

Progress Report 2007-2008: “The impact of red imported fire ants on insect abundance as a food source for broods of the critically endangered Attwater’s prairie chicken”

Alejandro Calixto, Research Scientist, Bastiaan M. Drees, Professor, Extension Entomologist, Texas AgriLife Extension Service, and Mike Morrow, Wildlife Biologist, Attwater Prairie Chicken National Wildlife Refuge

This project was undertaken to develop documentation of the effect of the red imported fire ant, *Solenopsis invicta* Buren (Hymenoptera: Formicidae), on spring (May-June 2006-2008) arthropod fauna that potentially serve as a food source for the Attwater’s prairie chicken by reducing ant population levels using broadcast applications of bait formulated insecticides.

Materials and Methods

March 2006 – October 2008: Ten 5-acre (2 hectare) plots were located at the APCNWR in March 2006. Treated and untreated plots were paired for each location to reduce variability. Bait treatment was applied at random to one of 2 paired five-acre plots at each of five replicate locations using Amdro®Pro (hydramethylnon) fire ant bait (“hopper blend”) at a rate of 1.5 lb/acre, treatments were applied on March (2006, 2007 and 2008), and retreated on November (2006, 2007) to maintain 80%+ fire ant control. The remaining five plots were used as untreated control plots. Subsequently samples were taken in and around experimental sub-plots, 0.5 acre (87 ft radius circle) in size located in the center of each plot, using: 1) pitfall traps (5 per plot), 2) food lures (10 per plot) and, 3) sweep netting (4 per plot). Sampling was conducted 6 consecutive weeks (from May 5 through June 8 for each year).

Pitfall traps consisted of 5 120 ml plastic cups filled with isopropyl alcohol distributed uniformly throughout the 0.5 acre subplot (systematic sampling). Traps were deployed on the ground, equipped with a plywood shade suspended approximately 2 cm from ground level, and left open for two consecutive days after which they were collected and taken to the laboratory for further processing.

Food lures were used in this study to assess control and treatment surface activity of red imported fire ant foraging workers on each of the paired plots by determining the number of *S. invicta*/30-45 minutes attracted to a food lure (hot dog slice). Ten lures were distributed uniformly through the experimental unit (systematic sampling) near each pitfall trap location (pitfalls were not open when this assessment was made). Ants on slices were frozen and later counted by species.

Sweep netting samples were taken at four different points for each experimental plot. A sample consisted of twenty-five 180° arcs through the vegetation walking at a constant speed, quickly turning and reversing direction at the end of each swept. Each sweep-net sample was transferred to a one-gallon plastic bag and labeled. Plastic bags were then stored in a freezer for post processing. Samples were separated into winged/unwinged categories and then counted. Wet and dry mass was determined for each sample. Beginning on 2007 every insect collected either on pitfall traps and sweep netting was measured.

Results

Fire ant density: Based on data collected using pitfall traps and food lures, the bait treatment effectively reduced fire ants. RIFA density was significantly lower on bait treated plots (more than 80% control) compared to those untreated indicating the effectiveness of the bait treatment. Density remained low throughout the sampling periods, re-treatments were applied to ensure low densities of fire ants on experimental plots.

Insect biomass: overall measurements (gr- wet and dry) for both winged/unwinged in pitfall traps and sweep netting showed no differences between sites where RIFA was reduced vs. those untreated.

Insect abundance: overall numbers of winged/unwinged insects in pitfall traps and sweep netting showed no differences between sites where RIFA was reduced vs those untreated.

Insect sizes: overall size of insects (order level) in pitfall traps and sweep netting showed no differences between sites where RIFA was reduced vs those untreated. However, one order in particular (Orthoptera) showed the most significant change in size in sites where RIFA is reduced compared to untreated. This indicates RIFA is probably selecting against Orthoptera, going after smaller individuals, important for diets of prairie chickens that requires further investigation.

Based on these preliminary results we conclude that for the 2006-2008 season removal of RIFA did not exert significant impacts on relative insect abundance and biomass for both winged and unwinged guilds, further analyses at order/family level and size classes might be necessary to understand the impacts of RIFA on insect assemblages.

In our first report we suggested that further and more detailed analysis of samples (by order/family) is needed to effectively determine the impact of fire ants on insect abundance. A slight change in the protocol was suggested for FY 2007 where samples are additionally separated by size and insect order to improve the confidence of the results. Those changes were made resulting on better resolution of the impact of RIFA on the insect community inhabiting Attwater chicken prairie's. Our results indicate RIFA is probably selecting against Orthoptera ("grasshoppers"), going after smaller individuals, important for diets of prairie chickens that requires further investigation.

In addition to these changes, 5 food lures for ant assessments were added to each plot (10 total), and pitfall traps were left open for seven consecutive days instead of two. The number of ants on each food lure was estimated up to 100 ants per lure. Finally, the shades were not used for most of the pitfall traps in FY07 and FY08.

As November 2008, samples processing is still underway (currently on samples from late may 2008). Due to changes in protocol, samples from pitfall traps and sweep netting are taking longer since each individual insect is being measured. This section is expected to be completed on December 2008.

Presentations (Posters)

- 2008 A., Calixto, B. Drees, M. Morrow, D. Roach, J. Johnson, T. Catanach and C. Botero. Impact of *Solenopsis invicta* on prairie insects essential for the survival of the endangered Attwater's prairie-chicken. Entomological Society of America, Annual Meeting. Reno, Nevada.
- 2008 A., Calixto, B. Drees, M. Morrow, D. Roach, J. Johnson, T. Catanach and C. Botero. Impact of *Solenopsis invicta* on prairie insects essential for the survival of the endangered Attwater's prairie-chicken. The Wildlife Society, Annual Meeting. Miami, Florida.
- 2008 A., Calixto, C. Botero, B. Drees, M. Morrow, D. Roach, J. Johnson and M. Harris. Red Imported Fire Ant impact on insect community as a food source for the endangered Attwater's Prairie Chicken. Annual Red Imported Fire Ant Research Conference. Charleston, South Carolina.
- 2008 C. Botero, A., Calixto, B. Drees, M. Morrow, D. Roach, J. Johnson and M. Harris. Red Imported Fire Ant impact on insect community as a food source for the endangered Attwater's Prairie Chicken. 56th meeting of the Southwestern Branch of the Entomological Society of America. Fort Worth, Texas.

Proceedings

- 2008 Botero, C., B. Drees, A. Calixto and M. K. Harris. 2008. Red imported fire ant impact on insect community as a food source for the endangered attwater's prairie-chicken. Pp. 15. In proceedings 56th meeting of the Southwestern Branch of the Entomological Society of America. Fort Worth, Texas.

Project participants:

Therese Catanach, Graduate Student (Texas A&M University)
Camila Botero, Graduate Student (Texas A&M University)
Johnny Johnson, Extension Demonstration Technician (Texas AgriLife Research)
Julie Smith, Research Assistant (Texas AgriLife Research)
Don Hardeman, Student Worker (Texas A&M University)
Susan Dean, Extension Demonstration Technician (Texas AgriLife Research)
Donna Roach, Wildlife Biologist (APCNWR)
Dr. Paul Nester, Extension Agent – IPM Harris Co. (Texas AgriLife Extension)
APCNWR SCA Interns (Rebekah Smith, T. J. Schultz, Leann Wilkins, Stacie Cossel)