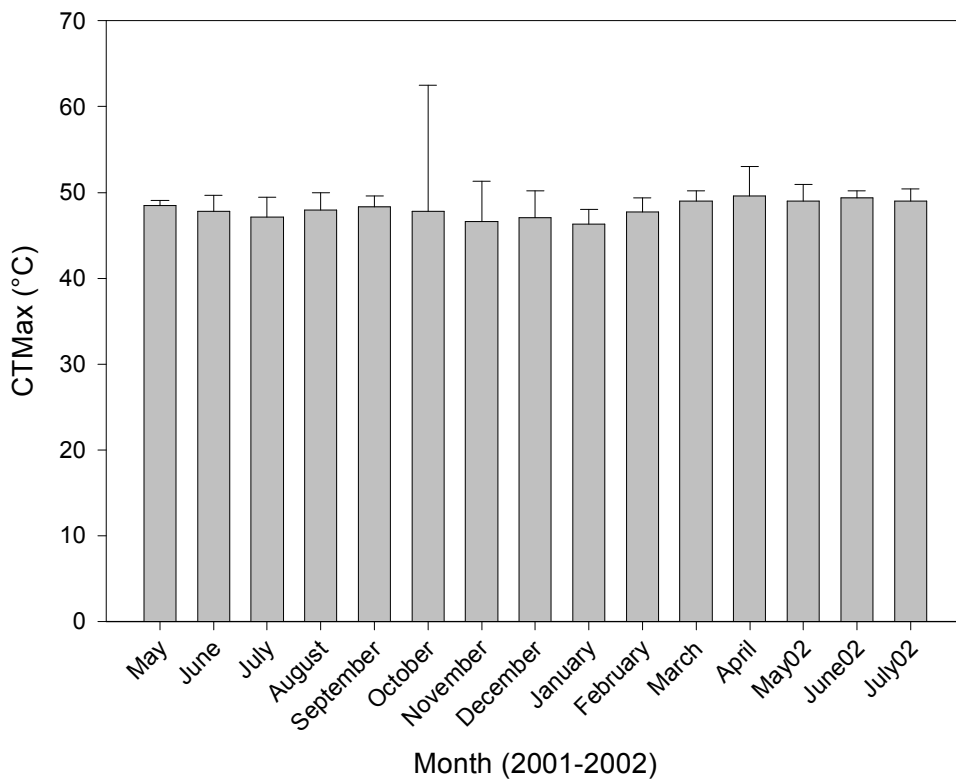


Figure 1. Seasonal variation of red imported fire ant critical thermal maxima (CTMax).



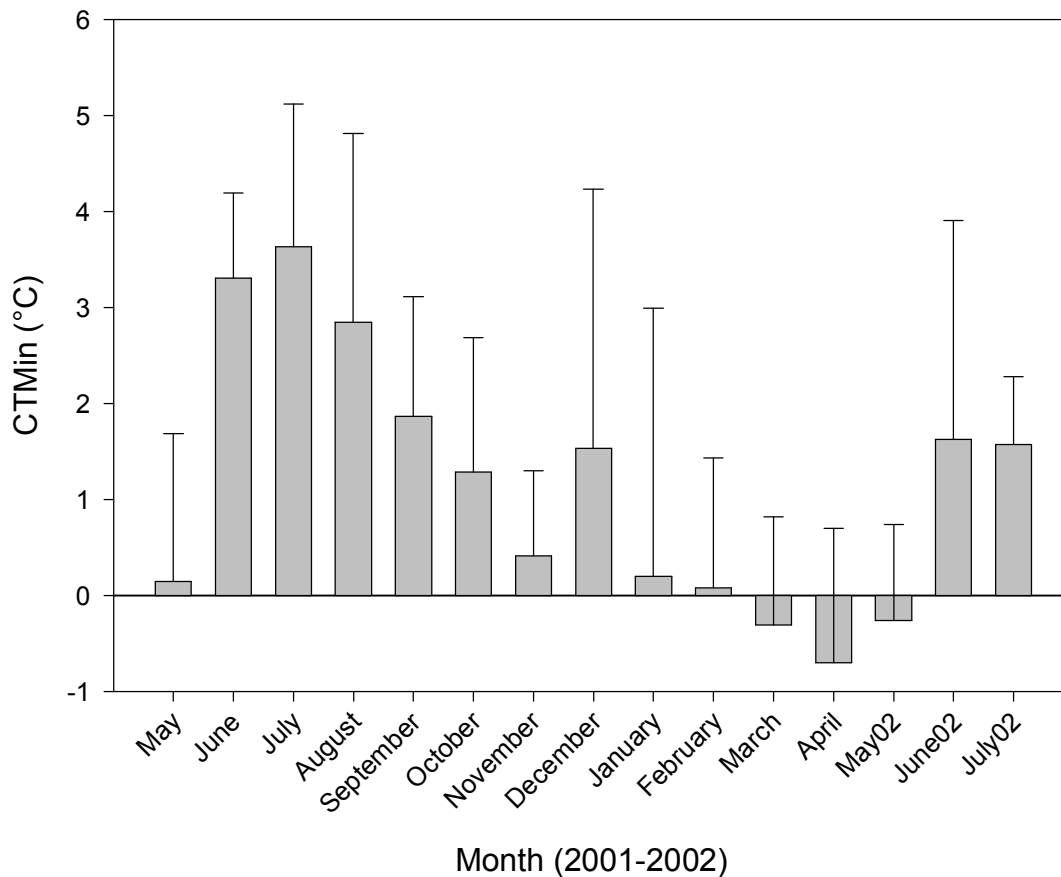


Figure 2. Seasonal variation of red imported fire ant critical thermal minima (CTMin).

### Heat Tolerances: Reports

An oral presentation was presented at the Entomological Society of America national meeting in Ft. Lauderdale, FL in November 2002: V. Bertagnolli, L. C. Graham, and A. G. Appel. Seasonal variation in temperature sensitivity of the red imported fire ant.

### Desiccation Tolerances: Results

Desiccation rates and tolerances of alate and worker red imported fire ants were determined in an air velocity of 100 ml/min at 5 relative humidities at each of 5 temperatures. After 2 h exposure, water loss (mg/g) for all stages increased with increasing temperature and decreasing relative humidity. Temperature contributed >90% to water loss. The relationships of water loss, temperature, and relative humidity can be estimated using a 3D Gaussian model (Fig 3).

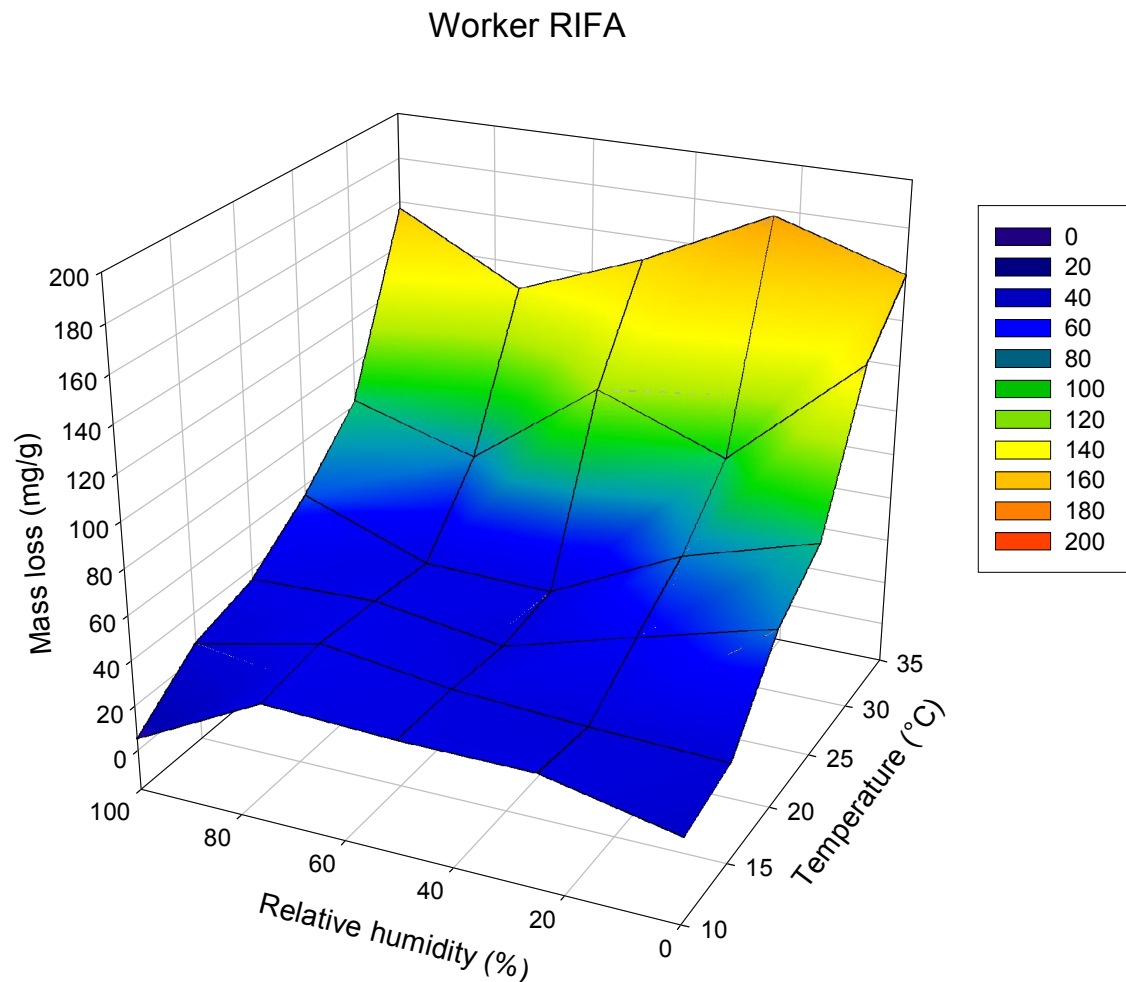


Figure 3. Relationship of worker red imported fire ant water loss to desiccation temperature and relative humidity.

### Desiccation Tolerances: Reports

One poster presentation was made at the 2001 Entomological Society of America national meeting in San Diego, CA ( A. G. Appel. Importance of respiratory water loss in alate red imported fire ants.) and another poster on the effects of abiotic factors on water loss of red imported fire ants is scheduled for 2003

## **The Vitellogenin Gene, Putative Pheromone Binding Gene, and Cytochrome P450 Gene Expression in the Imported Fire Ant, *Solenopsis invicta* B.**

**Principal Investigators:** Nannan Liu and Lee Zhang

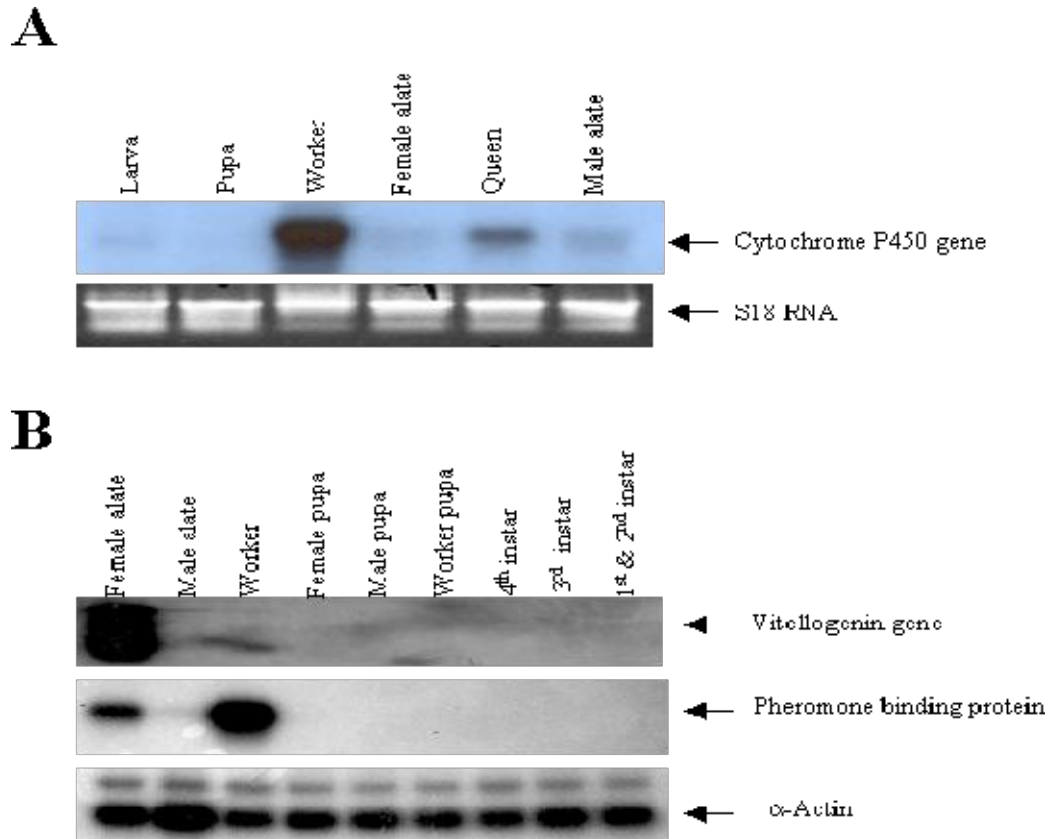
Understanding the molecular basis involved in development and reproduction of the red imported fire ant could provide a major breakthrough in fire ant management. Isolation and characterization of the gene(s) involved in development and reproduction will enable us to study gene regulation in growth, reproduction, and caste differentiation of the fire ant and will provide useful information and tools for developing novel strategies to control this insect pest. Recently 16 cDNA fragment homologues to the vitellogenin gene (Vg1), a putative pheromone binding gene, and a new cytochrome P450 gene have been identified that are specifically overexpressed in queens but not in workers. With these differentially expressed genes, we are able to examine gene expression at different life stages and castes of the fire ant.

### **Current Study and Results**

To determine the expression of the vitellogenin gene, the putative pheromone binding gene, and cytochrome P450 in the imported fire ant, mRNA levels of the genes in different life stages and castes of the fire ant were determined by northern hybridization. Three micrograms of poly(A)<sup>+</sup>RNA from each sample were separated by formaldehyde denaturing gel electrophoresis. RNA blots were hybridized with the [ $\alpha$ -<sup>32</sup>P] dCTP labeled gene fragments. To check the amounts of RNA loaded in each lane, blots were re-hybridized with either a fragment of the actin gene,  $\alpha$ -Actin, from *D. melanogaster* or S18 RNA. We found that the cytochrome P450 gene was overexpressed in workers; the vitellogenin gene was only expressed in female alates and queens; and the putative pheromone binding protein was expressed in workers, female alates, and queens with much higher expression in workers (Figure 1). These

results suggest that these three genes play roles in the growth and reproduction of the imported fire ant.

Figure 1. Vitellogenin gene, putative pheromone binding gene, and cytochrome P450 gene expression in the imported fire ant



### Significance, Anticipated Results and Future Direction

Our current investigation provides a solid framework for designing future experiments on gene regulation of growth, reproduction, and caste differentiation of the imported fire ant. Such studies include 1) isolation and characterization of 5' promoter regions of the differentially expressed genes to understand how the gene expression is regulated in different life stages and castes, and 2) regulation of the vitellogenin gene, the putative pheromone binding gene, and P450 gene expression by juvenile hormone (JH) in the red imported fire ant.

## **Facilitating Fire Ant IPM Implementation in AL Public Schools**

**Principal Investigators:** X.P. Hu, F. Graham, A. Appel, K. Flanders, T. Daugherty

### **Objectives**

The goal of this program is to inform schools and communities and to facilitate IFA IPM implementation through educational training, demonstration, and fundamental researches.

Three informational workshops were conducted in Mobile and Jefferson counties with a total attendance of 252. The following topics were presented at the workshops: basic biology, aggressive nature, invasive habit, ecological and economic impact on general public and school education, new technologies and the principles of IPM. The audiences included administrators, general public, and master gardeners.

One train-the-trainer educational workshop was conducted. Fifty two landscape workers, teachers, pest control personnel, and school managers from 3 schools were trained. Training topics were: how to identify ants; how to prevent fire ants from invading school properties; new technologies for fire ant management and implementation of IPM in their schools. The trainers can incorporate the new knowledge into their existing program.

The number of mounds and mound vitality ratings were surveyed in various landscape habitats at 6 schools. The objective was to determine if certain landscape areas harbor mounds that are significantly different from those in open areas. The landscape elements were grouped into 5 categories: building perimeter (less than or equal to 1 ft from foundation), flowerbed and ornamental bed, electric equipment (air conditioners, pole and supporting cable), football field and landscape lawn. Our data indicate:

1. Large areas tend to have higher mound densities than small areas.
2. More mounds were found on the edges of lawns, football field, sidewalks and roadways.

This is particularly important in the late spring and early summer when fire ant swarmers seek warm and damp cracks to start new colonies.

3. Mound densities were greater at the bases of objects (electric equipment, electric poles and supporting cables, fences, large ornamentals, etc.) than mound densities in open field and adjacent lawns. It is possible that these objects generate a warm, supportive and moist niche favored by fire ants, regardless of area.
4. The lowest density of mounds was found at building perimeters, possibly because the shady, and relatively cool conditions were not conducive to fire ant establishment.
5. Later in the fall, we found more mounds at the edge of flowerbeds and ornamental beds, but total mound numbers remained the same.
6. Mound size did not vary due to location.

The results are useful for developing a hazard rating system for RIFA at schools. The results suggest that edges and supporting subjects may offer an early, successional habitat for fire ant colonies and may require special survey and pest management attention. It suggests that landscape designers and manager may be able to affect RIFA populations by manipulating the distribution of landscape elements in school environments.

