Evaluation of fipronil fire ant bait for the suppression of red imported fire ants, *Solenopsis invicta* (Hymenoptera:Formicidae)

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Red imported fire ants, *Solenopsis invicta* Buren are significant pests in the Texas landscape. They are also a serious medical problem due to their painful sting, which makes controlling them a high priority, especially in urban areas. Treating individual fire ant mounds is the fastest way to kill fire ant colonies. The use of fire ant baits is a more environmentally friendly option for control, since a lower amount of chemical is found within fire ant baits compared to other contact insecticides. Also the baits are delivered into the mounds by the worker ants, so small amounts of baits are needed to reduce fire ant populations (Drees et al. 2002).

There are several fire ant baits on the market that range from fast acting baits, such as those containing indoxacarb to slower acting fire ant baits, such as those containing insect growth regulators (Merchant and Drees 2006). Also a new formulation containing fipronil on a corn grit matrix is on the market. Fipronil is a phenyl pyrazole that acts as a nervous system toxicant, which blocks the passage of chlorine ions by interacting with gamma-aminobuteric acid (GABA)-gated chloride channels on nerve cell membranes. This bait formulation is available for broadcast or as individual mound treatments.

This trial was conducted to evaluate the efficacy of fire ant populations using individual mound treatments of Maxforce™ FC (0.004% fipronil), Advion™ (0.045% indoxacarb), Siesta™ (0.063% metaflumizone), Amdro™ (0.73% hydramethylnon), and Extinguish™ Plus (0.365% hydramethylnon + 0.25% methoprene) fire ant baits.

Methods and Materials

On July 16, 2007 at 7:00 am, twenty-eight square plots (Table 1) were measured and recorded at the Dallas Research and Extension Center on Coit Road, Dallas Co., each plot containing eight fire ant mounds. A field flag was inserted into the ground to denote the four edges of the plot. Fire ant mounds within each plot were considered active if many (dozens of) worker ants were observed within 15 seconds after disturbing the mound with a stick. Within each plot, all active mounds were tagged using spray paint. The plot measurements were blocked and arrayed from longest to shortest, then divided into 4 blocks containing 4 treatment plots each. This allowed the total length of the plots or all the treatment plots to be roughly equal, so colony migration into and out of the plots was similar for all treatments.

The treatments included:

1. Untreated control (CK) received no treatment
2. Maxforce™ FC (0.004% fipronil)
3. Advion™ (0.045% indoxacarb)
4. Award™ (1% fenoxycarb)
5. Amdro™ (0.73% hydramethylnon)
6. Extinguish™ Plus (0.365% hydramethylnon + 0.25% methoprene)
7. Seista (0.63% metaflumizone)

Application of treatments began at 6:00pm and concluded at 7:00pm on July 16, 2007. Four tablespoons of fire ant bait were placed around each mound so as to not disturb the mound during application. Temperature was 87 degrees with winds 5-10 mph.

Evaluations of mound activity was conducted prior to application and at 3 days, 1 week, 2 weeks, 1 month, 2 months and 3 months post treatment. For the evaluation process, fire ant mounds within each plot were considered active if many (dozens of) worker ants were observed within 15 seconds after disturbing the mound with a stick. Data were analyzed using Analysis of Variance (ANOVA) test with means separated using Duncan's Multiple Range Texas at $P \leq 0.05$ (SPSS for Windows, Lead Technologies, Version 14.0).

Results and Discussion

All treatment plots significantly reduced active fire ant mounds compared to the untreated control plots for the entire study (Table 2). The Advion™ and Siesta™ treated plots had fewer active fire ant mounds compared to the other treatments at 1 week, 2 weeks, and 1 month, although not significantly different than the other treatments. However at 2 and 3 month observations, more active fire ant mounds appeared in the Siesta™ plots. After 3 months, although not significantly different, the Advion™ and Award™ treated plots had the fewest active fire ant mounds compared to the other treatments.

The average daytime temperature during this study was 90°F with a total of 4 inches of rain, which could have resulted in the loss of active fire ant mounds within the control plots.

Table 1. Treatment block assignments based upon plot length.

Block and Plot Number	**Plot Length (ft^2)**	**Treatment**
8, 17, 19, 20	4956, 9040, 762, 18315	Advion™
3, 14, 15, 22	7520, 11532, 9300, 3520	Amdro™
10, 12, 23, 27	8904, 10192, 4510, 7205	Award™
7, 11, 24, 25	4584, 10160, 3960, 10615	Extinguish™ Plus
6, 9, 13, 18	11070, 7826, 6975, 1632	Maxforce™
1, 4, 28, 29	6426, 15015, 8030, 3905	Siesta™
2, 16, 21, 26	14586, 9968, 3630, 5335	Untreated Control

Table 2. Number of active red imported fire ant mounds found after individual mound treatments at the Dallas Research and Extension Center, Dallas Co.

Treatment	3 Days	1 Week	2 Weeks	1 Month	2 Months	3 Months
Advion™	3.25a	1.75ab	1.25a	0.50a	1.00a	1.00a
Amdro™	6.75cd	4.75cd	2.50ab	1.50ab	2.25a	3.50a
Award™	6.50cd	4.00c	4.75bc	2.50b	2.50a	1.75a
Siesta™	4.00ab	1.00a	1.00a	0.50a	2.00a	2.75a
Extinguish™ Plus	5.25bc	3.00bc	2.75ab	2.50b	3.25a	2.50a
Maxforce™	6.75cd	4.75cd	4.25bc	2.25ab	2.75a	2.50a
Untreated Control	7.50**d**	6.50**d**	6.00**c**	5.75**c**	6.25**b**	6.25**b**

[a]Means 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, 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.