

Comparison of broadcast treatment vs. spot treatment of Esteem® fire ant bait for the control of red imported fire ants, *Solenopsis invicta* Buren

Kimberly Schofield, Program Specialist-IPM
Bastiaan Drees, Professor and Extension Entomologist
Texas AgriLife Extension Service

The red imported fire ants, *Solenopsis invicta* Buren (Hymenoptera: Formicidae), is a medically important insect. Since fire ant stings are sometimes fatal, people who live in areas where they are common should know how to effectively control them. When treating for red imported fire ants, bait applications are often used as an effective method for control. Fire ant bait products consist of corn grit containing soybean oil in which the active ingredient of the insecticide is dissolved. The fire ant workers pick up the bait particle, extract the toxic oil, and feed it to the queen and other ants (Merchant and Drees 2006).

Broadcasting fire ant bait or treating individual ant mounds are the two most common ways to use these products to obtain control. Broadcasting fire ant bait is the preferred method. When applying fire ant baits to large areas there is a slower re-infestation rate by colonies migrating from neighboring untreated areas (Drees et al. 2002). A special local needs label issued by the Texas Department of Agriculture in spring 2009 allows for the “skip swath” application of the insect growth regulator (IGR) product, Esteem® Ant Bait (0.50% pyriproxyfen), whereby the 2 lb/acre rate is applied to every other 25 ft swath; thereby saving application time application and using half the rate per acre while still attaining similar levels of control compared to the full broadcast application. Earlier studies with fenoxycarb ant bait documented that application as a “grid spot treatment” placing 2 Tbsp of bait in a 20 by 20 pace (60 by 60 ft) pattern achieved similar suppression compared to the broadcast treatment (Drees et al. 1992, 1995). In this trial, we wanted to evaluate if a spot treatment is as effective as a broadcast treatment of Esteem at controlling red imported fire ants within 1/4 acre plots.

Materials and Methods

On June 9, 2009, on the grounds of the Frito Lay headquarters (7701 Legacy Dr Plano, TX 75024-4002), twelve plots, each measuring 100 by 100 feet (0.25 acre) were established. Twenty foot buffers were established on all sides of the plots. The three treatments evaluated in this trial were: 1) untreated control; 2) broadcast application of 2 lb/acre Esteem® (0.50% pyriproxyfen) ant bait (0.5 lb per 0.25 acre plot); and 3) a "grid-spot" application of Esteem where 3 tablespoons of bait was applied in spots on a 10 ft by 10 ft grid, so 16 spots were treated within a 0.25 acre plot. Within each plot, a 40 ft radius circular sub-plot was created and active red imported fire ant mounds were counted. Pre-treatment counts of active fire ant mounds were taken within each plot beginning at 10 a.m. with temperatures at 77° F and winds 0-5 mph. Active mounds were counted within each plot by disturbing suspected mound sites with a stick to determine activity. Mounds were considered active if many (dozens of) worker ants were observed within 15 seconds. All active fire ant mounds within the plot were counted and recorded. The mound counts were blocked and arrayed from the highest to the lowest mean number of active mounds

per sub-pot and blocked into four replications or blocks. Then treatments were randomly assigned within each replication.

Treatments were applied on June 9, 2009 from 10:45 a.m. to 1 p.m. with temperatures between 82-88° F. Broadcast treatments of 0.5 lbs of Esteen® fire ant bait were applied using a Scott's® Handy Green II hand-held spreader (US Patent No. 5, 285, 971). The plots were evaluated at 1, 2, 3 and 4 months post treatment as described above. Data were analyzed using SPSS Analysis of Variance (ANOVA) test with means separated using Duncan's Multiple Range Test at $P \leq 0.05$ (SPSS for Windows, Lead Technologies, Version 13.0).

Results and Discussion

At the 1 month observation, there were no significant differences found between the treated and control plots. However at the 2, 3 and 4 months post treatment observations, both the spot and broadcast treatment of Esteen® fire ant bait treated plots had significantly less active fire ant mounds compared to the untreated control plots (**Table 1**). At the 1, 2 and 3 month observations, although not significantly different, there were fewer active mounds in the broadcast treated plots compared to the spot treated plots. At 4 month observation, the broadcast application had significantly fewer active ant mounds compared to the untreated control plots; the grid-spot treatment plots also had fewer, but not significantly different than the control or the broadcast treatment plot means. Additional observations are required to document the full potential of these IGR treatment patterns because suppression occurs slowly as worker ants die of natural causes and the active ingredients prevents production of new workers for many months following treatment. Since the initial fire ant population was low, future studies need to be conducted on comparing these two application methods.

Table 1. Number of active red imported fire ant mounds found after treating with Esteen® fire ant bait at the Frito Lay campus in Plano, TX.

| Treatment | Pre-count | 1 Month | 2 Months | 3 Months | 4 Months |
|----------------------------|------------------|----------------|-----------------|-----------------|-----------------|
| Broadcast Treatment | 6.33a | 4.67a | 2.67a | 1.33a | 0.67a |
| Spot Treatment | 6.33a | 5.00a | 5.00a | 4.00a | 3.00ab |
| Control | 6.67a | 6.33a | 6.33b | 6.00b | 5.67b |
| <i>df</i> | 2 | 2 | 2 | 2 | 2 |
| <i>F value</i> | 0.02 | 0.45 | 1.43 | 2.85 | 5.28 |
| <i>Significance</i> | 0.98 | 0.66 | 0.31 | 0.14 | 0.05 |
| <i>Mean Square</i> | 0.11 | 2.33 | 10.33 | 16.44 | 18.78 |

^aMeans followed by the same letter within the same column were not significantly different using Analysis of Variance (ANOVA) and means separated using Duncan's Multiple Range Test at $p \leq 0.05$ (SPSS, Windows 11.5).

Literature Cited

- Drees, B. M., C. L. Barr, and S. B. Vinson. 1992. Effects of spot treatments of Logi® (fenoxycarb) on polygynous red imported fire ants: an indication of resource sharing? *Southwestern Entomol.* 17(4):313-319.
- Drees, B. M., C. L. Barr, M. E. Heimer, and R. Leps. 1995. Reducing treatment costs for fire ant suppression in Texas cattle production systems. *in* Proceedings of the Fifth International Pest Ant Symposia and the 1995 Annual Imported Fire Ant Conference (ed. S. B. Vinson and B. M. Drees), San Antonio, Texas. pp.146-154.
- Drees, BM, CL Barr, SB Vinson, D Kostroun, B Sparks, D Pollet, D Shanklin, K Loftin, K Vail, RE Gold, ME Merchant, N Riggs, B Hickman, P Nester, K Flanders, PM Horton, D Oi, PG Koehler, R. Wright. 2002. Managing Imported Fire Ants in Urban Area. TX Coop. Extension, B-6043. p. 4.
- Merchant, Michael and Bart Drees. 2006. The Texas Two-Step Method: Do-it-yourself Fire Ant Control for Homes and Neighborhoods. Tx. Coop. Extension, L-5070.