

UPDATE ON USDA-ARS FIRE ANT BIOLOGICAL CONTROL RESEARCH

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A National Fire Ant Strategy was initiated in 1998 by the USDA-ARS, Center for Medical, Agricultural, and Veterinary Entomology (CMAVE) in Gainesville, Florida to coordinate efforts among federal, state, and private sectors to ensure that current and new technologies are quickly evaluated for effectiveness, and rapidly implemented. The goal of the strategy was to develop and optimize integrated pest management (IPM) tactics using biologically-based components with the goal of reducing the imported fire ant (IFA) to levels below economic thresholds on agricultural lands and local elimination of this pest in urban environments. By coordinating these efforts between federal, state and private groups, we could release and monitor biological control organisms in several states, compare regional results, develop new biological controls, mass propagate those that are successful, and then develop these into IPM strategies for area-wide management of the imported fire ant.

Our biological control research has concentrated on three self-sustaining agents, 1) a parasitic ant, *Solenopsis (Labauchena) daguerrei* (Santschi), 2) phorid flies in the genus *Pseudacteon sp.*, and 3) two pathogens, *Thelohania solenopsae*, and *Vairimorpha invictae*. The parasitic ant is a potential stress factor of fire ant colonies and is being held in quarantine at CMAVE. In quarantine, previous attempts to transfer *S. daguerrei* from *S. richteri* to *S. invicta* colonies have not been successful but hopefully, future studies will solve this problem. The fire ant decapitating fly *Pseudacteon tricuspis* is rapidly expanding out of release sites around Gainesville, FL. The flies have also been released in 11 states and appear to be established at point locations in 7 states (AL, FL, LA, MS, NC, SC, and TX). A second species, *Pseudacteon curvatus*, has also been released and appears to be established in Alabama. IFA colonies have been inoculated with the pathogen, *Thelohania solenopsae*, in 10 states (AL, AR, FL, GA, LA, MS, NC, OK, SC and TN). Infections have been detected in 9 of these states (AL, AR, FL, GA, LA, MS, NC, OK and SC). In Florida, we have inoculated both polygyne and monogyne fire ant populations, and in Alabama and Tennessee, we have inoculated not only the red imported fire ant, but also the hybrid.

Joint efforts between APHIS, ARS, & DPI

An important outcome of ARS phorid fly research is the recent decision by APHIS and the Florida Department of Agriculture and Consumer Services Division of Plant Industry in November, 2000 to mass rear phorid flies for controlled releases of these biological control agents. Starting in the spring 2001, they will begin mass rearing *Pseudacteon tricuspis*, doubling the current output by CMAVE. The flies then will be shipped to field sites for release in Florida, Georgia, North- and- South Carolina, Louisiana, Mississippi, Texas, Alabama, Arkansas, Oklahoma, and Tennessee. Scientists from APHIS, Gulfport, MS facilities will oversee releases and assist states in monitoring field sites.

Fire Ant Research at the USDA-ARS, South American Biological Control Laboratory:

Juan Briano is conducting biological control studies in South America concentrating on field studies with microsporidian pathogens *Thelohania solenopsae* and *Vairimorpha invictae*. In addition, he also studies the parasitic ant *Solenopsis daguerrei* and assists with phorid fly explorations. In recent studies with microsporidia, he has been monitoring pathogen-infected *S. invicta* populations in field sites north of Buenos Aires. The plots, infected with *T. solenopsae* and/or *V. invictae*, are located along roadsides in Santa Fe Province, Argentina. Preliminary results indicate a reduction in active *S. invicta* colonies ranging from 53 to 100%.

Fire ant integrated pest management pilot test on Fort Jackson, South Carolina:

In May, 2000, a cooperative study by USDA/ARS/CMAVE; EPAs Pesticide Environmental Stewardship Program; DoDs U.S. Army Environmental Center (AEC), and Center for Health Promotion and Preventive Medicine (CHPPM); U.S. Army and Air Force National Guards; Clemson University; the Council of State Governments Southern Legislative Conference (SLC); and Aventis was established in South Carolina. The objective is to determine if an IPM strategy of chemical treatments plus the addition of multiple biological control agents will reduce the number of chemical treatments needed over time to control IFA populations. The integrated strategy combines computerized ArcView GIS/GPS precision-targeting technology to plot and monitor IFA mounds, classic biological control agents specific to the IFA (the parasitic phorid fly, *Pseudacteon tricuspis*, and the microsporidian pathogen, *Thelohania solenopsae*,) and use of the chemical fipronil.

After three months, preliminary findings indicate that the chemical treatment with fipronil reduced IFA populations by 96% in the plot with the chemical treatment plus biocontrol (Plot A) and by 87% in the plot with the chemical treatment only. In the untreated control, there was an increase of 44% in IFA populations. Adjacent to Plot A, phorid flies were observed attacking IFA workers in 3 different colonies, indicating the phorids that were released have established at the release site and are exerting pressure, attacking and parasitizing foraging fire ant workers. Samples of IFA workers in Plot A indicated successful inoculation of colonies with the pathogen, *Thelohania solenopsae*. The demonstration will continue for three years.

Imported fire ant area-wide management proposal:

An ARS area-wide proposal (5 years) was submitted to USDA-ARS in January, 2001 for the suppression of IFA populations in pastures. The goal is to use available self-sustaining IFA biological control agents in conjunction with bait toxicants to, (1) maintain low fire ant populations, in addition, (2) reduce numbers of chemical bait treatments and, (3) slow reinfestation into treated areas. The test plots will be located in Oklahoma, Texas and Florida. The principal investigators on the project are R. Brenner, D. Oi, S. Porter, R. Vander Meer, and D. Williams from USDA-ARS, Gainesville, FL; A-M. Callcott, USDA-APHIS, Gulfport, MS; B. Drees and C. Barr, Texas A&M Univ.; R. Wright, Oklahoma State Univ.; and P. Koehler, University of Florida. The project was recently funded.

Recent Accomplishments by USDA-ARS-CMAVE:

- 1) Shifted ARS imported fire ant research to develop and release biological control agents that are self-sustaining, environmentally safe, and economical
- 2) Established rearing of two species of phorid flies for release in field sites in the U.S.

- 3) Discovered the IFA pathogen *Thelohania solenopsae* in the U.S. and developed method to infect field populations
- 4) Established cooperative agreement between the Southern Legislative Conference (SLC) for the propagation and release of biological agents in the southern states
- 5) Established cooperation with state universities and other agencies for field evaluation and testing of 3 biological control agents in 11 southern states
- 6) Established cooperative effort between ARS, EPA, DOD, SLC, SC National Guard, Clemson Univ., and Aventis to conduct the first imported fire ant IPM field test using chemical treatments and the release of biological control agents
- 7) Established a joint agreement between ARS, APHIS and the Florida Department of Agriculture (Division of Plant Industry) to mass produce phorid flies
- 8) Proposal for an area-wide suppression of IFA populations using IPM practices on large areas. The proposal was recently funded.

Future goals:

- 1) Mass production of successful biological control agents and distribute to all states infested with IFA
- 2) Discover and develop additional biological control agents that will reduce IFA populations
- 3) Develop more fire ant specific baits, formulations and other methods of control such as semiochemicals to disrupt the social structure of colonies
- 4) Continue to implement IPM strategies against the IFA