

The background of the entire page is a faded, high-magnification photograph of several fire ants. The ants are shown in various orientations, with their characteristic reddish-brown bodies and black abdomens clearly visible. They appear to be in motion, possibly interacting with each other or a surface.

PROGRESS REPORT

FY 2007

THE ALABAMA FIRE ANT MANAGEMENT PROGRAM

... making fire ants easier to live with



ENTOMOLOGY AND PLANT PATHOLOGY

Edited by L.C. "Fudd" Graham and Kelly Ridley

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FY 2007 IN REVIEW



~The Alabama Fire Ant Management Program~
 ...making fire ants easier to live with.

Auburn University—Dept. of Entomology & Plant Pathology

Auburn, AL

Volume 2, Issue 1

INTRODUCTION

In Alabama, when people hear the words, fire ants, they begin to think of the horror stories they have involving this invasive species. Everyone knows someone who has stepped in a fire ant mound inadvertently and paid the consequence. Though fire ants will never become extinct in the United States, they can be managed effectively using some simple techniques. The Alabama Fire Ant Management Program, consisting



Fire ant mounds in field.

Courtesy USDA-ARS

of the Alabama Cooperative Extension System, the Tuskegee Cooperative Extension System, and Alabama A&M University, while working with the USDA-APHIS and the USDA-ARS get these control methods out to the public. By informing the public, we better equip them to deal with fire ant problems around their homes and to avoid the economic losses homeowners suffer due to fire ants each year.

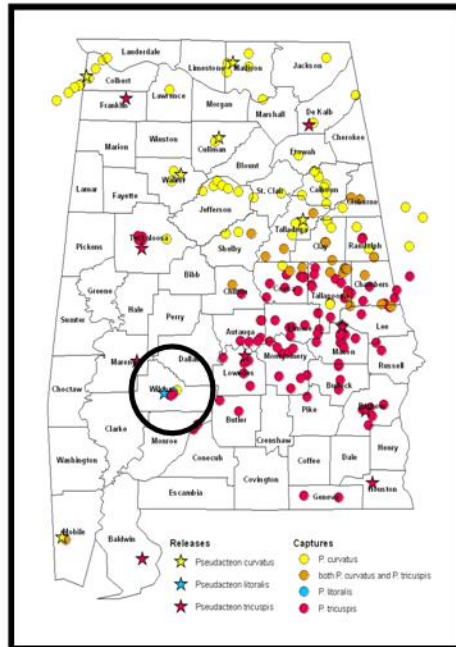
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By the Numbers:

- ◆ Additional leveraged funding for FY 2007: **\$570,589**
- ◆ 30 Scientific papers and presentations
- ◆ 14 Publications and articles
- ◆ 53 Extension articles, presentations, and workdays
- ◆ 24 ongoing bait demonstrations
- ◆ 12 mass media spots

PHORID FLY SUCCESS IN ALABAMA



Location of phorid flies in Alabama.

Since the first release of phorid flies into Alabama, nearly 10 years ago, the flies have spread over 2/3 of the state, and are continuing to spread outward by 10-20 miles each year. The expansion of the phorid flies continues to be monitored each summer.

This past summer, Wilcox County became the first site in the United States to have three species of phorid fly established in one place, and also the only place in the country where the *Pseudacteon litoralis* species has ever been recovered in the field. *Pseudacteon tricuspis*, *Pseudacteon curvatus*, and now *Pseudacteon litoralis* are all combating fire ants together at this site.

There are more than 20 different species of phorid fly present in South America, which is the fire ant and phorid fly's natural home. The Alabama Fire Ant Management Program plans to release a fourth of these species into Alabama this summer, *Pseudacteon obtusus*. This phorid species attacks smaller fire ant workers and prefers trailing or solitary ants; whereas the other three species are attracted to mound disturbances.

LAUNCH OF eXtension



The imported fire ant eXtension website was launched in April 2007. This site contains the latest, best-of-the-best information, news, and FAQ's about fire ants. Information for this site was gathered by researchers across the country, and Alabama has played a key role in building the site. By providing such a site, stakeholders can now readily access fire ant information easily and efficiently. To visit eXtension, go to: www.extension.org/fire+ants.



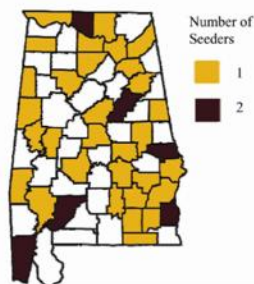
Phorid fly attacking fire ant worker.
 Courtesy Missouri State

FIRE ANTS & EXTENSION, A POWERFUL COMBINATION

In 2007, 41 Extension agents along with 17 stakeholders (Pest Control Perators, etc) were trained in fire ant biology and control methods. This one-day training was conducted in 5 locations across the state and was also video-conferenced in order to allow as many agents to attend as possible. By conducting this training, Extension agents are better able to properly answer daily questions from the public involving fire ants. The training was put on by the Alabama Fire Ant Management Program.

Currently, there are **24 on-going fire ant bait**

demonstrations being conducted by Extension agents in 20 counties in Alabama. This is up from just 13 demonstrations that were conducted in 2006. Extension agents also conducted 54 workshops, presentations, and workdays involving fire ants in 2007.



Herd Seeder Locations in Alabama

There are now **42 herd seeders** available for public use located at Extension offices across the state (see map). This is up from just 20 in 2006! The herd seeders are available for use free-of-charge at Extension offices. This provides the public access to the equipment needed to conduct multi-acre fire ant control. This is great news for landowners.

FIRE ANT - PHORID FLY INTERACTIONS

Research conducted at Auburn University indicates the preference of *Pseudacteon curvatus* phorid flies to the black and hybrid imported fire ants. The researchers used an electroantennogram (EAG) to observe responses for olfactory sensitivity in both the *P. tricuspsis* and *P. curvatus* species of phorid fly to extractions of the 3 fire ant species. This research also found that the *P. tricuspsis* had greater EAG responses to all 3 of the fire ant species than did *P. curvatus*.



Electroantennogram
Courtesy Iowa State University

Using the same EAG recordings the researchers began to try to identify the active components of fire ant semiochemicals that attract the phorid flies to the fire ants. They found that the 3 species of fire ant all use the same major active components, which are, *cis* C₁₁ and *cis* C_{13:1}. This research could lead to the identification and synthesis of chemical compounds used as attractants by phorid flies to locate fire ants.

This research will have **major benefits to U.S. Agriculture, Public Health, and the Environment** by giving environmentally-friendly strategies

for controlling invasive fire ants. It will also aid the efforts of the Alabama Fire Ant Management Team in using phorid flies as biological controls.

FIRE ANT EXHIBITS ...getting information to the public.

The Alabama Fire Ant Management Team prepared and staffed a **fire ant exhibit at the Alabama National Fair in both October 2006 and 2007**. By having a booth we are able to reach more stakeholders to answer fire ant questions. With the help of the Master Gardeners the booth was staffed at all times. Stakeholders were given handouts involving urban fire ant control, tips for spreading fire ant bait, types of baits, their prices and where to locate the needed equipment.

The fire ant display was also exhibited at the following places in the state and beyond:

- ◆ **AgRoundup:** Auburn, AL
- ◆ **Alabama Peanut Festival:** Dothan, AL
- ◆ **Chilton Regional Extension Center, Farm, Home, and Wildlife Expo:** Clanton, AL
- ◆ **Insectival:** Columbus, GA
- ◆ **Sunbelt AgExpo:** Moultrie, GA

FIRE ANT RESEARCH IS ONGOING

Researchers associated with **The Alabama Fire Ant Management Program** are breaking through new barriers in fire ant research.

One research project involves deciphering genes that are involved in the development, reproduction and social behavior of the red imported fire ant. They have isolated 33 genes that are differentially expressed among developmental stages and between workers and queens. It is suggested that these genes are strongly associated with

development and caste differentiation in the fire ant. This is fundamental research because it **may give us better methods to control the fire ant.**

Another project involves **bulk blending fertilizer and fire ant bait**. The experiment was conducted last summer, and the results thus far



Spreading Fert. & Esteem
Courtesy Fudd Graham

indicate that mixing fire ant bait and fertilizer and applying it immediately is just as successful as applying fire ant bait alone. The experiment will be repeated again in the summer of 2008.

A research project involving the use of natural products and essential oils against fire ants is being done. They intend to measure the toxicity of such products, which can then ultimately be used in the home as **organic agents to fight fire ants.**

Alabama Fire Ant Management Program Personnel and Cooperators



Auburn University - Department of Entomology & Plant Pathology

Advisory Committee

Arthur G. Appel, Ph.D. – Department Chair

Kathy L. Flanders, Ph.D.

L.C. “Fudd” Graham, Ph.D.

Michael L. Williams, Ph.D.

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

Researchers

Micky D. Eubanks, Ph.D.

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Diego Gimenez

Jonathan Gladney

Tony Glover

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Tinsley Gregg

Warren Griffith

Chazz Hesselein

Rickey Hudson

Jimmy Jones

Ken Kelley

David Koon

Willie Lampley

Maggie Lawrence

Sallie Lee

Mario Lightfoote

Charlie Mason

Paul Mask

Mike McQueen

Virginia Morgan

Charles Pinkston

Dan Porch

Stan Roark

Wayne Robinson

Terry Shackelford

Kerry Smith

Jimmy Smitherman

Lewis Tapley

Jimmy Todd

Jack Tatum

Kevan Tucker

Reafield Vester

Mac Washington

Carol Whatley

Eddie Wheeler

Anthony Wiggins

Stan Windham

Amy Winstead



Tuskegee Cooperative Extension System

George Hunter – Lowndes/Wilcox Co.

Rory Stephens – Barbour/Bullock Co.



Alabama Agricultural Experiment Station

Tony Dawkins - Sand Mountain Research and Extension Center

Arnold Caylor – North Alabama Horticulture Research Center



Alabama A & M - Department of Plant & Soil Science

Ken Ward, Ph.D.

Rufina Ward, Ph.D.

Alabama Fire Ant Management Program Personnel and Cooperators



**Alabama Department of
Agriculture & Industries**



U.S. Fish and Wildlife Service



USDA-ARS
Sanford D. Porter, Ph.D.
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USDA-APHIS
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Local Cooperators

Baldwin Co.	Mark Kaiser	Mobile Co.	Bruce Porter, USFWS
Barbour Co.	Lee Fenn	Talladega Co.	Mike Duke
Cullman Co.	Mr. & Mrs. F.D. Alexander		Greg Myrick
	St. Bernard Abbey Farm		Greg Street
Franklin Co.	Bob Rogers	Tuscaloosa Co.	Munny Sokol Park
Houston Co.	Joe Carothers	Wilcox Co.	Jack Biddle
	John McDaniel	Dadeville, AL	Stillwaters Golf Course
Macon Co.	Tim and Susan Gaasch	Fayetteville, AL	Farmlinks Golf Course
	Tony & Diane Silva	Sylacauga, AL	Merkel Field Sylacauga
Marengo Co.	Lynn Crocker	Walker Co.	Dorman Grace

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Kathie Kalmowitz

The Chemical Company



Jeffery Smith
John Altom



David Herd



Doug Van Gundy

Sincere apologies to anyone inadvertently omitted from this list

Trade names are used only to give specific information. The Alabama Fire Ant management Program and the Alabama Cooperative Extension System do not endorse or guarantee any product and do not recommend one product instead of another that might be similar.

Funding Leveraged by Fire Ant Program

- ❖ Fadamiro, H.Y. (PI). Isolation, Identification and Biological Activity of Novel Chemical Compounds Mediating Attraction of Parasitic Phorid Flies to Invasive Fire Ants. Auburn University Biogrants Program. Pre-proposal approved November 2007. Full proposal is being developed for a budget of \$49,820 for two years.
- ❖ Flanders, K. L., and B. M. Drees, P. Nester, and P. Beckley. Dec. 2006. Taking the Sting out of Fire Ants: A Proposal for an eXtension Program on Imported Fire Ant Management. CSREES eXtension, \$30,000.
- ❖ National Science Foundation, Population Biology/Evolutionary Biology Program. Funded August 2007 – July 2010. Do positive species interactions promote invasions? Effects of ant-hempiteran mutualisms on the success and consequences of ant invasions. (M.D. Eubanks, PI). (collaborative project with D. Holway at UC-San Diego and A. Suarez at UI at Champaign) Total Award \$592,873 Eubanks Portion \$269,033.
- ❖ Flanders, K. L., and B. M. Drees. Dec. 2006. Support for leader of the Imported Fire Ant eXtension CoP to Offset Time and Travel Expenses. CSREES eXtension, \$19,932.
- ❖ Oi, Faith and Fudd Graham. Urban IPM. eXtension Grant funded. \$40,000.
- ❖ Oi, Faith, Rebecca Baldwin, Fudd Graham, Janet Hurley, and Michael Merchant. Marketing IPM as Green School Technology in Southern Schools. National EIPM Grant funded. \$75,284.
- ❖ Merchant, Michael E., Blake Bennett, and Janet A. Hurley. Multi-state Evaluation of School IPM Cost-Calculator and Training Model. Southern Region IPM Grant funded. \$15,020 subcontract to AU.
- ❖ Jackai, Louis, R. Ankumah, H. Oh, N. Tackie, A. G. Appel, L. C. 'Fudd' Graham, R. Pacumbaba. Integrated Pest Management and Food Safety in the Small Farm Environment. AALGA Grant funded, \$10,000.
- ❖ Graham, Fudd. School IPM PCO Training. Alabama Department of Ag and Ind. Grant funded. \$42,000.
- ❖ BASF Chemical Co. \$6000 Gift.
- ❖ Valent Chemical Co. \$6000 Gift.
- ❖ Xing Ping Hu, Field evaluation of bait products, gift from industries: \$7,500.

Total Funding Leveraged: \$570,589

Publications (* denotes graduate student):

- Chen, L., and H.Y. Fadamiro. 2007. Antennal sensilla of the decapitating phorid fly, *Pseudacteon tricuspis* (Diptera: Phoridae). *Micron*. In press.
- Chen, L., and H.Y. Fadamiro. 2007. Behavioral and electroantennogram responses of phorid fly *Pseudacteon tricuspis* (Diptera: Phoridae) to red imported fire ant *Solenopsis invicta* odor and trail pheromones. *Journal of Insect behavior*, 20: 267-287.
- *Coppler, L.B., J.F. Murphy, and M.D. Eubanks. 2007. Red imported fire ants may disrupt biological control in tomato. *Florida Entomologist* 3:419-425.
- Flanders, K. L. 2007. 2007 Fire Ant Control Materials for Alabama Homeowners. Alabama Cooperative Extension System Circular ANR-175-A, rev.
<http://www.aces.edu/pubs/docs/A/ANR-0175-A/ANR-0175-A.pdf>.
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- Hu, X.P. 2007. Are you smarter than other PCOs in fire ant management? *Pest Control Technology* April: p. 62, 64, 66, 68.
- Hu, X.P. Song D. and Zhou C. 2007. Field evaluation of label-rate broadcast treatment with bait products for controlling the Red Imported Fire Ants, *Solenopsis invicta* Buren (Hymenoptera: Formicidae). *Sociobiology* 50 (3): 861-866.
- Liu N. 2007. 33 online publications on the genes in the red imported fire ants in the National Center for Biotechnology Information (NCBI).
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- Liu, N. 2007. Expression of arginine kinase gene in the red imported fire ant, *Solenopsis invicta* Buren. The Alabama Fire Ant Management Program, Progress Report FY 2006, pp 54-57.
- Steven M. Valles, Charles A. Strong, David H. Oi, Sanford D. Porter, Roberto M. Pereira, Robert K. Vander Meer, Yoshifumi Hashimoto, Linda M. Hooper-Bui, Hussein Sánchez-Arroyo, Tim Davis, Vedham Karpakakunjarum, Karen M. Vail, L. C. "Fudd" Graham, Juan A. Briano, Luis A. Calcaterra, Larry E. Gilbert, Kenneth Ward, and David C. Thompson. 2007. Phenology, distribution, and host specificity of *Solenopsis invicta* virus-1. *J. Invert. Path.* 96:18-27.
- *Styrsky, J.D. and M.D. Eubanks. 2007. The ecological consequences of interactions between ants and honey-dew producing insects. *Proceedings of the Royal Society, Series B* 274:151-164.
- Wang, H., Q. Lin, L. Zhang and N. Liu, 2007. Cloning, sequencing, and gene expression of arginine kinase in the red imported fire ant, *Solenopsis invicta* Buren. *Insect Molecular Biology* (in re-review).

Proceedings Articles:

- Chen, L., S. Ochieng, and H.Y. Fadamiro. 2007. Comparative electroantennogram response of two phorid fly species to different species of imported fire ants. *Proceedings of the 2007 Annual Red Imported Fire Ant Conference, Gainesville, Florida*.
- Fadamiro, H.Y., and L. Chen. 2007. Semiochemical mediated responses of the phorid fly *Pseudacteon tricuspis* to imported fire ant odor. *Proceedings of the 2007 Annual Red Imported Fire Ant Conference, Gainesville, Florida*.

Graham, L. C. and *V. E. Bertagnolli. 2007. A New Addition to Our Arsenal of Ant WMDs. Proceedings of the 2007 Annual Red Imported Fire Ant Conference, Gainesville, Florida.

Scientific Papers & Presentations: (*denotes graduate student)

- *Barnum, T.R. and M.D. Eubanks. Tending and defending: Comparing ant-aphid mutualisms involving native and invasive ants. Annual Meeting of the Ecological Society of America, San Jose, California, August 2007.
- *Bertagnolli, Vicky, L.C. “Fudd” Graham, Robert K. Vander Meer, Kenneth E. Ward and Rufina N. Ward. 2006. Distribution of Imported Fire Ant Populations in Alabama. 2006 ESA Annual Meeting, Indianapolis, Indiana (poster, Dec 10-13, 2006).
- *Bertagnolli, Vicky, L.C. “Fudd” Graham, Robert K. Vander Meer, Kenneth E. Ward and Rufina N. Ward. 2007. OUCH! Who bit me? – IFA in Alabama. 2007 Imported Fire Ant Conference, Gainesville, FL (poster, Apr 23-25, 2007).
- Chen, L., S. Ochieng, and H.Y. Fadamiro. 2007. Comparative electroantennogram response of two phorid fly species to different species of imported fire ants. 55th Annual Meeting of the Entomological Society of America, San Diego, California, December 9-12, 2006.
- Chen, L., and H.Y. Fadamiro. 2007. Behavioral response of phorid fly *Pseudacteon tricuspis* (Diptera: phoridae) to red imported fire ant *Solenopsis invicta* odor and trail pheromone. Entomological Society of America, Southeastern Branch Annual Meeting, Knoxville, Tennessee. March 4-7, 2007.
- Chen, L., S. Ochieng, and H.Y. Fadamiro. 2007. Comparative electroantennogram response of two phorid fly species to different species of imported fire ants. 2007 Annual Red Imported Fire Ant Conference, Gainesville, Florida. April 23-25, 2007.
- Drees, B., K. Flanders, and H. Ritchie-Holbrook. 2007. eXtension fire ant website launch at <http://www.extension.org>. 2007 Imported Fire Ant Conference, Gainesville, FL (April 23-25).
- Eubanks, M.D. and *J.D. Styrsky. Consequences of ant-Hemipteran mutualisms for plants. Gordon Research Conference on Plant-Herbivore Interactions, Ventura, California, February 2007.
- Eubanks, M.D. Pervasive invasives and complex trophic interactions: fire ant – aphid mutualisms as keystone interactions. Students Choice Seminar, Department of Entomology, Washington State University, March 2007.
- Eubanks, M.D. Pervasive invasives and complex trophic interactions: fire ant – aphid mutualisms as keystone interactions. Department of Ecology and Evolutionary Biology, University of California-San Diego, April 2007.
- Eubanks, M.D. Mutualisms as keystone interactions and extended phenotypes. Yin and Yang: The Combined Influence of Positive and Negative Species Interactions in Ecological Communities Symposium at the Annual Meeting of the Ecological Society of America, San Jose, California, August 2007.
- Eubanks, M.D. Pervasive invasives and complex trophic interactions: fire ant – aphid mutualisms are keystone interactions. Department of Entomology, Pennsylvania State University, September 2007.
- Fadamiro, H.Y., and L. Chen. 2007. Semiochemical mediated responses of phorid fly *Pseudacteon tricuspis* to imported fire ant odor. 2007 Annual Red Imported Fire Ant Conference, Gainesville, Florida. April 23-25, 2007.
- Fadamiro, H.Y. 2007. Semiochemical mediated host-parasitoid interactions: a case study of some parasitic wasps and decapitating phorid flies. USDA-ARS Yakima Agricultural Research Laboratory, Wapato, Washington. September 7, 2007.

- Fadamiro, H.Y., and L. Chen. 2007. Olfactory response of the decapitating phorid fly, *Pseudacteon tricuspis* to the red imported fire ant, *Solenopsis invicta*. 4th Asia Pacific Conference on Chemical Ecology, Tsukuba, Japan. September 11-14, 2007.
- Fadamiro, H.Y. 2007. Semiochemical-mediated host-parasitoid interactions: response of parasitic phorid flies to host imported fire ant odor. 38th Annual Conference of the Entomological Society of Nigeria. Ile-Ife, Nigeria. October 7-10, 2007.
- Flanders, K. L. Imported Fire Ant eXtension. Update on FAQ's. eXtension Community of Practice Leadership Conference, Louisville, KY, October 2006.
- Flanders, K. FAQ, Ask the Experts. Annual Meeting Entomological Society of America, Indianapolis, Indiana December 2006.
- Flanders, K. and B. Drees. 2007. Imported Fire Ant eXtension: A New Way of Connecting Experts to Provide Unbiased Information for the Client, Annual Meeting Entomological Society of America, San Diego, CA (poster, December 11, 2007).
- Flanders, K. L. 2007. Making Fire Ants Easier to Live With: Alabama Cooperative Extension System's Fire Ant Education Program. Southern Region, American Society for Horticultural Science, Mobile, February 4, 2007.
- Flanders, K. and B. Drees. 2007. Imported Fire Ant eXtension, Southeastern Branch Entomological Society of America, Knoxville, TN (poster, Mar. 4-6, 2007)
- Flanders, K. and P. Beckley, moderators, Fire Ant eXtension Work Day, March 7, 2007, Gainesville, Florida.
- Flanders, K., P. Beckley, C. Whatley, V. Morgan, and B. Drees. 2007. Asked and Answered: the imported fire ant eXtension FAQs. 2007 Imported Fire Ant Conference, Gainesville, FL (poster, April 23-25).
- Flanders, K. and B. Drees, moderators, Fire Ant eXtension Work Day, April 26, 2007, Gainesville, Florida.
- Flanders, K. 2007. Imported Fire Ant eXtension. Extension Development Council Seminar Teaching and Educational Technologies Workshop, National Association of County Agricultural Agents AM/PIC, Grand Rapids, MI (July 2007).
- Graham, L. C. "Fudd", *Vicky Bertagnolli, Kenneth E. Ward, and Rufina N. Ward. 2006. Range expansion of *Pseudacteon* spp. (Diptera: Phoridae) in Alabama. 2006 ESA Annual Meeting, Indianapolis, Indiana, (poster, Dec 10-13, 2006).
- Graham, L. C. and *V. Bertagnolli. 2007. Field evaluation of metaflumizone for control of fire ants. Annual Meeting of the Southeastern Branch Entomological Society of America, Knoxville, Tennessee, (March 4-7, 2007).
- Graham, L. C. and *V. E. Bertagnolli. 2007. A New Addition to Our Arsenal of Ant WMDs. Poster presented at the 2007 Annual Imported Fire Ant Conference, Gainesville, Florida.
- Graham, L.C., J. Hurley, F. Oi, J. VanKirk, *V. Bertagnolli-Heller. 2007. Southern Regions School IPM Working Group. Poster presented at 2007 North American Pesticide Applicator Certification and Safety Education Workshop.
- Zehnder, C.B., *L.B. Coppler, and M.D. Eubanks. Ant-aphid mutualisms and community composition influence the spread of aphid-vectored plant viruses. Annual Meeting of the Ecological Society of America, San Jose, California, August 2007.

Invited Presentations:

- Fadamiro, H.Y. 2007. Recent Developments in Insect Chemical Ecology and Integrated Pest Management. Federal University of Technology, Akure, Nigeria. October 10, 2007 (invited speaker, part of seminar was on fire ant-phorid fly interactions).
- Fadamiro, H.Y. 2007. Chemical-mediated host-parasitoid interactions: a case study of some parasitic wasps and decapitating phorid flies. University of Minnesota, Department of Entomology Seminar Series. October 30, 2007 (invited speaker).

- Graham, Fudd. 2006. Fire ant management. Annual Meeting of the Tennessee Vegetation Management Association, Burns, Tennessee. (November 8-9, 2006).
- Graham, Fudd. 2007. Fire ant management: stop chasing them around. 2007 Alabama Recreation and Parks Association Conference., Huntsville, Alabama (November, 2007)
- He, L. and N. Liu, 2007. Functional genomics of the red imported fire ants, expressed sequence tags (EST), microarrays and their implication in the biology of the fire ants. Invited Lecture at Southwest University, Chongqing, China.

Extension Publications, Articles, Presentations, Workdays, & Workshops:

- Cain, Danny, Program for Gardendale Rotary Club on fire ant control.
- Cain, Danny, Presentation at Walker County Master Gardener class on fire ant control in the home landscape.
- Cain, Danny, "Fire Ant Control Demonstration," Forestry Field Day, Double Springs, April 13, 2007.
- Conner, Valerie, Keeping Children Safe in the Home, Autauga Co. (see Valerie Connor's report).
- Conner, Valerie, Keeping Children Safe in the Home, Chilton Co.
- Conner, Valerie, Keeping Children Safe in the Home, Lowndes Co.
- Dorough, Henry, Fire Ant Management, Talladega Rotary Club, Talladega Co.
- Dorough, Henry, Fire Ant Management, Talladega Pilot Club, Talladega Co.
- Dorough, Henry, Fire Ant Management, Montgomery Co. Cattlemen's Assoc.
- Dorough, Henry, Fire Ant Management, Randolph Co. Cattlemen's Assoc.
- Dykes, Rachel and David Koon, Home Grounds Workshop, New Brockton, April 23, 2007.
- East, Chip, "Fire Ant Control," Lee Co. Fruit and Vegetable Meeting, March 2007.
- East, Chip, Fire Ants, at the Restricted Pesticide Applicator Education Meeting, Clay Co.
- East, Chip, Fire Ants, at the Restricted Pesticide Applicator Education Meeting, Cleburne Co.
- Graham, Fudd, Fire Ant Biological Control, Fire Ant Management Information Training, Mobile, May 30, 2007.
- Flanders, Kathy and Jimmy Jones, Headland Fire Ant Training and eXtension update, April 9, 2007.
- Flanders, Kathy and Anthony Wiggins, Evergreen Fire Ant Training and eXtension update, April 10, 2007.
- Flanders, Kathy, Danny Cain, Ronald Britnell, and Mike Reeves, Jasper Fire Ant Training and eXtension update, April 11, 2007.
- Flanders, Kathy and Stan Roark, Crossville Fire Ant Training and eXtension update, April 12, 2007.
- Flanders, Kathy and Willie Datcher, Autauga Fire Ant Training and eXtension update, April 13, 2007.
- Flanders, Kathy, Imported Fire Ant eXtension, In-Service Training for University of Tennessee Extension Agents, Spring Hill, TN May 10, 2007.
- Flanders, Kathy, Fire Ant Biology, Fire Ant Management Information Training, Mobile, May 30, 2007.
- Flanders, Kathy, Fire Ant Control Products, Fire Ant Management Information Training, Mobile, May 30, 2007.
- Flanders, Kathy, Fire Ants, Alabama Forestry Camp, Epes, AL June 5, 2007.
- Flanders, Kathy, Fall Armyworms and Fire Ants, Haylage Workshop, Fairhope, AL, July 12, 2007.
- Flanders, Kathy, Controlling Fire Ants in the Landscape both Safely and in an Environmentally Sound Way, Sustainable Landscape Workshop, Birmingham, September 25, 2007.
- Flanders, Kathy, Fire Ants & You, Chambers County Farm City Tour, 6 sessions, Nov. 2007.

Futral, Tommy, Fire Ants, Horseshoe Bend Garden Club, Tallapoosa Co., Jan 15, 2007.

Gilbert, Ted, Chip East, Stan Roark, and David Koon, Fire Ant Bait Application Demonstration and Workshop, Phenix City, June 28.

Gregg, Tinsley, Fire Ant Management, Livestock Farmer's Meeting, Etowah Co., July 30, 2007.

Gregg, Tinsley, Farmers, Fire Ants, and the Environment, Annual Regional Poultry Workshop, Gadsden, October 11, 2007.

Gregg, Tinsley, Fire Ants, exhibit for the Etowah Co. Open House.

Hesselein, Chazz and Ken Kelley, Demonstration and Calibration of Herd blower and Seeders as Fire Ant Applicators, Fire Ant Management Information Training, Mobile, May 30, 2007.

Hesselein, Chazz, Magnolia Cemetery Fire Ant Control Demonstration, Fire Ant Management Information Training, Mobile, May 30, 2007.

Hesselein, Chazz, Common Cents Fire Ant Management or How to Control Fire Ants Without Burning a Hole in Your Pocketbook, 2007 Deep South Horticulture Short Course, West Florida Research and Education Center, August 17, 2007.

Koon, David, Fire Ants, Home Grounds Workshop, Geneva Co.

Koon, David, Fire Ants, Home Grounds Workshop, Dale Co. .

Koon, David, Fire Ants, Home Grounds Workshop, Pike Co.

Koon, David, Fire Ant Management, Master Gardener Training Class, Pike Co.

Koon, David, Fire Ant Management, Master Gardener Training Class, Houston Co.

Koon, David, Fire Ant Management, Master Gardener Training Class, Coffee Co.

Pinkston, Charles and Dan Porch, Fire Ant Control for Homeowners, Gadsden, AL, April 27, 2007.

Roark, Stan, Calhoun County Master Gardener Class, January 31, 2007

Roark, Stan, Randolph County Master Gardener Class, February 2, 2007

Roark, Stan, Russell County Landscape Workshop, February 24, 2007 Roark, Stan, Coosa Valley Youth Center, Calhoun County, February 27, 2007

Roark, Stan, Fire Ant Bait Spreaders, Turfgrass Workshop, Auburn, Lee Co., April 14, 2007.

Roark, Stan, Coosa Valley Youth Center, Calhoun County, May 29, 2007

Roark, Stan, Fire Ants, Talladega Co, October 12, 2006.

Roark, Stan, Coosa Valley Youth Center, Calhoun County, November 7, 2006.

Robinson, Wayne, Fire Ant Management in Horse Pastures, Lamar Co., October 20, 2007.

Wheeler, Eddie, Fire Ant Management, Guntersville Garden Club, February 2007.

Wheeler, Eddie, Fire Ants, Dealing With Drought in a Landscape Workshop, August 2007.

Yates, Rudy, Fire Ants, Selma City Schools Earth Day, April 2007.

Outreach Activities, Presentations, Teaching, and Teaching Materials:

Prepared and staffed educational booth on The Alabama Fire Ant Management Program at Alabama National Fair, 6-15 October 2006.

Prepared and staffed educational booth on The Alabama Fire Ant Management Program at Sunbelt Agricultural Exposition in Moultrie, Georgia, 17-19 October 2006.

Prepared and staffed educational booth on The Alabama Fire Ant Management Program at the Annual Co Ag Fall Roundup/Taste of Alabama Agriculture, Auburn University, Alabama, 21 Oct. 2006.

Prepared educational booth and trained booth staff on The Alabama Fire Ant Management Program for the Annual National Peanut Festival, 3-12 November 2006.

Prepared and staffed educational booth on The Alabama Fire Ant Management Program at Oxbow Meadows Insectival, 8 July 2007.

- Prepared and staffed educational booth on The Alabama Fire Ant Management Program at Alabama National Fair, 5-14 October 2007.
- Prepared and staffed educational booth on The Alabama Fire Ant Management Program at Sunbelt Agricultural Exposition in Moultrie, Georgia, 16-18 October 2007.
- Prepared educational booth and trained booth staff on The Alabama Fire Ant Management Program for the Annual National Peanut Festival, 2-11 November 2007.
- Prepared and staffed educational booth on The Alabama Fire Ant Management Program at the Annual Co Ag Fall Roundup/Taste of Alabama Agriculture, Auburn University, Alabama, 3 Nov. 2007.
- Graham, Fudd. 2006. Send Those Fire Ants on a Picnic. Public Employees Safety Council of Alabama Annual Meeting, Gardendale, Alabama. (Nov. 2, 2006).
- Graham, L. C. "Fudd". 2006. Fire Ant Management, Lecture for Economic Entomology Lab.
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- Graham, Fudd. 2007. Fire Ant Management. Pesticide Dealer Meeting, Headland, Alabama. (1/11/07).
- Graham, L. C. "Fudd". 2007. Fire Ant Bait Application, Home Horticulture Field Day, April 14, 2007.
- Graham, L. C. "Fudd". 2007. Fire Ants, Cleburne County Farm Day.
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- Graham, L. C. "Fudd". 2007. Fire Ants & Phorids, Lecture for Entomology for Educators Lab, Summer Semester 2007.
- Graham, L. C. "Fudd". Posters: the good, the bad and the ugly. AACAAAS 2007 Professional Development Sessions, Guntersville, Alabama, June 13, 2007.
- Graham, Fudd and Vicky Bertagnolli. 2007. Fire Ant Management (4 presentations). 2007 Farm, Home, and Wildlife Expo, Chilton Research and Extension Center, Clanton, Alabama, 11 August 2007.
- Graham, Fudd. 2007. Fire Ant Control Options in Municipal Landscapes: Heading in the Right Direction. Birmingham City Worker Training, Birmingham Botanical Gardens (11/13/07).

Mass Media:

- Addington, A. Fire ants: Get rid of these stinging pests yourself. Columbus Ledger-Enquirer, June 14, 2007. <http://www.ocm.auburn.edu/clippings/061407.html#22214509>
- Backyard Wisdom with Maggie Lawrence – Fire Ant Management – May 2007.
- Cain, Danny, Article in Daily Mountain Eagle about fire ant control.
- Cain, Danny, Fire ant control program on local cable television program "Coffee Time" -- estimated potential viewing audience 240,000.
- Cain, Danny, Article in Daily Mountain Eagle on other problematic ants.
- Cooperative Farming News – Fighting fire ants helps protect livestock, hay and finances, pp 29-30 – May 2007.
- Glover, Tony, Dry conditions often bring out more ants, Birmingham News, Saturday June 30, 2007. <http://www.al.com/living/birminghamnews/index.ssf?base/living/1183191770301010.xml&coll=2>

- Graham, L. C. "Fudd", 2006, Special report: Parasite imported from South America kill fire ants. WPMI, NBC 15, Mobile, Pensacola, Ft. Walton. Bruce Mildwurf reporting. Nov 3, 2006. [http://www.nbc15online.com/news/special_report/story.aspx?content_id=AEF\(EDA6-B](http://www.nbc15online.com/news/special_report/story.aspx?content_id=AEF(EDA6-B) (10/17/06).
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- Interview with Valent[®] media group - Fire ant management with baits - Spring 2007.
- Nicholas, J. Introducing enemies: virus, brain eating flies adds fire to fire ant battle. Prattville Progress, May 19, 2007.
- The Auburn Villager – Feel the burn no more – Jacque Kochak (7/26/07).

Scripted PowerPoint Presentations & Videos:

- Flanders, K. 2007. Imported Fire Ant eXtension, PowerPoint Presentation. <http://www.nacaa.com/ampic/2007/presentations/fireants.ppt>
- Flanders, K. and M. Lightfoote. 2007. Fire Ant Control Made Easy video, revised.
- Imported Fire Ant Community of Practice (K. Flanders, B. Drees, co-leaders). 2007. Imported Fire Ants. www.extension.org/fire+ants

Press Releases:

- Maggie Lawrence and Kathy Flanders, Fire Ants: No Magic Bullet on Horizon. http://www.extension.org/pages/Fire_Ants%3A_No_Magic_Bullet_on_Horizon
- Maggie Lawrence, Glenda Freeman, Terry Meisenbach, and Kathy Flanders, eXtension Fights Exotic Pest with Launch of Imported Fire Ants Web Site. April 24, 2007. http://www.extension.org/pages/eXtension_Fights_Exotic_Pest_with_Launch_of_Imported_Fire_Ants_Web_Site
- Maggie Lawrence, Glenda Freeman, Terry Meisenbach, and Kathy Flanders, Imported Fire Ant Background Facts.

Demonstrations and Field Trials:

- Talladega Co., Pasture, Bait and fertilizer applied as a mixture, Fudd Graham and Henry Dorough.
- Talladega Co., Golf Course, BASF Product test, Fudd Graham and Vicky Bertagnolli.
- Tallapoosa Co. Golf Course, TechPac Product test, Fudd Graham and Vicky Bertagnolli.
- Lee Co., Ag Heritage Park, Extinguish Plus Demonstration, Fudd Graham and Vicky Bertagnolli.
- Lee Co., Horse Unit, Esteem Demonstration and Product test. Fudd Graham, Vicky Bertagnolli, and Kelly Ridley.

Evaluation of Integrated Pest Management Methods for Red Imported Fire Ants

L. C. 'Fudd' Graham, Kathy Flanders, Vicky Bertagnoli, Kelly Ridley
 Department of Entomology, Auburn University

Rufina Ward & Ken Ward
 Alabama A&M University

Henry Dorough, Chazz Hesselein, Tim Reed, Rickey Hudson, Danny Cain, Charles Pinkston,
Anthony Wiggins, Charles Mason, Chip East
 Alabama Cooperative Extension System

Tony Dawkins
 Alabama Agricultural Experiment Station

Phorid Flies in Alabama

This is the 11th year of the phorid fly program in Alabama. Phorid flies have been released in 16 counties to date (Fig 1.). *Pseudacteon tricuspis*, which attacks medium-size fire ant workers, has been released in nine counties. *Pseudacteon curvatus*, which attacks small fire ant workers, has

been released in six counties.

Pseudacteon litoralis, which attacks large workers, was released in Wilcox County. Fire ant population data are collected from each site twice per year.

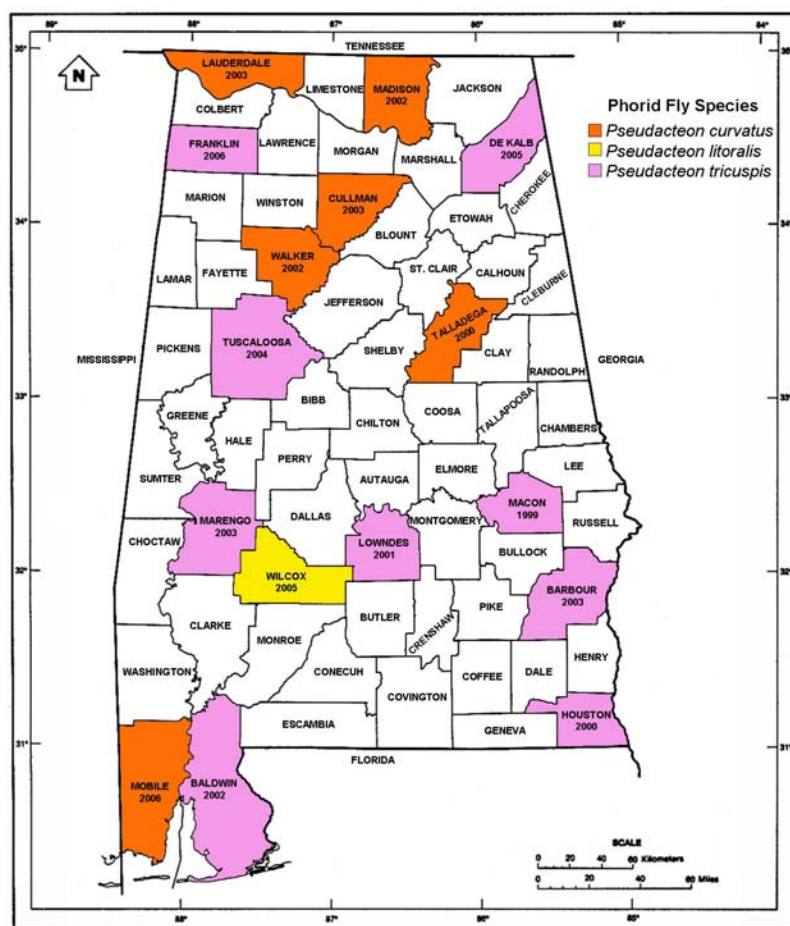


Figure 1: Counties where phorid flies were released.

In 2005, the phorid fly, *Pseudacteon litoralis*, was released in Wilcox County, Alabama. Only one fly was recovered in 2006 at the release site. In 2007, *P. litoralis* was again recovered at the site. **This is the only site in the United States where *P. litoralis* has been recovered in the field and is considered to be established (Fig 2).** Alabama was the first state with two species of phorid fly established and we are now the first, and only state, with three species of phorid established. *P. litoralis* has been released in other states, but has never been recovered in the field from these sites. A fourth species, *Pseudacteon obtusus*, was unavailable for field release in 2007 and will be released in 2008. This is a cooperative program with the USDA. The agency provides phorid flies for release and data are shared with the USDA.

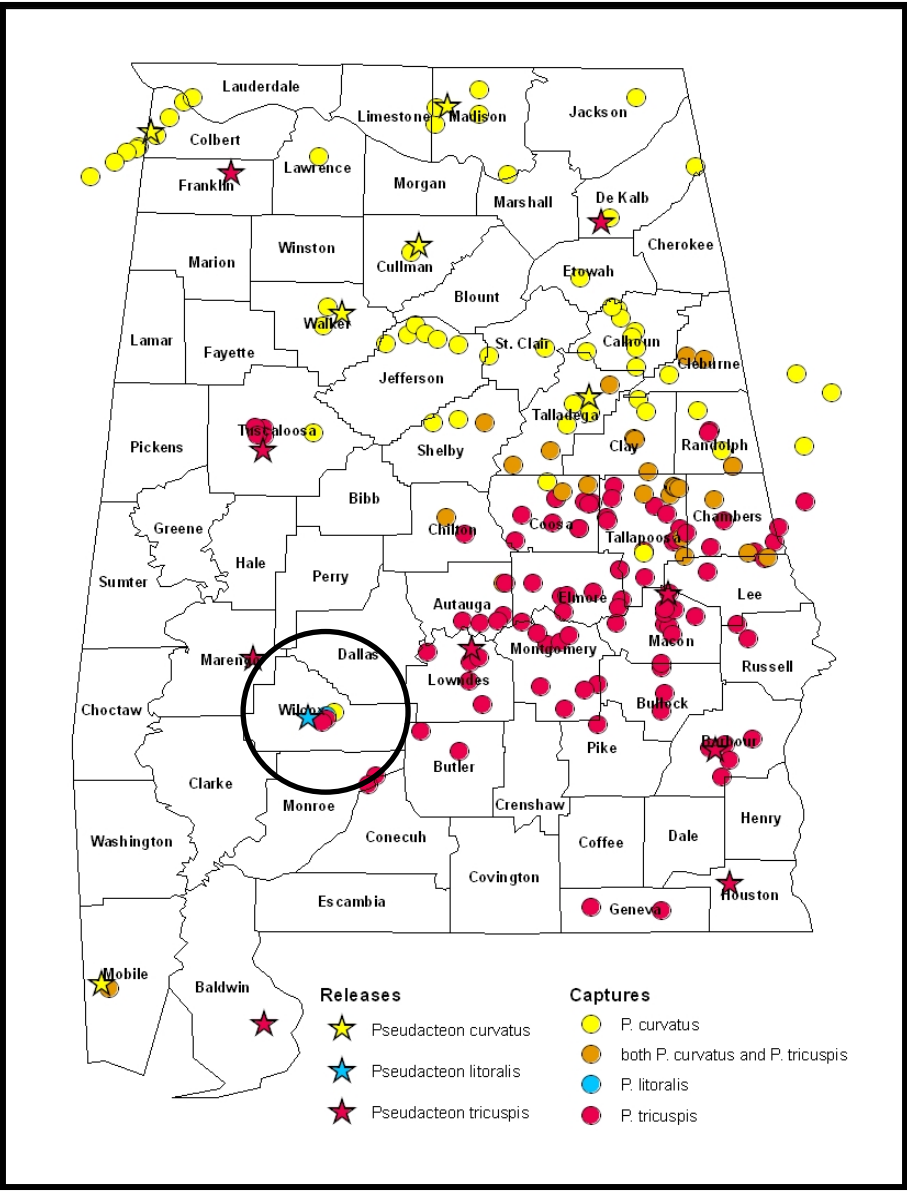


Figure 2:
Phorid fly captures in Alabama, circled area has all three species co-existing in one location.

The red imported fire ant, *Solenopsis invicta*, and the black imported fire ant, *Solenopsis richteri*, were both accidentally introduced into Alabama. Since their ranges overlap here, a hybrid has developed. Phorid flies are not only specific to the size of fire ant workers, they also have a preference for these two fire ant species. In order to insure a successful release of a species of phorid fly, we need to know where these fire ant species are located.

A project involving mapping the location of each fire ant species was initiated in 2004 and was completed this year. A grid approximately 18 miles X 18 miles was superimposed on a

map of Alabama and worker ants were collected from three mounds near each grid intersection (Fig. 3). Ants were then sent to Bob VanderMeer at the USDA-CMAVE laboratory in Gainesville, FL for identification.

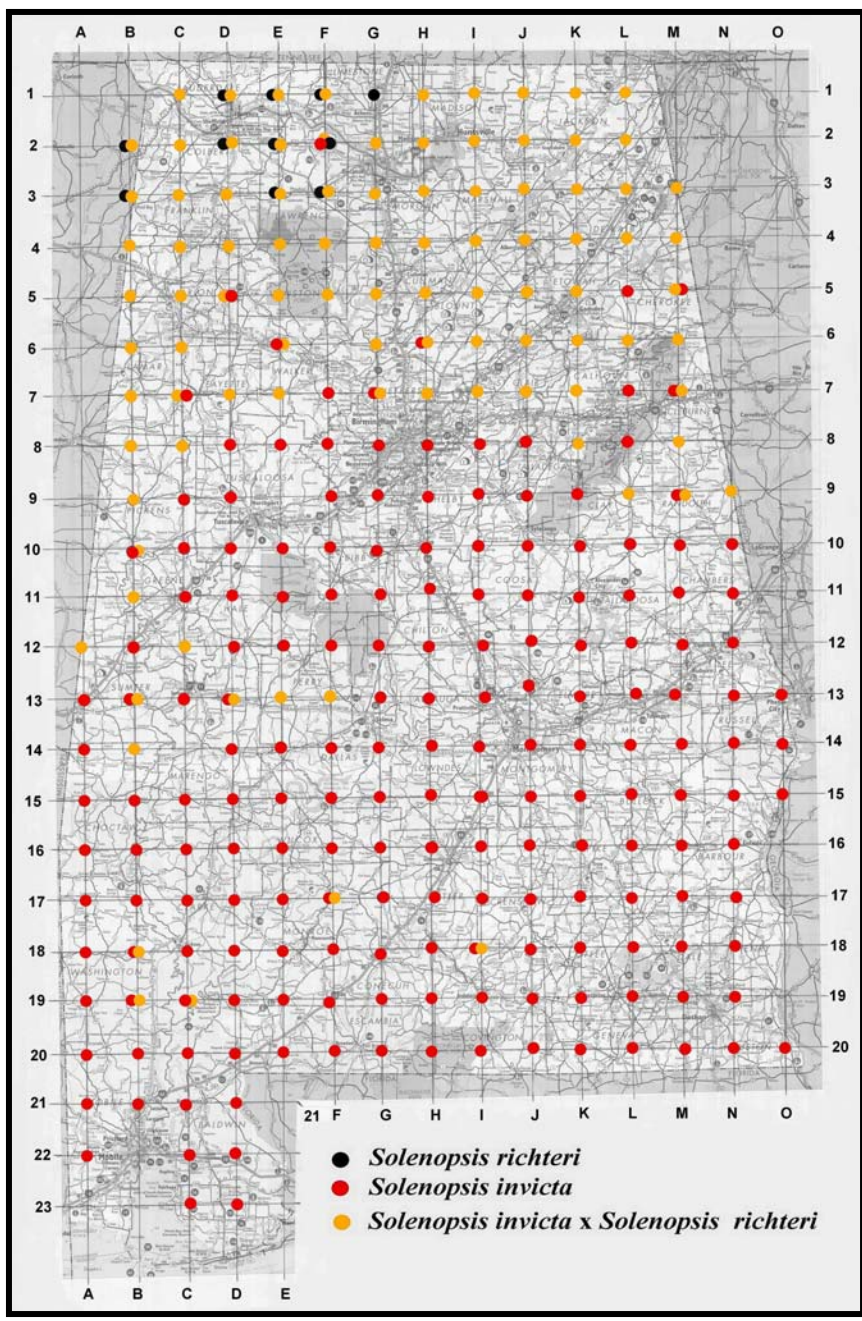


Figure 3: Distribution of fire ant species in Alabama.

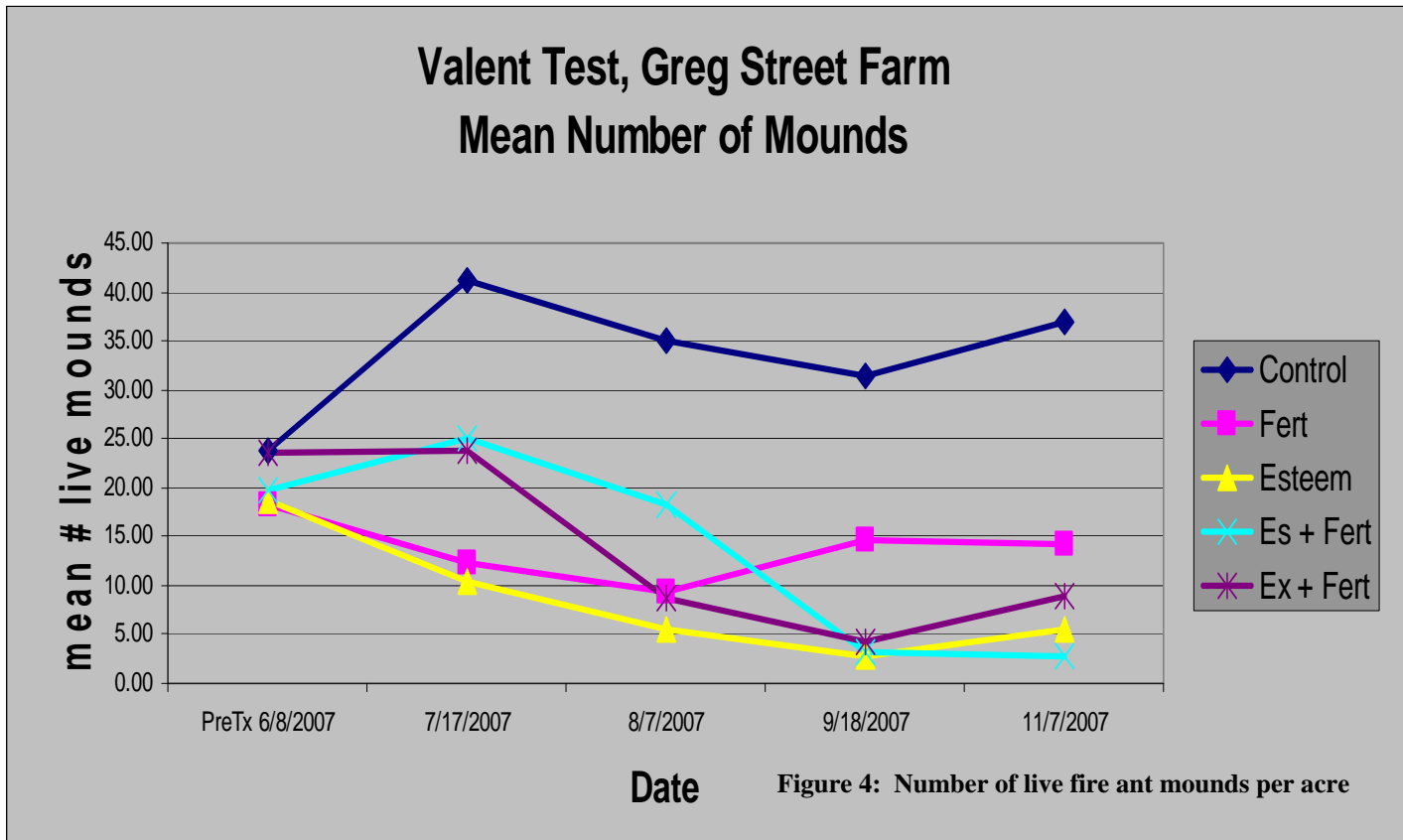
New Fire Ant Management Options

For years, researchers have advised against mixing fire ant bait with fertilizer for a one trip application in a pasture or field. Recent research has suggested that this bulk mix of fertilizer and fire ant bait can be successful. A replicated experiment was conducted on the farm of Greg Street in Talladega County with Regional Extension Agent Henry



Applying fire ant bait and fertilizer.
Courtesy Fudd Graham

Dorough. Valent[®] and Wellmark[®] provided fire ant bait and the Talladega County Co-op provided the fertilizer for the trial. Growth regulator fire ant baits Esteem[®] and Extinguish[®] were bulk mixed with fertilizer at the co-op and were taken directly to the field for application. Esteem[®] was applied as a standard. All plots received bait at a rate of 1.5 pounds of product per acre. Fire ant bait mixed with fertilizer and applied immediately after mixing were just as effective as bait alone after three months, but the bait alone worked faster. This trial will be repeated in 2008.



Getting the Word out – On-Campus Demonstrations of “How to Control Fire Ants”

The Alabama Fire Ant Management Program has two on-going bait demonstrations on campus. One is located at the Ag Heritage Park and is sponsored by Wellmark International®. The other, located at the AU Horse Research & Teaching Unit, is the site where the National Champion AU Equestrian Team trains and competes. If you want to see the effectiveness of fire ant baits, visit these two campus areas on your next visit to AU.



Ag Heritage Park, Fire Ant Bait Demonstration Site.



AU Equine Unit, Fire Ant Bait Demonstration Site.



Making Fire Ants Easier to Live With: Fire Ant Education and Outreach

Kathy Flanders, Fudd Graham, Vicky Bertagnolli
Dept. of Entomology & Plant Pathology, Auburn University

Henry Dorough
Regional Extension Agent, Animal Sciences and Forages,
Alabama Cooperative Extension System

Fire Ants at the Fair:

The fire ant display was staffed at all times and the public was invited to ask questions about fire ants. Various publications were handed out to the stakeholders involving fire ant control in the lawn and gardens, and methods in which to apply fire ant baits.

Events where the Fire Ant Display was used:

- Alabama National Fair, Montgomery, AL, October 2006 & October 2007
- AgRoundup, Auburn, AL, October 2006 & November 2007
- Alabama Peanut Festival, Dothan, AL, November 2006 & November 2007
- Sunbelt AgExpo, Moultrie, GA, October 2006 & October 2007
- Chilton Regional Extension Center, Farm, Home, and Wildlife Expo, Clanton, AL, August 2007
- Insectival, Oxbow Meadows Environmental Learning Center, Columbus, GA, July 2007

Members of the Fire Ant Management Team along with the Montgomery Area Master Gardeners, staffed the booth at the Alabama National Fair. Jimmy Jones and Rachel Dykes work with Master Gardeners at the Peanut Festival each year. Co-leaders Dr. Fudd Graham and Vicky Bertagnolli-Heller staffed the booth at AgRoundup and Sunbelt AgExpo.

Hands-on Fire Ant Training for Extension Agents:

For the past 10 years, fire ant education efforts have focused on providing Extension Agents and other trainers with the information and training tools that they can use to teach others about fire ants and how to control them. This effort has succeeded to the extent that fire ant education has become an integral part of educational programs conducted by the Alabama Cooperative Extension System (see the list of educational programs below). If agents conduct an

educational program on lawns, landscapes, cattle operations, child safety, or other situations where fire ants occur, they will routinely add information about fire ants. For examples of this change in behavior, see the individual reports below by Valerie Conner, David Koon, Eddie Wheeler, and Rachel Dykes.

Fire ant training needs to be ongoing, to ensure that Extension agents are provided with the latest information about fire ants and fire ant management. Forty-one Extension Agents and seventeen stakeholders (pest control operators, grounds maintenance personnel, etc.) were trained in April 2007. The one-day fire ant training was repeated at five locations, and also video-conferenced, to allow for participation of as many Extension agents as possible. Agents used this knowledge to answer day-to-day questions on fire ants from their clientele, and to conduct fire ant demonstrations and educational workshops (see examples later in this report). Special thanks to Yvonne Thomas, Danny Cain, Emily Brogden, Larry Wells, and Tony Dawkins, for hosting the fire ant training sessions at their facilities.



Fire ant education.
Courtesy Kathy Flanders

Imported Fire Ant eXtension

The imported fire ant eXtension web portal was launched in early April 2007

(www.extension.org/fire+ants). This site contains the latest, best-of-the-best information, news, and FAQs about fire ants. This information is gathered from experts across the United States.

Alabama has played a lead role in launching and maintaining this

site. Extension agents, Extension specialists, and researchers

from Alabama are participating in this project by providing, editing, and reviewing content,

answering questions about fire ants, marketing the web site, or translating the site into Spanish.

People from Alabama who have been working on fire ant eXtension:

Dr. Kathy Flanders, Extension Entomologist and Associate Professor, Department of Entomology and Plant Pathology, Auburn University is co-leader of this initiative.

Dr. Anne M. Adrian, Co-leader, Extension Computer Technology Unit, Alabama Cooperative Extension System facilitates web conferencing, internet videoconferencing, chat sessions, and other methods used to create and maintain the fire ant eXtension web portal.

Dr. Jeffrey Bastuscheck, Contracts and Grants Specialist, Alabama Cooperative Extension System, facilitates the process of applying for and administering the eXtension

grants. He will aid in the recruitment of non-eXtension resources for support of the program.

Dr. Diego M. Gimenez, Jr., Extension Specialist & Hispanic/Latino Initiative Coordinator/Associate Professor, Auburn University facilitates the translation of eXtension products into Spanish, and verifies the quality of the translated products. Our translator is Mr. Sergio Ruiz-Córdova.

Dr. M. Virginia Morgan, Co-chair, ACES eXtension Work Team, Alabama Cooperative Extension System (ACES) facilitates the continuing engagement of the team by providing guidance on design, marketing, and assessment of the eXtension products.

Kerry P. Smith, Alabama Master Gardener Program Coordinator and Ag Program Associate, Dept. of Horticulture, Auburn University is co-chair for the development of a fire ant training module for Master Gardener Community Advisors.

Dr. Carol A. Whatley, Glenda Freeman, Maggie Lawrence, and Mario Lightfoote, Extension Communications, Alabama Cooperative Extension System, have provided expertise in technical writing, copy editing, marketing, and video production.

Dr. Paul L. Mask, Assistant Director, Agriculture, Forestry and Natural Resources, Alabama Cooperative Extension System, and Professor, Agronomy and Soils, Auburn University is the Administrative Advisor for the imported fire ant eXtension project.

The following people from Alabama are also involved in this project, by providing, editing, and reviewing content, answering questions about fire ants, and marketing the web site:

Auburn University: Vicky Bertagnolli-Heller, Fudd Graham

Alabama Cooperative Extension System: Robert Boozer, Chuck Browne, Danny Cain, Doug Chapman, Willie Datcher, Henry Dorough, Rachel Dykes, William East, Wayne Ford, Tommy Futral, Ted Gilbert, Jonathan Gladney, Tony Glover, Gary Gray, Tinsley Gregg, Warren Griffith, Charles Hesselein, Ken Kelley, David Koon, Willie Lampley, Sallie Lee, Paul Mask, Charlie Mason, Gerald (Mike) McQueen, Charles Pinkston, Dan Porch, Stan Roark, David Robinson, Terry Shackelford, Jimmy Smitherman, Lewis Tapley, Jimmy Todd, Eddie Wheeler, Anthony Wiggins

Alabama A&M University: Rufina Ward, Ken Ward

Tuskegee University: George Hunter, Rory Stephens

For more information about this project, see:

http://about.extension.org/wiki/Imported_Fire_Ants_Update_December_2007.

eXtension Launches at Fire Ant Conference:

Seven members of the imported fire ant eXtension work team attended the Imported Fire Ant Conference in Gainesville, FL, in April, to participate in the launch of the web site. These agents also participated in the April 26th Imported Fire Ants eXtension workday.

You Have to See It to Believe It:

Fire ant demonstrations allow Extension agents to show the general public how easy and effective fire ant bait applications can be. Fire ant educational programs, often accompanied by local fire ant demonstrations, help familiarize stakeholders with fire ant management practices. Presentations at Professional Meetings gain recognition for the Alabama Fire Ant Management Program at the regional and national level. Forty-two Herd seeders, used to apply fire ant bait, are available for use by Alabama stakeholders, courtesy of the Alabama Fire Ant Management Program and the Alabama Cooperative Extension System Program (Figure 1 below).



**Displaying the types and uses of
fire ant baits.
Courtesy Kathy Flanders**

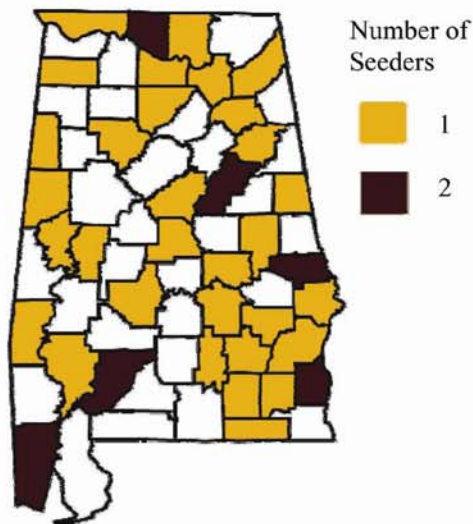


**By educating Extension Agents, we
better allow them to aid the public with
imported fire ant concerns.
Courtesy Kathy Flanders**

The following fire ant bait demonstrations are on-going:

Blount Co.	Nursery, Dan Porch
Blount Co.	Master Gardener truck garden and orchard
Butler Co.	Pasture, Anthony Wiggins and Ken Kelley, 79% control
Chilton Co.	Fruit, Gary Gray
Clay Co.	Nursery/commercial vegetable production, Chip East
Conecuh Co.	Park, Anthony Wiggins & Ken Kelley
Cullman Co.	North Alabama Horticulture Research Center, Dan Porch & Arnold Caylor (see Dan Porch's report below)
Dekalb Co.	Pasture, Tinsley Gregg, 85% control
Henry Co.	Forage research plots, Jimmy Jones
Henry Co.	Turfgrass, Jimmy Jones
Houston Co.	Dothan Area Botanical Gardens, Reafield Vester & Jimmy Jones
Jackson Co.	Garden/Tomato, Dan Porch
Lamar Co.	City park, Wayne Robinson & Mac Washington
Lamar Co.	Pasture, Wayne Robinson & Mac Washington
Lee Co.	Auburn University Ag Heritage Park, Fudd Graham & Vicky Bertagnolli-Heller
Lee Co.	AU Equine Unit (pasture), Fudd Graham, Vicky Bertagnolli-Heller, & Kelly Ridley
Marshall Co.	Forestry fire lanes, Eddie Wheeler
Marshall Co.	Vineyard, Dan Porch
Mobile Co.	Cemetery, Chazz Hesselein
Morgan Co.	Fruit farm, Doug Chapman
Russell Co.	Park, Ted Gilbert, Stan Roark, and Chip East
Sumter Co.	Grounds of 6 Headstart programs, Willie Datcher & Willie Lampley
Talladega Co.	Pasture, Fudd Graham and Henry Dorough
Tallapoosa Co.	Pasture, Henry Dorough
Washington Co.	Pasture, Anthony Wiggins & Ken Kelley
Winston Co.	Farmstead, Danny Cain

Location of the Herd Seeders Used to Apply Fire Ant Bait



If you want to borrow a Herd Seeder, please contact one of the following people:

County	Contact Person ¹
Barbour	David Koon
Bullock	George Tabb
Calhoun	David West
Chilton	Jim Pitts (Chilton Regional R&E Ctr)
Choctaw	John Ollison
Clarke	Kevin Tucker
Coffee	Stan Windham
Crenshaw	Russty Parish

County	Contact Person ¹
Cullman	Charles Pinkston
Dale	Tommy Agee
Dallas	Mike Davis (Blackbelt Regional R&E Ctr)
De Kalb	Tony Dawkins (blower seeder) (Sand Mountain Regional R&E Center)
Elmore	Rich Beauchamp
Etowah	Tinsley Gregg
Franklin	Tim Reed
Geneva	Mary Baltikauski
Greene	Willie Datcher
Hale	Johnny Gladney, Brenda Glover
Henry	Jimmy Jones
Lamar	Wayne Robinson
Lauderdale	Randall Armstrong
Lee	Chuck Browne
Limestone	Doug Chapman
	Gerry Thompson (Tennessee Valley Regional R&E Ctr)
Madison	Ken Creel, Tyrone Smith (blower seeder)
Marshall	Dan Porch
Mobile	Ken Kelly
	Chazz Hesselein (blower seeder) (Ornamental Horticulture Research Ctr.)
Monroe	Anthony Wiggins
Montgomery	Jimmy Smitherman
Morgan	Mike Reeves
Pickens	Sam Wiggins
Pike	Tommy Powell
Randolph	(Randolph Co. Cattlemen's Association)
Russell	Ted Gilbert
Shelby	Jack Tatum, Nelson Wynn
Talladega	Henry Dorough 2 seeders, one a blower seeder
Tallapoosa	Tommy Futral, Shane Harris
Walker	Danny Cain

¹At the County Office of the Alabama Cooperative Extension System unless otherwise noted

Forest & Garden Fire Ant Control Demonstrations

Eddie J. Wheeler

Urban Regional Extension Agent, Marshall County

Fire Ant Demonstrations:

1. Treasure Forest - A demonstration for the forest of Mr. John Troup of Grant, Alabama was established with the cooperation of Mr. Dan Porch, County Extension Coordinator, Blount County. The fire lanes of the forest were treated with Esteem[®] at a rate of 1.5 lbs. per acre on May 30,

2007. The area treated was approximately eight (8) acres. The temperatures were in the upper 70's. The bait was applied with the use of a Herd seeder mounted on an ATV.

Follow-up visits were conducted on

July 26 and August 20 to determine the effectiveness of the treatment. There was some fire ant activity near the edge of the forest. A determination was made that the bait was about 75% effective. The landowner was pleased with the results of the bait. There are plans to work with this landowner in 2008, to continue to reduce the fire ant population. Mr. Troup also graciously allows our office to conduct the "Classroom in the Forest: Forest in the Classroom" program on his property.



2. CASA Community Garden- A demonstration was established on November 2, 2007 for the CASA community garden in Guntersville, Alabama. The area is approximately one (1) acre and was treated with Esteem[®] at a rate of 1.5 lbs per acre. The bait was

applied with a hand held spreader. Temperatures on the day of establishment were in the mid 70's. A follow up visit was conducted on December 3, 2007, it seems as if the bait was about eighty (80%) per cent effective. This is a demonstration that I would like to continue for 2008 in order to make an application of the bait earlier in the year.

Fire Ant Presentations:

- 1. Guntersville Garden Club Meeting: Fire Ant Management** - presented information on fire ant biology and management at the meeting on February 13, 2007. Twelve (12) individuals attended the meeting.
- 2. Guntersville Civitan Meeting: Dealing with Drought in the Landscape** (with a fire ant management session) - presented on August 21, 2007. Twelve (12) participants took part in the meeting.
- 3. Muscadine Field Day/Tour** - presented information on fire ant biology and management during a tour of the Jerry Wenker Muscadine Vineyard in Martling, Alabama. The tour was conducted on September 21, 2007. Twenty five (25) individuals participated in the tour with a majority being students from the Marshall Technical School Horticulture Class. The fire ant mound model was used to illustrate ant activity in and around a mound. A display of fire ant products, particularly baits, were available and discussed.
- 4. Small Fruit Workshop** - a presentation on Fire Ant Management for Small Fruit Operations was a part of the workshop. The workshop was conducted at the Marshall Technical School on October 2, 2007. Eighty (80) individuals participated in the workshop; the fire ant portion of the workshop had an emphasis on baits that can be used in small fruit operations. Fire ant baits were available



for observation and discussion. See enclosed Success Story by Eddie Wheeler and Dan Porch for more information on this workshop.

The fire ant publications distributed for these presentations included , ANR-0175, Imported Fire Ants in Lawns, Turf and Structures, ANR-0175A, 2007 Fire Ant Control Materials for Alabama Homeowners, ANR-1161, Getting The Most Out of Your Fire Ant Bait and ANR-1185, The Hidden Truth about Red Imported Fire Ants.

Small Fruit Workshop Provides Valuable Information

Eddie J. Wheeler, Marshall Co. for ETP20B on 2007-12-04

&

Daniel Wade Porch, Blount Co.

Originally published as a success story from the Alabama Cooperative Extension System,, https://ssl.acesag.auburn.edu/etp/eval_public_view.php?id=47556d7fc3ad6. Portions reproduced here with permission.

Industry Overview:

Commercial and Home Horticulture currently has tremendous popularity in Alabama. This interest is also evident in Marshall County. The latest agricultural statistics information shows



Participants gain helpful information on fire ant management & small fruit production.
Courtesy Eddie Wheeler & Daniel Porch

that horticulture for Marshall County contributed **\$2,011,000** to the economy of which **\$721,000** was for fruits, nuts and vegetables.

Small Fruit production is particularly gaining interest, and this indicates that producers are in need of information on recommended production practices that they can use in their operations. In an effort to provide producers with the latest information that would

lead to better production efficiency, The Alabama Cooperative Extension System (ACES), organized a small fruit workshop.

Fruit Workshop:

On Tuesday, October 2, 2007, Eddie J. Wheeler, Urban Regional Extension Agent in Marshall County, conducted a small fruit workshop. The educational workshop, was held at Marshall County Technical School in Guntersville. The topics presented at the workshop were: Fire Ant Management for Small Fruit Operations, Blackberry Production, ABC's of Muscadine Production, and Blueberry Establishment and Variety Trial Results.

The workshop was sponsored by the Alabama Cooperative Extension System, Marshall Farmers Cooperative, North Alabama Horticultural Research Center, Weathers Furniture and Appliance Company Inc., Neena's Lakeside Grill, Marshall County Technical School Horticulture Class, and Wenker's Vineyard.

Speakers for the workshop were Eddie J. Wheeler, Dan Porch, Cooperative Extension Coordinator/Blount County, Jerry Wenker, Wenker's Vineyard, and Arnold Caylor, Superintendent, North Alabama Horticultural Research Center in Cullman, Alabama. Mrs. Cindy Wigley, Director of the Marshall County Career/Technical Education and Casey Smith, Instructor with the Marshall County Technical School Horticulture Class provided the group with welcome and opening remarks.

Eighty (80) individuals attended the workshop. Ninety percent (90%) of the attendants indicated that the information provided by way of presentations was very helpful, while seven percent (7%) indicated that it was somewhat helpful, and the remaining three (3%) percent had no opinion. In addition, ninety seven percent (97%) of the attendants indicated that the educational handout material was very helpful, while three percent (3%) indicated that it was somewhat helpful.

Imported Fire Ant Demonstrations Involving Vegetable & Fruit Crops in Northeast Alabama

Dan Porch
CEC Blount County

In 2007 several demonstrations were conducted across the Northeast Alabama area. Two demonstrations were conducted in which ant counts were taken and reduction in number or occurrence of the pest was recorded. Others were conducted to show various individuals the impact of baits and let them draw their own conclusions.

The Wenker Vineyard, a 2 acre U-Pick muscadine operation, located in Marshall County, was treated in the fall of 2006 with Esteem[®] at a rate of 1.5 lbs. per acre. No ant counts were taken prior to the 2006 treatment. Ant counts were taken on a 1/4 acre of the vineyard on May 29, 2007 using the hot dog tube method in a 20 minute time period. The total ant count in the quarter acre on May 29th was 170 ants. Environmental conditions included very low soil moisture with temperatures in the mid-80's. Few mounds were visible.

Esteem[®] was reapplied at a rate of 2 lbs. per acre on May 29th using a Herd Seeder attached to an ATV. Ant counts were taken in mid-October in the same general vicinity in the vineyard. Environmental conditions included temperatures in the low 80's and very dry soil conditions once again. The only ants trapped in mid-October were native ants. The Esteem[®] did an excellent job of controlling the fire ants. When Mr. Wenker was asked about his fire ant situation in the



Muscadines
Courtesy Irvin-House Vineyards

vineyard, his reply was simply, “I don’t have any.” Mr. Wenker is planning on purchasing his own Herd Seeder for broadcasting fire ant bait in the future.

Mr. Kenneth Eakin lives in Jackson County and raises about 2 acres of various vegetable and fruit crops, including annual hill strawberries and tomatoes. Several rows of plastic were



laid in the fall of 2005. These rows were used through the strawberry growing season of 2006. Mr. Eakin wanted to plant in the used plastic again in 2007. However, after inspecting the area visually, several fire ant mounds were identified in the area. They were especially concentrated in the old plastic area. Ant counts were taken on May 30, 2007 in a ¼ acre area that included the old plastic area. One Thousand three hundred eleven (1311) ants were trapped using the hot dog tube method in a 20 minute time period.

Environmental conditions at the time of the count included temperatures in the mid-80’s with slightly overcast skies, and moisture conditions that were very dry at the time, but this is a drip irrigated field, so the ants had access to surface moisture. Ants were very active. Esteem[®] was applied to the entire area at a 2 lbs. per acre rate at 5:30 p.m. with a Herd Seeder attached to an ATV.

Ant counts were taken in the same vicinity of the field, using the same trapping method on August 19th, just over 2.5 months after initial application. A total of 59 ants were trapped. This is a reduction of 95.5 %. The grower’s remarks were, “This is remarkable, this stuff works.”

The North Alabama Horticulture Research Center in Cullman was treated at the request of Superintendent Arnold Caylor. Most of the station that is in fruit and vegetable production was treated with Esteem[®] at a rate of 1.5 lbs. per acre. Other areas that are planted to ornamentals were treated with a bag of Award[®] that had been stored for some time. The Certified Organic production area was not treated. The workers at the station usually battle fire ants in the area where tomatoes and other crops are grown utilizing plasticulture. They were so pleased with the results of the application that was made on May 31st that they purchased 50 lbs. of Esteem[®] for fall application. The bait was applied on both occasions using the Fire Ant Team Herd Spreader attached to an ATV. Mr. Caylor and the crew at the station are now great spokesmen for the use of baits for fire ant control.



Triple J Nursery, a wholesale and retail nursery in Blount County, battles fire ants each year just as many nurseries in Alabama do. Mr. Jimmy Witt, owner of the nursery, had indicated that it was quite expensive to do mound treatments several times during the year. He was persuaded to give bait a try. Extinguish Plus[®] was applied to the entire nursery area that is not under plastic in early June 2007, approximately 4 acres. Extinguish Plus[®] was applied at 2 lbs. per acre using a Herd Seeder mounted on an ATV. When asked about fire ants 3 months later, Mr. Witt's reply was, "I don't have any." The nursery was retreated with Extinguish Plus[®] in mid- October for continued control.

Mr. Allen Neel, Master Gardener in Blount County, grows about two acres of fruits and vegetables each year to share with seniors at the Blountsville Senior Center. His fruit plantings have been in place now for a number of years. Upon observation, he had several large fire ant mounds in the fruit production area and scattered around the vegetable production area.



His production area was treated with Esteem[®] at a rate of 2 lbs. per acre June 1, 2007. He was informed about the nature of bait and how it works. At the Master Gardener Association meeting in August he was asked about the effectiveness of the bait application, he said, “I don’t have any fire ants.” He purchased Esteem[®] and made a fall application on his own. Who better to spread the word about the use of baits to control fire ants than the Master Gardeners!

Fire Ants, Fire Ants, Go Away: Little Children Want to Play

Willie E. Datcher from AFNR - FIELD for ETP20D on 2007-12-20

Co-author: Willie H. Lampley

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If you think that having fire ants in the yard is bad, try dealing with them in the playground where little children want to play. Crying from not getting what you want may be bad, but what about a child crying because of a fire ant bite. There are six Head Start Centers in Sumter County that have had problems with fire ants for a long time. The Director of the centers, Mr. Gary



James, has been battling these little critters with hardly any documented success, and therefore decided to contact the local County Extension Office for some advice on how to control fire ants. After contacting the local County Extension Office, the CEC contacted the Regional Extension Agent to discuss the problem to see if they could assist in any way. The Regional Agent and the CEC decided to

conduct fire ant bait demonstrations at the 6 Head Start Centers.

Fire ant baits are safer than other insecticides that are applied as drenches, sprinkled on the top of the mound, or broadcast. The insect control agent never makes up more than 1% of the bait, which means that 0.01lbs. or less of active ingredient is used per acre. Fire ant baits can give longer lasting control because they control the young fire ant colonies that may be too small to see. Baits have fewer non-target effects than other control methods have because they are designed to be picked up and consumed by fire ants. Fire ant baits are usually cheaper than individual mound treatments because it is time consuming to treat every mound. Individual mound treatment can cost five to ten times as much as baits, if the cost of labor is considered.



**Willie Datcher, REA, shows Mr. James the spreader to be used for applying fire ant bait.
Courtesy Willie Datcher, Willie Lampley**

Extinguish Plus[®] was broadcast using hand held and push-type spreaders. The spreaders were calibrated to spread 1 ½ pounds of fire ant bait per acre. The demonstration was conducted in mid-October. After about 4 weeks we noticed about a 40 % reduction in fire ants and in about 8 weeks there was a 90 % reduction.

The staff at the Head Start Centers were very excited and pleased with the results of the fire ant bait demonstrations. Plans are to continue to use baits at the centers and treat individual mounds that may escape the bait treatment with a mound treatment.



**Willie Lampley and Mr. James discuss details of applying the bait.
Courtesy Willie Datcher, Willie Lampley**

Fire Ant Meeting, Mobile, AL: Changing Minds & Practices for the Better

Chazz Hesselein

*Extension Specialist, Ornamental Horticulture
Ornamental Horticulture Research Center, Mobile, AL*

In conjunction with a fire ant bait demonstration trial that was conducted at the historic Magnolia Cemetery in Mobile, AL from 2005-2006, a fire ant training was held on Wednesday, May 30, 2007 in the cemetery and at the near-by Texas Street Recreation Center.

The training began with a discussion of the successes and problems associated with the demonstration trial. Fire ant mounds in the experimental plots were flagged and treatment plots marked so that participants could see the residual effects of the fire ant bait treatments. One fire ant bait was rancid when shipped which rendered it ineffective, but proved to be a good demonstration of the importance of using fresh insecticidal bait. After discussing the trial, a demonstration of the fire ant bait spreading equipment was performed. This equipment is housed at the Mobile Ornamental Horticulture Research Center and the Mobile County Extension office and is available for use by landowners and businesses at no charge.



**Fudd Graham informs participants about fire ant biology.
Courtesy Kathy Flanders**

The training moved from the Magnolia Cemetery to the Texas Street Recreation Center where Dr. Kathy Flanders and Dr. Fudd Graham provided classroom training on fire ant biology and fire ant chemical and biological control. Lunch, at the Recreation Center, was generously sponsored by Wellmark International® who also provided fire ant bait for the Magnolia Cemetery fire ant bait demonstration.

Thirty-six (36) people attended the training, twenty-two (22) of those receiving commercial pesticide applicator re-certification points. A survey was completed by twenty-eight

(28) participants following the training. Fifteen (15) survey respondents planned to change their fire ant control tactics as a result of the training, fifteen (15) respondents were planning on using

the fire ant application equipment, and twenty-seven (27) respondents felt they were comfortable using the equipment after the morning's demonstration. Twenty-two (22) respondents felt they knew more about fire ant biology, twenty-five (25) about fire ant management techniques, twenty-



Participants learn about imported fire ant chemical/biological control.
Courtesy Chazz Hesselein

one (21) about fire ant biological control, and eighteen (18) about calibrating and operating fire ant bait spreading equipment than they did before the training. Respondents indicated that they would like to learn more about fire ant biology (3), management techniques (9), biological control (9) and calibrating and operating bait application equipment (4).

Keeping Children Safe in the Home

Valerie Conner
Nutrition, Diet, and Health REA

I performed three programs in Autauga, Chilton, and Lowndes Counties on Keeping Children Safe in the Home, and distributed the "Fire Ant Problems" information and web-site information. The programs were attended by twenty-six individuals. The fire ant information was simply a part of my presentation, but from the response of the participants, it was a very important part. Most people in rural areas encounter fire ants on a regular basis, and this proved to be the case for the individuals attending such programs. Most of the participants were foster parents, child day care providers, or were training to get their day care license with Head Start (a federal program). I will conduct two more programs in January 2008.

Fire Ant Management Activities in Henry & Houston Counties

Jimmy Jones, CEC, Henry Co.
Rachel Dykes, REA, Home Grounds and Horticulture
Reafield Vester, Extension Agent, Houston Co.

Fire Ant Project Activities in Henry County & Surrounding Counties:

- 1) **Fire Ant Demonstration, First Baptist Church, Headland, AL** (87% control)
 Spread bait on the Youth Drill Field and playground area with 1 ½ lbs. per acre of Amdro Pro[®].
- 2) **WREC Forage Evaluation Plots Demonstration** (80-85% control)
 Spread 1 ½ lbs. per acre of Amdro Pro[®] on Irrigated and Non-Irrigated forage plots to kill fire ants which hampered evaluators at forage harvest time.
- 3) **National Peanut Festival Fairgrounds Demonstration, Dothan, AL** (75-80% control)
 Spread 1 ½ lbs. per acre of Amdro Pro[®] on fairgrounds and outdoor stage area in late September 2007. By the time of the Peanut Festival in early November, the number of fire ant mounds were reduced greatly. There were 15,000 visitors to the stage area with no fire ant bites, and 35,000 visitors to the eating areas, ride areas, livestock areas, and booth areas. No complaints of fire ant problems in booths or fairground areas were reported.
- 4) **Fire Ant Display at National Peanut Festival**
 25,000 people pass by booths and receive information on fire ant projects and control in AL. The booth was manned for 10 days by 25 volunteers of the Wiregrass Master Gardeners Association. 8000 publications were handed out during the fair.
- 5) **Botanical Gardens Fire Ant Demonstration, Dothan, AL** (80% control)
 Spread 1 ½ lbs. per acre of Amdro Pro[®] on the gardens area in early June 2007, in this multi-year demonstration. One month later, we observed 80% control of the fire ants in the treated area, based on pre- and post-tests.

Wiregrass Home Grounds Workshops

David Lee Koon from AFNR - FIELD for PPA20 on 2007-12-11

Co-author: Rachel E Dykes

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Home Grounds Workshop:

Homeowners face a variety of problems within the home grounds environment. How to deal with disease and insect problems, how to plant and maintain landscape plants, how to deal with drought periods and how to choose and apply pesticides in a safe manner are all topics identified as problems areas for homeowners by County Extensions Coordinators and Advisory Council members throughout the Wiregrass region.

In an effort to help educate homeowners about these problem areas the Alabama Cooperative Extension System conducted a series of spring and fall home landscape workshops throughout the wiregrass region. Regional Workshops were conducted in Barbour, Pike, Coffee, Geneva and Dale counties. Workshop participants learned about Turfgrass management and weed control, fire ant control, pesticide safety and use, low maintenance landscaping, drip irrigation, fall color options for the landscape, and wildlife and home pest control.

There were over 150 participants in the wiregrass home landscape workshops. Participants



**Fire ant control materials are discussed in
Pike County.
Courtesy David Koon**

indicated the information about low maintenance landscape and drip irrigation would allow them to effectively deal with the severe drought the wiregrass region is currently experiencing. A Geneva County participant said that the program on drip irrigation was one of the best she has attended. She used the information she received to install her own drip irrigation system in her landscape, which resulted in time saved and healthy plants. **Participants in Coffee County responded to the workshops by indicating the cost and time of attending would more than pay for itself by simply learning how to effectively choose and apply fire ant control material.**

Wiregrass Master Gardner Classes

*Rachel E Dykes from CES DISTRICT TWO for ETP20E on 2007-12-12
Co-author: David Lee Koon*

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Overview of the Classes:

Three Regional Master Gardener classes were conducted in the Wiregrass area last spring and fall. The classes were held in Troy, Dothan, and New Brockton, AL. Overall, 66 interns were trained in the subjects of plant physiology, propagation, plant pathology, entomology, landscape design, fire ant management, care and maintenance of landscape plants, and more. The interns are currently working towards their certification by volunteering with Extension and their communities through various horticulture education projects.

In the Wiregrass Area, Certified Master Gardeners and interns have greatly impacted their communities through their volunteer efforts this year. In Houston County, volunteers have

planted educational trial gardens at the Dothan Area Botanical Gardens, built an outdoor classroom at Hidden Lake Elementary School, and taught children about heirloom plants at the Spring and Fall Heritage Days at Landmark Park. In Coffee County, the interns worked a horticulture booth for children at the local petting zoo, planted beds at the local nursing home and library, and are working towards landscaping a cemetery that was destroyed by the Enterprise tornado. The Pike County Master Gardeners are actively working on an herb demonstration garden. The Barbour County Master Gardeners landscaped a local house museum, owned by the Alabama Historical Society, and installed a drip irrigation system to demonstrate its usefulness to the public. Master Gardeners from all over the Wiregrass came to the National Peanut Festival to give out information to the public on fire ant control.

The Coffee County Master Gardener class was the first ever for the county. All of the class members were very enthusiastic students and volunteers. Every intern showed interest in getting certified and starting a local Master Gardner Association in the area so they can easily stay active and in touch with each other.

The Master Gardener program is a very successful way of educating people on horticulture issues here in the Wiregrass. When Master Gardeners are trained, they in turn, educate their community by way of projects, programs, and simply answering everyday questions from their peers. They are a great help to Extension, and with their growing numbers, will have an even greater impact on their communities in the future.

Laboratory and Field Evaluation of Natural Products & Essential Oils Against the Red Imported Fire Ant, *Solenopsis invicta* Buren

Arthur G. Appel & Maria J. Eva

Dept. of Entomology and Plant Pathology, Auburn University

Objectives:

1. Determine the contact and fumigation toxicity of natural products and essential oils against monogyne red imported fire ants.
2. Determine the repellency of selected natural products and essential oils to monogyne red imported fire ants.
3. Measure the effects of topically applied natural products and essential oils to monogyne red imported fire ant colonies.

Procedures:

1.) Determine the contact and fumigation toxicity of natural products and essential oils against monogyne red imported fire ants.

Monogyne red imported fire ants will be obtained from colonies in Auburn, Alabama.

Groups of ants will be confined in glass Petri dishes and exposed to various concentrations (1-25%) of natural products and essential oils such as citronella, lemon, lime, and peppermint extracts.

Various volumes of natural products and essential oils will be dissolved in 1 ml acetone and applied to a 9.0 cm diameter piece of Whatman #1 filter paper. The filter paper will be dried in a fume hood and placed into a glass Petri dish coated on the inside walls with Teflon emulsion to contain the ants on the filter paper and to prevent escape. Ten ants will be placed into each Petri dish, the dish will be left uncovered, and mortality scored for 24 hrs. Fumigation toxicity will be measured by confining groups of 10 ants in 0.954 glass jars. The jars will be sealed and a small piece of cotton, to which various volumes of a natural product or essential oil will be applied, suspended from the inside of

the lid. Mortality will be scored as above. Probit analysis will be used to estimate LD₅₀ and LT₅₀ values.

2.) Determine the repellency of selected natural products and essential oils to monogyne red imported fire ants.

Repellency of selected natural products and essential oils will be determined in Petri dish and trail-following assays. Circles of filter paper will be treated as above with candidate natural products and essential oils as mentioned above and then dried. Treated half-circles will be paired with untreated half-circles and taped together to form a complete circle. The half treated and half untreated circle will be placed into a glass Petri dish with Teflon treated sides to which 10 ants will be added. The position of each ant (on the treated or untreated half circle) will be recorded every 15 min. for 2 hrs. Foraging trails will be established between a colony of red imported fire ants and several satellite boxes containing food and water. The only connection between the colony and the food sources will be a strip of paper. Repellency of a target compound will be measured by counting the number of ants that cross a point along the trail in 1 min, then applying the compound to the trail, and again counting the number ants crossing the point along the trail.

3.) Measure the effects of topically applied natural products and essential oils to monogyne red imported fire ant colonies.

Mature mound characteristics including diameter, height, and geographic orientation on the Auburn University campus will be recorded. The mound will be pierced with a marking flag and the number of ants on the flag and surface of the mound estimated after 30 sec. Mounds will be treated with selected natural products or essential oils by injection or topical application. The volume of diluted compound will be based on mound size (ca. 1 ml dilution per liter mound volume). Colony mortality and mound location will be determined daily for 5 days.

Results:

Field and laboratory evaluations of natural products and essential oils against the red imported fire ant, *Solenopsis invicta* Buren

- Toxicity and repellency of 25 natural products and essential oils were determined in laboratory bioassays
- Several new bioassays were developed to measure repellency of compounds at very low concentrations (<100 ppm)
- Common essential oils such as clove and cinnamon were extremely toxic at 100 ppm; exceeding 90% mortality in 15-30 min of exposure
- Repellency can be measure by avoidance of treated surfaces and substrates including sand

Assessment of Fire Ant Control Technologies on the Pest Control Industry in Alabama

Xing Ping Hu, Greg Pate, & Jason Burkett

Objectives

- 1) To document the impacts of mound disturbance vs. no disturbance techniques prior to treatment of baits and granular products.
- 2) To elucidate the effectiveness of broadcast vs. individual mound treatment using baits.
- 3) Initiation of an Extension program outreaching professionals by developing a visual document on application of GR baits.

Results

- 1) Four individual mound treatment methods (band or mound surface application to disturbed or undisturbed fire ant mounds) were investigated for their effects on fire ant control. The first trial was conducted at a residential area in November

2006 and the second trial at E.V. Smith Research Center in June 2007. Each trial had 10 replicates of each treatment method. Control effects were measured by post-treatment bait-removal-rate and mound activity. Removal rates of the bait were greater on applications of bait on the mound surface than on applications around mound in the November trial regardless of mound disturbance. There were no differences among treatments in the June trial. No significant difference was observed in mound activity, regardless of the treatment methods or the season of application.

Surprisingly, the results of this study do not corroborate early observations that mound disturbances decrease control and the theoretical assumption that mound disturbances obstruct foraging activity because workers have to relocate the brood and queen. Instead, this study indicates that mound disturbance probably does affect efficacy when baits are used as mound treatments. Possible explanations are that the mound disturbance opens entry for bait particles to fall directly into nest and once the ants settle, or even if they do not, they may still forage on the bait located in and close to the mound.

- 2) We evaluated the effectiveness of broadcast baits vs. individual mound treatment using baits, also in November 2006 and June 2007. In the June trial, a faster decrease of mound activity was observed in broadcast plots compared to individual treatment. In contrast, the decrease of mound activity was slower in broadcast plots than individual mound treatment in November. These results suggest a possible season-effect and a behavior-effect of bait application.
- 3) An extension program is in the process of being developed. This educational program will be targeting pest control professionals who are at the front line in the battle with fire ants. We have realized that further study is needed to gain comprehensive understanding on how bait application technologies affect control effort before an educational package is made available to Extension Agents.

Isolation and Identification of the Chemicals Mediating Fire Ant-Phorid Fly Interactions

Henry Y. Fadamiro

Project Objectives

- 1) Comparative study of electroantennogram response of *P. tricuspis* and *P. curvatus* to body extracts of red, black, and hybrid IFA.
- 2) Identification of the active components of fire ant semiochemicals eliciting responses in *Pseudacteon* phorid flies using GC-EAG and GC-MS techniques.

Objective 1: Comparative study of electroantennogram responses of *P. tricuspis* and *P. curvatus* to body extracts of red, black, and hybrid IFA.

To determine possible differential olfactory sensitivity of phorid fly species to different species of imported fire ants, we compared the electroantennogram (EAG) responses of both sexes of *P. tricuspis* and *P. curvatus* to body extracts of red (*S. invicta*), black (*S. richteri*), and hybrid (*S. invicta* × *S. richteri*) imported fire ants. We extracted fire ant workers of different species with hexane, and then tested the EAG responses of each sex of two phorid fly species to four doses (0.001, 0.01, 0.1, and 1 worker equivalents) of each of the fire ant species. The data showed a significant effect of sex on EAG response for both phorid fly species. Females of both species generally showed significantly greater EAG response than con-specific males to body extracts of the three imported fire ant species. In general, *P. tricuspis* showed greater EAG response than *P. curvatus* to body extracts of all three fire ant species. Body extracts of black and hybrid imported fire ants elicited significantly greater EAG response in both phorid fly species than did body extract of the red imported fire ant. These results may, at least in part, show the observed preference of *P. curvatus* for black and hybrid imported fire ants

Objective 2: Identification of the active components of fire ant semiochemicals eliciting responses in *Pseudacteon* phorid flies using GC-EAG and GC-MS techniques.

We have commenced a study to identify the semiochemicals used by phorid flies to locate fire ant workers. During the process of purification of fire ant body extract, we found that fire ant poison may contain some previously unidentified chemicals. The fire ant poison is mainly composed of *trans* and *cis* forms of alkaloids. There are seven *trans* forms (*trans* C₁₁, *trans* C₁₃, *trans* C_{13:1}, *trans* C₁₅, *trans* C_{15:1}, *trans* C₁₇, *trans* C_{17:1}) and five *cis* (*cis* C₁₁, *cis* C₁₃, *cis* C_{13:1}, *cis* C₁₅, *cis* C_{15:1}) forms of alkaloids reported in literatures. However, our gas chromatography (GC) analysis results showed that, apart from the 7 reported *trans* form alkaloids, there are 13 *cis* form alkaloids. These results raise a question that *cis* form alkaloids may be not only *cis* (2R, 6S) as reported in literatures, but also *cis* (2S, 6R), *cis* (2S, 6S), *cis* (2R, 6R). The structures of these *cis* form alkaloids need to be verified by GC-MS analyses. We have successfully conducted GC-EAG recordings with phorid fly antenna to detect active compounds from worker extracts of the above three fire ant species. The major active components are the same among the three fire ant species. They are *cis* C₁₁ and *cis* C_{13:1}. We are optimistic that this project will soon result in the identification and synthesis of novel chemical compounds used as attractants by parasitic phorid flies to locate fire ants.

In addition to accomplishing the above two main objectives, we also concluded our study on morphology of antennal sensilla of phorid fly, *P. tricuspis*. We studied the morphology of the antennal sensilla of both sexes of *P. tricuspis* using scanning and transmission electron microscopy. Antennae of *P. tricuspis* show strong sexual dimorphism in structure and shape: the female has a feathered arista which is located distally on the flagellum and has three sub-segments that bear small spinules of microtrichia. Three major types of sensilla were found on the flagellum (funicle) of both sexes: sensilla trichodea, sensilla basiconica, and sensilla coeloconica. Two of these, s. trichodea and s. basiconica were found to serve as chemoreceptory sensilla. The third and least abundant sensilla type, s. coeloconica, had no wall pores and may function as thermo-hygroreceptors. With the exception of the long subtype of s. trichodea, which was recorded only on the male antennae, no other marked sexual differences were recorded in the number and distribution of antennal sensilla in *P. tricuspis*.

Practical Applications of the Project:

This project has potential practical benefits to U.S. agriculture, public health, and the environment; by suggesting novel environmentally friendly strategies for control of IFA in the U.S. Identification of novel chemical compounds used as attractants by parasitic phorid flies to locate fire ants will assist in current efforts at utilizing phorid flies as biological control agents

for fire ants. For instance, such compounds could be used to attract phorid flies to fire ants for parasitism. In addition, this study has some scientific significance by advance our understanding of how insects interact and communicate using chemicals.

Identify Genes Differentially Expressed in the Red Imported Fire Ant

Dr. Nannan Liu

Introduction

The long-term goals of our project are to decipher genes involved in the development, reproduction, and social behavior of the red imported fire ant, *Solenopsis invicta* Buren. In insects, ESTs (**expressed sequence tag**) and microarray technique have been employed for the investigation of genome-wide changes in gene expression during development, in specific tissues or cells, in response to environmental stress, and in social insect polyphenisms. To achieve our long-term goal and characterize the functional genomics of the red imported fire ant, we have comprised the first comprehensive effort to develop the first state-of-the-art fire ant EST database with 4,860 unique EST sequences from the fire ant queen library and a microarray system of the red imported fire ant. The EST library database represents an entire genomic population of mRNAs of the fire ants, and by enabling simultaneous monitoring of the expression of many genes, allows us to study many interesting aspects of the biology of fire ants, including genes that play important role in the development, caste differentiation, and physiological behaviors.

Current Study and Results

The specific objective of our FY 2006-2007 project is to “Identify genes that are differentially expressed between larvae and adults, queens and workers, female alates (winged)

and queens (wingless) of the red imported fire ant.” This is a continual project in our laboratory to achieve our long-term goal to decipher genes involved in the development, reproduction, and social behavior of the red imported fire ant, *Solenopsis invicta* Buren. With a great effort to identify genes that are differentially expressed between larvae and adults, queens and workers, female alates (winged) and queens (wingless) of the fire ant; in the current study, we have conducted microarray study with our fire ant EST library and isolated 33 genes that are differentially expressed among development stages and between workers and queens of the fire ant. To confirm the microarray results, we further characterized the expression of these 33 genes in fire ants using Northern blot analysis and reverse transcription, real-time quantitative polymerase chain reaction (RT-qPCR) techniques. Our Northern blot analysis and RT-qPCR results were consistent with those of our array experiments, strongly suggesting that these 33 genes may have roles in the developmental and caste differentiation. These 33 genes have been submitted to the **National Center for Biotechnology Information (NCBI)** Genbank database and the sequences have been published online for public use (see Publications).

We recently cloned and sequenced an arginine kinase gene. Arginine kinase (Fig. 1) is a

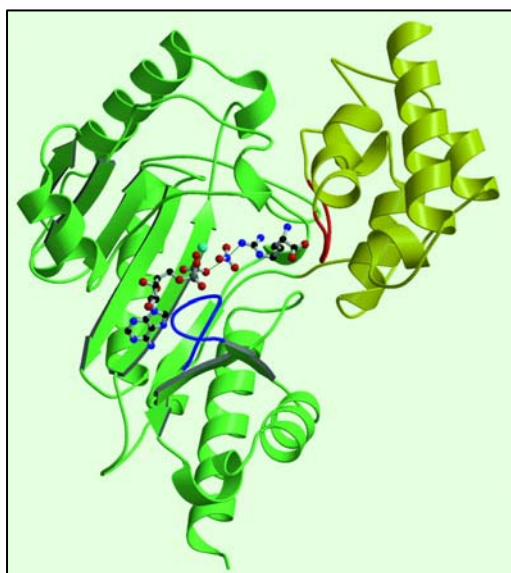


Figure 1: Structure of arginine kinase
Courtesy Dr. Nannan Liu

primary enzyme participating in cell metabolism and ATP-consuming processes, plays an important role in cellular energy metabolism, and maintains constant ATP levels in insect cells. Using northern blot analysis, we identified that the expression of the arginine kinase gene was readily detectable in 3rd+4th instars, worker pupae, and alate pupae; increased in male alates (3.7-fold) and the female alates (6.8-fold); and rose to a maximum in workers. To further validate our Northern blot analysis results, we have further characterized the expression of

the arginine kinase gene in the fire ants using RT-qPCR technique according to the comments from the manuscript reviewers. Our RT-qPCR results were consistent with that of Northern Blot analysis, suggesting the different demand for energy-consumption and production in the different castes of the red imported fire ant.

Impact:

Our research on identifying the genes that are differentially expressed between larvae and adults, queens and workers, and female alates (winged) and queens (wingless) is extremely important because it provides the first information on how the components work together to maintain the complexity and order of fire ant social life. It is of fundamental biological interest and importance in finding a better way to manage the fire ant. Our study has provided the framework for designing future experiments, such as functional studies on the roles of the differentially expression genes, by knocking out the gene using the double-stranded RNA-mediated interference technique.

Imported Fire Ant-Related Activities

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eXtension:

- 1) Ken and Rufina Ward assisted with FAQ development by providing questions and answers, and editing.
- 2) Submitted ideas/opinions on IFA website prototypes.
- 3) Participated in online conferences, including FAQ Orientation for CoP Members, Wiki training sessions, etc.
- 4) Participated in three IFA eXtension workshops [Knoxville, TN (March 2007); Gainesville, FL (April 2007); San Diego, CA (December 2007)].
- 5) Volunteered for the Youth Module and Master Gardener Module teams
- 6) Rufina Ward attended the Annual Imported Fire Ant Meeting in Gainesville, FL, April 2007

Student Training:

Rufina Ward participated in the Upward Bound & Math/Science Mentoring Program sponsored by the North Alabama Center for Educational Excellence (summer program). He mentored 2 minority students from 2 local high schools on a fire ant project, “*Distribution of Imported Fire Ants in Three Types of Microhabitats*,” by Terrance Pride (Johnson High School), and Erica Rice (Butler High School). Student mentees studied general insect groups and fire ant biology in the classroom and conducted a field exercise where they collected, analyzed and interpreted data collected from fire ant populations at the Winfred Thomas Agricultural Research Station (WTARS), Alabama A&M University. During this exercise, students learned how to use GPS equipment for data collections.

Outreach:

Rufina Ward participated as a resource speaker on IFA management in agricultural and urban areas at the 5th Annual Risk Management and Community Outreach Conference, Alabama Fire Ant Management Program – Fiscal Year 2007 Progress Report

sponsored by the Small Farms Research Center, Alabama A&M University (Holiday Inn Hotel, Huntsville, AL, November 2007). The title of the presentation was “*Got Ants? How to Deal with Pesky Imported Fire Ants in Urban and Agricultural Areas*”. This annual meeting targets extension personnel, farmers, landowners, farm and agribusiness management specialists, education personnel, community leaders, government officials and the general public.

Research:

Ken Ward, Rufina Ward and Wubishet Tadesse currently have a Specific Cooperative Agreement with Dr. James T. Vogt, USDA-ARS Biological Control of Pests Research Unit, to study impacts of landscape characteristics and land use patterns on imported fire ant distribution patterns. A fire ant mapping study is currently being conducted at WTARS using pasture areas varying in such characteristics as topography, forage type, grazing history and soil type. Spatial analysis techniques are being used to look for relationships between mound distribution patterns and these types of variables. Field data (mound densities and sizes) were collected in spring and fall 2007. Fire ant abundance was estimated by counting and measuring ant mounds in 1000 m² circular plots centered on sampling points in a grid pattern. Imagery of the study site was obtained by flyover in spring 2007. Data analysis is currently in progress.

