



Texas Imported Fire Ant Research and Management Project

Progress Report - June 2002

Managing Red Imported Fire Ants in Hay, Cotton, Soybeans, Peanuts and Pecans

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Funding Amount/2 Years: \$125,248

Summary of Work to be Done: Studies will focus on understanding the role and economic impact of fire ants in agricultural production systems, specifically cotton, corn, peanuts and pecans. The potential for red imported fire ants to disrupt biological control of aphids in pecan and cotton and their negative impact on pecan and peanut production will be determined. The value of red imported fire ant as a predator of pest insects will be investigated in cotton and corn.

Major Accomplishments to Date: This project will evaluate the economic impact and control of red imported fire ant in several major field crops and pecans in the fire ant infested areas of Texas. Red imported fire ants are viewed as destructive pests in some of these agricultural systems where they damage equipment, feed directly on the crop, are a stinging hazard to workers, or disrupt biological control of other pest insects such as aphids. In other crops, such as cotton and soybeans, red imported fire ants may serve a beneficial role by suppressing populations of insect pests such as bollworms, armyworms and loopers.

The economic impact to of red imported fire ant in many crop production systems is not clearly defined in Texas. Producers need this information to determine economic and pest management consequences of fire ant control tactics. Information on the role of fire ants in cropping systems is also needed to resolve conflicts of interest involving area-wide management programs such as the release of biological control agents.

Accomplishments and contributions to the Texas Fire Ant Project to-date include:

Cotton. Replicated field studies have demonstrated that fire ants are important predators of bollworm and beet armyworm eggs and increased egg mortality by 20% or more. While previous studies have shown fire ants feed on insect pests of cotton, these data will quantify this impact over time. Cotton aphid densities were greater in the presence of fire ants in these studies. However, aphid densities did not exceed the economic threshold and aphid numbers soon declined as aphid predators increased. Studies suggest that fire ants in cotton have a net benefit to cotton pest management by preying on pest caterpillars. These field studies are being repeated during the 2002 growing season. Results will provide a quantitative measure of fire ant predation and its contribution to biological pest control in cotton. Fire ants foraging on the cotton plant were most abundant in the evening, throughout the night and early morning, and numbers sharply declined with increasing temperature during the day. Field scouts assessing fire ant densities during the day are likely to underestimate the number of foraging fire ants, and therefore their importance as predators of pest insects.

Pecans. Replicated field studies at two locations demonstrated that Extinguish Fire Ant Bait (methoprene) significantly reduced the number of fire ant mounds and the number of fire ants foraging on pecan tree trunks and in the canopy. In two years' field studies, fire ants had no significant impact on densities of aphid predators or aphids in an orchard near College Station. In an orchard in central Texas near Comanche, aphid numbers were greater and aphid predator numbers were reduced in the presence of fire ants during the fall in one of two years. These results suggest that fire ants can occasionally disrupt biological control of aphids by preying on aphid predators, but such an effect is not common.

In cooperation with Dr. David Willis, Economist at Texas Tech University and the Texas Pecan Growers Association, a questionnaire regarding the impact of fire ants in pecan production was developed and mailed to 1000 Texas pecan producers in the spring of 2002. A total of 423 producers returned completed questionnaires. Preliminary results found that more than 60 % of the respondents reported fire ant damaged irrigation systems and repair and replacement of these

systems is a major economic loss. Producers responded that fire ants also resulted in damage to electric motors and shredders, and the stinging hazard of fire ants reduced worker efficiency during grafting and harvest operations. Survey results are being analyzed by Dave Willis, Texas Tech, to quantify the economic impact of fire ants in pecan production. A follow-up telephone survey is underway to provide more detailed information on the dollar value growers are willing to invest in fire ant control in pecans.

Peanuts. Field studies in Comanche County demonstrated that a single application of Extinguish Fire Ant Bait soon after planting significantly reduced the number of foraging fire ants two months later. However, in both field studies, there were no significant differences in yield, grade and dollar value per acre of harvested peanuts between plots treated with Extinguish and not treated. These results suggest that under conditions in these two fields, there was no evidence that fire ants resulted in any economic loss to peanut production. Laboratory studies conducted by Dr. Forrest Mitchel, TAMU at Stephenville also showed that fire ants did not significantly damage sound peanuts.

Corn. An economic assessment of fire ants in agriculture by Curtis Lard, Texas A&M, and cooperators discussed the possible benefit fire ants have in feeding on corn earworm larvae in corn. A large field plot study was conducted during the spring of 2002 at the Texas A&M Stiles Foundation Farm to measure the impact of fire ants on corn earworm survival. These data have not yet been summarized.

Goals Achieved: This study is contributing to a greater understanding of the economic and biological impact of fire ants in several major field crops and pecans in Texas. The fire ant bait Extinguish has been shown to control this pest in pecans and the current economic analysis of fire ant damage will better define the benefits of investing in fire ant control. Studies in cotton are quantifying the biological control of cotton pests provided by fire ants and will better define their relationship to cotton aphids. Fire ants are common in peanut fields, but despite observations to the contrary, results from this study suggest they do not directly feed on sound peanut pods. Current studies in corn will measure the impact of fire ants on corn earworms which infest corn ears.

Relevance to the Texas Imported Fire Ant Research Ant Management Project: Project results will provide a better understanding of the role and impact, both positive and negative, of imported fire ants in cotton, corn, peanuts and pecans in Texas. Information on the role of fire ants and the efficacy and economic return of insecticide treatment for suppressing fire ants will help agricultural producers integrate this approach into existing pest management programs for these major crops. Survey results from pecan producers will better define the impact of red imported fire ants in pecan production systems. These outcomes will contribute to the goal of the Texas Imported Fire Ant Research and Management Plan to develop sustainable programs and methods which will eliminate the fire ant as a serious pest.

Products; publications submitted/published; presentations/posters presented at state and national technical conferences:

Publications:

Knutson, A. and R. Whitney. 2001. A field evaluation of the impact of fire ants on quality and yield of peanuts in Comanche County, Texas. Comanche County Annual Demonstration Handbook, Cooperative Extension Service.

Knutson, A., R. Whitney, B. Ree, A. Calixto. 2001. Control of fire ants in pecans with Extinguish fire ant bait. Comanche County Annual Demonstration Handbook, Cooperative Extension Service.

Ree, B. and A. Knutson. Evaluation of Extinguish for fire ant control in pecans. *The Pecan Grower News*. March 2001.

Ree, B. and A. Knutson, Survey results of impact of red imported fire ants in pecans. *Pecan South*, Dec. 2000.

Ree, B. and A. Knutson. Evaluating Extinguish for fire ant control. *Pecan South*. Feb. 2001.

Presentations:

Calixto, A., A. Knutson, A. Dean and M. Harris. 2002. Spiders in Texas' pecans, are they affected by fire ants? American Arachnological Society Annual Meeting. Univ. CA., Riverside, CA.

Calixto, A., A. Dean, B. Ree, A. Knutson and M. Harris. 2002. Use of refuge strips for the study of foliage dwelling spiders. American Arachnological Society Annual Meeting. Univ. CA., Riverside, CA.

Diaz, R., A. Knutson and J. Bernal. 2002. Impact of fire ants on bollworm and beet armyworm eggs and cotton aphids in cotton. Entomological Society of America Southwestern Branch Annual Meeting, Guanajuato, Mexico.

Knutson, A., R. Diaz, M. Campos, J. Bernal. 2002. Prey and foraging activity of red imported fire ants in the cotton canopy. Entomological Society of America National Conference. San Diego, CA.

Harris, M., A. Knutson, A. Calixto, A. Dean and B. Ree. Red imported fire ant and managing pests in the pecan canopy. Entomological Society of America National Conference. San Diego, CA.

Diaz, R., A. Knutson and J. Bernal. Impact of fire ants on bollworm and beet armyworm eggs and cotton aphids in cotton. Proc. 2002 National Fire Ant Conference. Athens, Georgia.

Knutson, A., R. Diaz, M. Campos, J. Bernal. 2002. Prey and foraging activity of red imported fire ants in the cotton canopy. Entomological Society of America Southwestern Branch Annual Meeting, Guanajuato, Mexico.

Knutson, A., B. Ree, M. Harris, A. Calixto and B. Whitney. 2001. Impact of Extinguish Fire Ant Bait and Lorsban trunk treatments on fire ants, native ants, pecan aphids and aphid predators. Proc. 2001 National Fire Ant Conference. San Antonio, TX.

Ree, B. 2001. Survey results of red imported fire ant management practices of Texas pecan producers. Southwestern Branch Meeting of the Entomological Society of America. San Antonio, TX.

Knutson, A., B. Ree, M. Harris, A. Calixto, and B. Whitney. 2001. Impact of Extinguish Fire Ant Bait and Lorsban trunk treatments on fire ants, native ants, pecan aphids and aphid predators. Presentation at the 2001 Annual Imported Fire Ant Research Conference. San Antonio, TX.

Calixto, A., A. Knutson, B. Ree, M. Harris and A. Dean. Interspecific Interactions of *Solenopsis invicta* with Other Ants, aphids, Predatory Insects and Spiders in Pecan Orchards. Poster presentation. 2001 Annual Imported Fire Ant Research Conference. San Antonio, TX.

Calixto, A., A. Knutson, B. Ree, M. Harris and A. Dean. 2000. Impact of fire ants on aphids, predatory insects and spiders in pecan orchards, a preliminary study. Poster presentation at Annual Meeting of the International Union for the Study of Social Insects - North American Section, Arkansas.

Knutson, A. Managing Fire Ants in Pecans. 2000. Presentation at the Annual Conference of the Texas Pecan Growers Association. Dallas, TX.

Whitney, B., A. Knutson, B. Ree. A. Calixto. Suppression of fire ants in pecans with Extinguish fire ant bait. 2000 Comanche County Demonstration Handbook.

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Economic Costs and Benefits of Managing Red Imported Fire Ants in Pecan Orchards

Principal Investigator: David B. Willis

Funding Amount/2 Years: \$26,078

Summary of Work to be Done:

The primary objective of this research is to determine the economic cost and benefits of controlling Red Imported Fire Ant (RIFA) infestations in Texas pecan orchards. Toward this objective, two specific tasks are now in various states of completion. The first task involved mailing a detailed survey to nearly 1000 commercial pecan growers in Texas to determine the impact that RIFA has on pecan growers. After three mailings, 462 usable surveys were returned and the data is now being statistically analyzed. The second task involved identifying ten commercial producers in the San Saba County and another ten producers in Comanche County who were willing to participate in a year-long telephone survey that focused on the impact that RIFA activity has on the daily operation of their orchards. These participating growers are telephoned every two weeks to collect detailed data on six RIFA related damage categories: (1) medical expenses resulting from RIFA stings; (2) lost labor hours; (3) kernel damage; (4) machinery damage; (5) irrigation system damage; and electrical system damage. The twice monthly telephone surveys are scheduled to continue to the end of harvest season in late November.

Major Accomplishments to Date:

The data collected from the three wave mail survey has been entered into an electronic data base and preliminary statistical analysis is underway. Eighty-four percent of the producers responding to the mail survey stated that RIFA activity adversely impacts their orchard operation. A

growing detailed data set of the impact and economic cost of RIFA on producer operations is now being systematically compiled.

Relevance to the Texas Imported Fire Ant Research Management Project:

One general objective of the Texas Imported Fire Ant Research Management Project is to document the economic and biological severity of RIFA, and to discover appropriate and cost-effective management programs that may alleviate continued damage from this pest in the future. One specific goal of the Texas Fire Ant Initiative is to determine the economic impacts of RIFA activity on production agriculture. This research project focuses on documenting the economic impact and human health effects that RIFA infestations have on pecan growers in Texas.

Products; publications submitted/published; presentations/posters presented at state and national technical conferences:

Results will be published and/or presented in the appropriate outlets once the data is compiled and statistically analyzed., 2001.