

STATUS OF USDA-ARS FIRE ANT
RESEARCH PROGRAM

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The USDA-ARS Fire Ant Research Group at the Insects Affecting Man and Animals Research Laboratory, Gainesville, Florida, has had several staff changes and redirections. We have currently five areas of fire ant research: taxonomy, ecology, impact, control, and biological control. Currently we have 7.5 scientists, 5 entomologists and 2 chemists. I make up the 0.5 scientists since I have other duties with the Household Insects Section. During this past year Dr. Clifford Lofgren retired in April, and his research area was redirected into population ecology, this position was filled by Dr. Sanford Porter formerly of the University of Texas at Austin. Dr. Porter joined the staff in the middle of December. Dr. B. Michael Glancey retired in July and his position will not be filled due to budget restraints. A senior technician, Mr. Kenneth Plumley, retired at the end of December and his position will not be refilled.

It is our aim in the taxonomy research unit to study the hybrid situation of Solenopsis invicta and Solenopsis richteri in the U.S. and South America. It is our objective to determine if these two species are true species or just a species complex created by ecological isolation. In the U.S., these two species readily intermate and create a hybrid which is fully fertile and has the characteristics of both its parents forms. It was thought that hybrids did not occur in South America due to geographical isolation. This is not true based on James Trager's book, "New Key to the Solenopsis of South America". Although no hybrids have yet been identified, there are several areas where the two species meet and have the opportunity to intermate. We

contracted with Dr. Trager to finish his key the Solenopsis species of South America. There are 17 described species in this genera, Dr. Trager has synonymized many names. We hope that Dr. Wojcik's taxonomic research will build on the foundation established by Dr. Trager's key and descriptions. Most of the material that was used by Dr. Trager originally was collected by Dr. William Buren and the USDA-ARS teams who did the initial fire ant surveys in South America of Solenopsis ants. It is Dr. Wojcik's responsibility to check areas where S. invicta and S. richteri are present. Also, he will look for hybrids between other Solenopsis species. We will check this by cuticular hydrocarbons and venom alkaloids as well as morphometric means. If need be we will use isoenzyme techniques to verify any hybrids. In February 1990, Dr. Wojcik collected over 700 samples of Solenopsis ants for analysis. Hopefully within the next few months, we will know if S. invicta and S. richteri are separate species or just a species complex here and possibly in South America.

There have been and will be several changes in our ecology research program which has been very capably lead by Dr. David Williams for a number of years. He has completed some excellent studies on the effect of temperatures on colony development. He has also completed a large project in Brazil to determine the extent of fire ant populations in recently disturbed, old farming, and virgin areas. As in the U.S., the highest density of fire ants, S. invicta, present were in recently disturbed areas. In older mature farming areas the fire ants were present, but not as numerous as in newly disturbed areas also in the virgin areas the fire ants were hardly present.

Dr. Williams has also been doing some cooperative work with the Charles Darwin Research Station on the Galapagos Islands on two serious pest ants, Wasmannia auropunctata and Solenopsis geminata. The work involves both basic biology and control of these two ant pests. In the future, Dr. Williams will be doing more work on the impact fire of ants and other

pest ants such as pharaoh ant and Argentine ants, on urban populations. This is an increasing problem in Florida and is considered by the Florida Pest Control Association to be their number one pest problem in the state. The control of ants in an urban setting is very difficult and often very poor control is achieved following chemical treatments. Since Dr. Porter will be taking over some of the ecology research, his first responsibility will be to study the single and multiple queen complex in Florida. He has already done a preliminary survey in South Florida during March. He will also do some work on the multiple queen in other areas of the U.S. and South America.

In the past, very little fire ant research had been done in South Florida in the semi-tropical region of the state to determine interaction of fire ants with the arthropod fauna of South Florida. A cooperative study with Palm Beach County Parks Department was set up by Dr. Wojcik to determine which fire ant control technologies would give the most efficient ant suppression with the least effect on other ant and arthropod species in the area. Amdro and Logic baits were applied at recommended dosages as a broadcast and single mound treatments in the parks. The data taken at monthly intervals indicated that both chemical baits were effective for fire ant control, and that the same arthropod complex was present six months after the treatment in both treatment and control areas. The single mound treatments had less initial adverse effect than the broadcast on other ant species, but broadcast treatments were less expensive due to high labor costs for single mound treatments. Within six months there was no difference in any of the treatment plots, but the fire ant populations were lower than in the check plots. These studies will be repeated this year in both South and North Florida to determine if timing of treatments is important in fire ant control within the state of Florida, since we have such a diverse ecosystem in Florida from the temperate regions of the north to the tropical regions in the southern areas of the state.

Dr. Vander Meer has concentrated mainly on pheromone research in relation to bait enhancement and species specific baits. Most of the work has concentrated on the queen recognition pheromones and the recruitment of ants to the components of these pheromones. Of the three queen pheromones isolated previously by Dr's. Tumlinson and Glancey, only one or maybe two are exhibiting attraction to worker ants (brood and queen tenders). One of the components of the trail pheromone has been synthesized in sufficient quantities for use in the baits. The second component should be synthesized within the next two months. These will be incorporated into a bait formulation along with an attractant fraction of soybean oil which should enhance the toxic bait. It is planned to have this work on the baits completed within the next year. Dr. Robert Vander Meer has been assisted by Dr. Pedro Hernandez who has synthesized the components of the trail pheromones.

Since Dr. A. Banks will be reporting on his studies with teflubenzuron, I will not repeat the data here except that this compound looks very promising for fire ant control. Recent studies investigated the effect of Amdro, Logic, and sulfluramid baits on multiple queen population of Solenopsis invicta. One pound per acre of any of the three compounds gave adequate control of fire ants in the field. Logic gave slightly better control than the other two against multiple queen colonies. Studies with a Sumitomo IGR, pyriproxyfen, look promising for fire ant control. Activity of pyriproxyfen is similar to fenoxycarb (Logic) .

In the area of biological control, Dr. Don Jouvenaz has completed his studies on the yeasts; these are not pathogenetic, but may be stressing the ants. He is currently working with the steinernematid nematode, in cooperation with Biosys for treatment of nursery stock, the exotoxin of Bacillus sphaericus was ineffective against fire ants. In the fall of 1989 a project review of the pathology unit of our laboratory suggested that we redirect some of our efforts in this area in the future. In South America, the biological control project in Argentina on the

effect of Thelohania solenopsis on indigenous populations of Solenopsis richteri being conducted by Mr. Juan Briano is going very well. This microsporidian disease appears to have no overt effect on the ant colonies. Diseased colonies are still in existence 16 months later. Disease increases colony movement, but the ants take the disease with them when they move. The major workers have a heavier rate of infection than the other castes. We also have been studying the long term effect of the parasitic ant, Solenopsis (Labauchena) daguerri on fire ants. This parasite is very numerous at times in the fire ant mounds but appears to be very cyclic. We see no signs that it kills off the colony even though we often find several Labauchena adults yoked on the fire ant queens. Dr. Silveira-Guido of Uruguay did much of the classical work with this parasite and he thought it had promise as a biological control agent. He was never able to colonize this parasite or reestablish it in new locations. This past year, 14 colonies of fire ants with Labauchena were brought back to Gainesville, Florida and all died. In Argentina the Labauchena are still present in the field, but are not adversely affecting the fire ant host colonies. This work will probably be terminated in the near future when Mr. Briano comes to Gainesville for his M.S. Degree in Entomology.

In the future we will be trying to do more research with less resources. Therefore, the USDA-ARS program will be very structured and goal-oriented. One of our main emphasis will be to aid APHIS in their program as well as continue studies on the basic biology, ecology, and control of this difficult species, the imported fire ant.