

Demonstration of Siesta™ (metaflumizone) Fire Ant Bait for the Management of the Red Imported Fire Ant in Managed Turf

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Management of the red imported fire ant, *Solenopsis invicta* Buren (Hymenoptera: Formicidae) on large mixed use land tracts using insecticide products is economically feasible when the economic impact of high fire ant population levels equals or exceeds the cost of control (Flanders and Drees 2004). Mixed use land tracts may include parks, camp grounds, convention centers, animal-care facilities, or a mixture of any of these. The use of these areas by large numbers of the general public can expose them to fire ants if no control measures are undertaken.

Fire ant bait products offer a means to treat large areas of managed turf to obtain a level of fire ant control and reduce the exposure of the general public to the fire ant. Fire ant bait formulations vary somewhat but most consist of de-fatted processed corn grit as a “carrier,” soaked with soybean oil as an attractant. The broadcasting of fire ant bait products allows foraging fire ants from visible or hidden mounds access to the bait particles that they pick up and take back to their respective colonies. When foraging ants return to the colony the product is fed ant-to-ant, ant-to-larva, larva-to-ant and ant-to queen(s) so that all members of the colony are affected. This is also why most bait ingredients must be rather slow to kill ants. If ants die too fast, the active ingredient fails to reach the queen or multiple queens.

Material and Methods

This demonstration was part of a EUP study being conducted by the BASF Corporation in developing of Siesta™ (metaflumizone) Fire Ant Bait product for use in managed turf areas. This study was established on a managed mixed grass turf area on the sports fields of the Gene Campbell Sports Complex, 3200 TXDOT Road, Conroe, TX (**Figure 1**). The Gene Campbell Sports Complex is a 60-acre facility with 6 lighted baseball fields, 6 lighted softball fields, concessions and restrooms. The baseball fields are maintained by Conroe Area Youth Baseball (CAYB) and the softball fields are maintained by Conroe Area Girls Softball Associations (CAGSA). This demonstration was conducted exclusively on the softball fields (**Figure 2**).

Each softball field was approximately 2 acres (285 X 310 ft). Field number 1 was left untreated while fields 2, 3, and 4 were treated with Siesta™ Fire Ant Bait at a rate of 1.5 lb product/acre (Figure 2). Treatments were made on Sept. 22, 2006 in the late afternoon, with an ATV (Kawasaki Prairie 700) mounted Herd GT-77 Sure Feed Broadcaster for Fire Ants (Herd Seeder Co., Inc., Logansport, IN (www.herdseeder.com)). The Herd GT-77 was calibrated to deliver 1.5 lb fire ant bait with a 20 ft swath while the ATV traveled at 11 mph. The Herd GT-77 was fitted with a Herd Seeder Co. #1 plate covering the hopper opening. An additional treatment was made to fields 2, 3, and 4 on Nov. 13, 2006 due to fire ant mound resurgence after 1st application. Moderate rainfall occurred during the test period. No irrigation equipment was present in these fields.

Pre-treatment assessments of the number of active red imported fire ant mounds were taken in each of the outfield areas. To determine if a mound was active, a shovel was used to slightly disturb the mound. If no fire ants appeared after 15 seconds, the mound was considered inactive. Refer to **Figure 2**, field 3, where the example of an evaluation area is outlined. All active mounds found within the various evaluation areas were recorded before treatment (Sept. 22, 2006), 1 month (Oct. 20, 2006), 2 months (Nov. 29, 2006), and 8 months (May 9, 2007) after the first Siesta™ treatment. In addition 2 groups of 10 active fire ant mounds were mapped in each evaluation area by using a handheld GPS unit (Trimble® Geo Explorer XT with submeter accuracy) before the bait application. Data collected in the field was processed using the Software ArcGIS 8.0 (ESRI™). The fire ant mounds were located and followed before (0 days) and after the 1st Siesta™ application (3 days, 1 month and 2 months) to determine the impact of the treatment (s). **Figure 3** shows the approximate location of the mapped mounds.

Effect Sizes (ES) were estimated for each sampling date due to the small sample size, unlike significance tests, these indices are independent of sample size. ES measures the magnitude of a treatment effect with respect to the control.

The ES is expressed as:

$$ES = \frac{\mu_1 - \mu_2}{\sqrt{\sigma_{Pooled}}}$$

Where μ_1 is the mean for the subscribed bait treatment and μ_2 is the control all divided by the square root of the pooled standard deviation. The effect sizes represent the change in numbers associated with the bait treatment. Negative values indicate that number of colonies decreased due to the bait treatment. We calculated the 95% confidence intervals (CI) for each ES. Lack of overlap of CI with zero (0) indicates that the bait treatment had a significant effect on colony density. We estimated that an Effect Size of -1.6 represents $\geq 80\%$ control, this percentage has been previously established by EPA as optimum control by fire ant products, we expect substantial control if ES estimated are below this threshold.

Results and Discussion

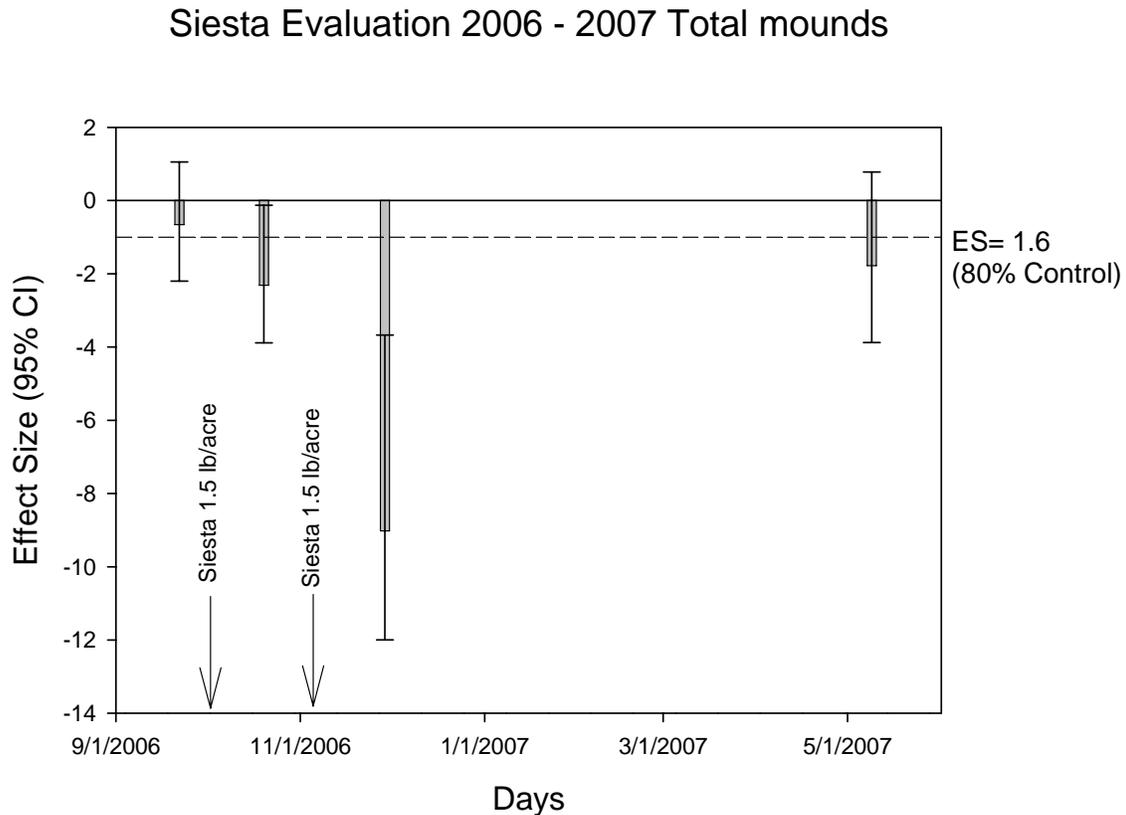
Total Active Fire Ant Mounds

The reduction in active fire ant mounds seen on the treatment date (Sept. 22, 2006) in **Figure 1** is an artifact of the sampling technique since the Siesta™ areas had a lower total mound count than the control in the pre-treatment evaluation. The mound reduction seen four weeks after application in the evaluation areas (**Figure 2**) of each softball field revealed little or no reduction in active fire ant mounds (**Graph 1**) from Siesta™ treatments when compared to the untreated control. Because of this less than desired result, BASF Corporation requested that we apply a second application (Nov. 13, 2006) of Siesta™ at 1.5 lb product/acre (as per the EUP label), bringing the total amount of Siesta™ to 3.0 lb product/acre in the treated areas of fields 2, 3, and 4 (**Figure 2**). The evaluation made 14 days after the second application and two months after the initial application showed a significant reduction in active fire ants in the Siesta™ treated areas. The 6 month

evaluation after the second Siesta™ treatment showed no significant reductions in fire ant mound activity when compared to the untreated areas.

Mounds that were present at the time of the first Siesta™ treatment were affected. Visual observations found the fire ant mounds in the treated area to be less than normal in appearance, i.e., erratic ant movements, non-aggressive behavior, uneven mound borders, and the fire ants were very sluggish in activity. The affect of the fire ant bait application on these mounds was overshadowed by the appearance of smaller mounds in the treated area, which could not be explained by the periodic nuptial flight of fire ant mating pairs. These smaller mounds had an active brood (immatures) and many worker fire ants. This is what prompted BASF Corporation to add the second Siesta™ treatment. The second application had a positive effect on the mounds, though this effect was not seen at the May 9, 2007 evaluation date (8 months following first application, 6 months following second application).

Graph 1: Effect of Siesta™ fire ant bait on active fire ant mounds from treatments applied Sept. 22, 2006 and Nov. 13, 2006 to the softball fields at the Gene Campbell Sports Complex, Conroe, TX (Montgomery Co.).



Effect on single fire ant mounds

The effect of Siesta™ treatments on individual mounds after the initial Siesta™ application is more dramatic than the effect on the total mounds (**Graph 2**). The Siesta™ application did have an effect on single mounds. There was a reduction in the 10 mapped mounds at all three evaluation times, with a significant reduction seen at both the 1 month and 2 month evaluations. Evaluating the effect of the second application on the 10 mapped mounds is hindered by the fact that most of the mapped mounds were affected by the first application.

The individual fire ant mounds present at the time of application showed effects from the Siesta™. This affect on the single mounds was overshadowed by the appearance of new mounds in the treated areas.

It appears from this study that just monitoring the affect of a fire ant bait treatment on selected individual mounds may not be enough when evaluating the effectiveness of a treatment. In addition to observing effects on individual mounds, reductions in total mounds within the treated area need to be documented to determine if the fire ant population is being reduced.

Graph 2: Effect of Siesta™ fire ant bait on individual active fire ant mounds from treatments applied Sept. 22, 2006 and Nov. 13, 2006 to the softball fields at the Gene Campbell Sports Complex, Conroe, TX (Montgomery Co.).

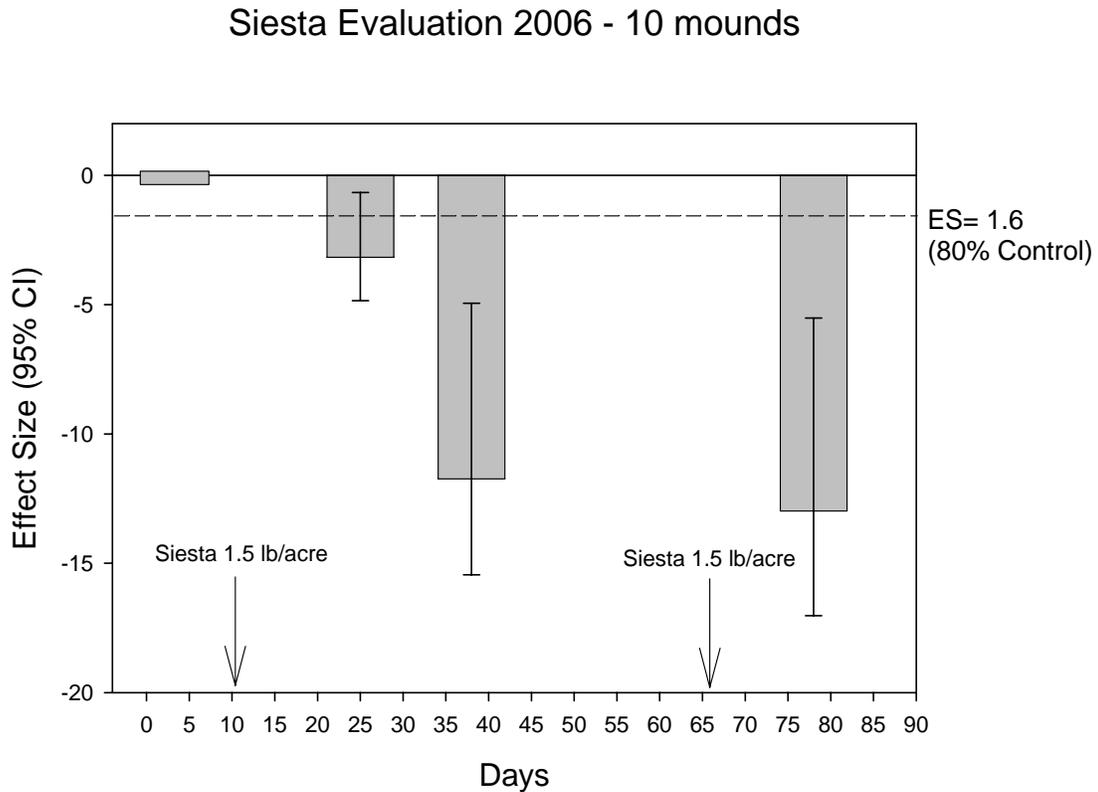




Figure 1. Aerial view of sports fields of the Gene Campbell Sports Complex, 3200 TXDOT Road, Conroe, TX (Montgomery Co.)



Figure 2. Aerial view of the softball fields of the Gene Campbell Sports Complex, 3200 TXDOT Road, Conroe, TX (Montgomery Co.). Treated Sept. 22 and Nov. 13, 2006.

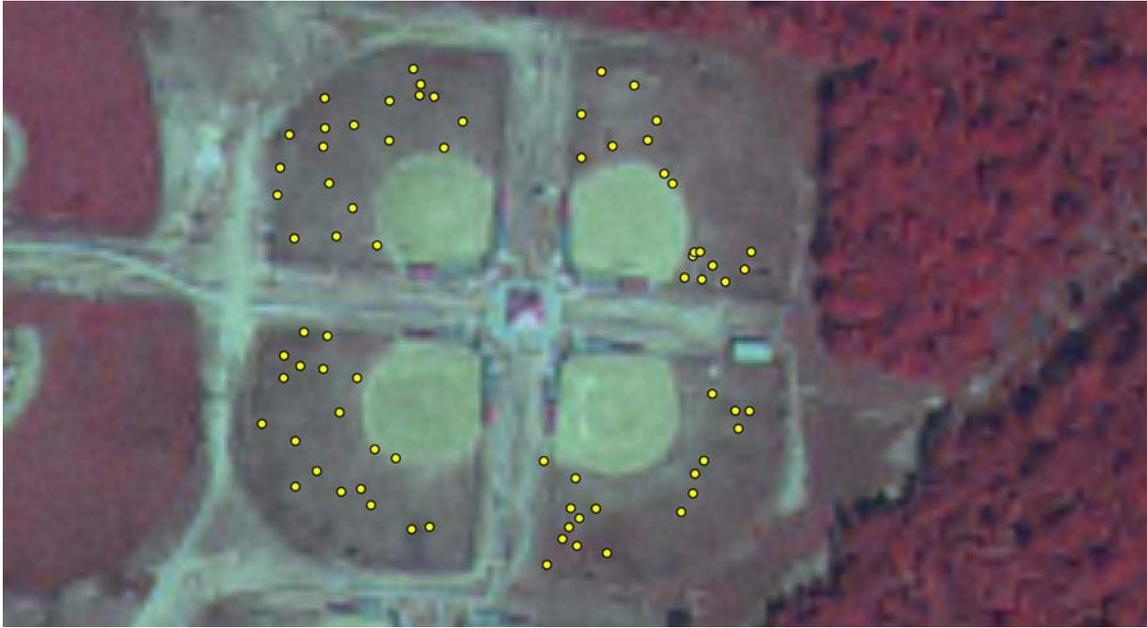


Figure 3: Aerial view of the softball fields of the Gene Campbell Sports Complex, 3200 TXDOT Road, Conroe, TX(Montgomery Co.) , with the approximate location of the 2 groups of 10 active fire ant mounds mapped by using a handheld GPS unit (Trimble® Geo Explorer XT with submeter accuracy) before the bait application.

Literature cited

Flanders, K. L. And B. M. Drees. 2004. Management of imported fire ants in cattle production systems. ANR-1248. Alabama Cooperative Extension System, Auburn, AL. 8 pp.

Acknowledgements

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