

Evaluation of Five Individual Mound Treatments for the Control of the Red Imported Fire Ant

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Many products registered for the suppression of the red imported fire ant, *Solenopsis invicta* Buren are applied to individual mounds or ant hills. These methods of application are direct and often result in rapid elimination of ant activity. In this trial, five products were evaluated for control of fire ants when applied as mound treatments: sulfuramid, Amdro[®], Logic[®], Orthene[®], and Spectracide[®].

Sulfuramid is an experimental bait product and Amdro[®] contains the ingredient, hydramethylnon. Both chemicals act as metabolic inhibitors, preventing ants consuming these ingredients from converting food into energy. Logic[®], containing the active ingredient fenoxycarb, is a carbamate insecticide that acts as an insect growth regulator. Queen ants fed this product become incapable of producing viable eggs. Larvae or brood developing in treated colonies become winged male and sterile winged female forms instead of worker ants. Decline of the colony occurs slowly due to natural mortality of worker ants present at the time of treatment.

The three bait-formulated insecticides evaluated are formulated on defatted corn cob grit coated with soybean oil. Although the active ingredients are viable for some time, the oil often degenerates (becomes rancid) over time when exposed to air. Two lots (1990 and 1991) of Amdro were tested from previously unopened containers to evaluate the shelf life of this bait product.

Orthene[®] Fire Ant Killer contains acephate formulated as a 75 percent powder. This organophosphate insecticide is a contact poison that rapidly kills ants. Rather than a bait, this product is applied as a dust treatment to the mound. Spectracide[®] contains the active ingredient diazinon in a granular form which is spread on the mound and watered in.

Materials were applied to individual fire ant mounds in discrete areas where all mounds were treated with the same products. Results from this experimental design are intended to evaluate 1) direct effects to treated mounds, and 2) whether treatments cause colonies to move or produce "satellite" colonies. Theoretically, if a treatment causes colony movement, the number of active fire ant mounds in a treated area will not be reduced relative to the number of mounds treated directly and in comparison with active mound numbers in untreated areas.

Materials and Methods

On 12 June, 1990 on mowed turf areas adjacent to the airport runway of Coulter Field, Bryan, Texas, circular plots were established to encompass 5 active red imported fire ant mounds. Four replications were established for each of seven treatments:

sulfuramid	5 tbsp/mound
Amdro [®] (hydramethylnon) lot-90	5 tbsp/mound
Amdro [®] lot-91	5 tbsp/mound
Orthene [®] Fire Ant Killer (75 % acephate)	2 tbsp/mound
Logic [®] (fenoxycarb)	3 tbsp/mound
Spectracide [®] (granular diazinon)	0.5 cup + 1 gal. water/mound
untreated check	

The location of the colonies within each plot was mapped, marked with number Ball[®] canning jar lids and rated for degree of activity. Activity was determined by observing the defensive movement of the ants following mound disturbance. This was done by slightly probing the mound with a thin metal wire and estimating the number of ants that came to the surface on a rating scale from 0 to 3: 0 = 0 ants; 1 = 1-100 ants; 2 = 101-1000 ants; 3 = >1000 ants. Colonies were rated prior to treatment and 2 days, 1, 2, 4, and 8 week post treatment.

In addition to the field trial, a preference test was conducted with fresh products, Amdro (lot 91), Logic, Black Flag[®] Fire Ant Ender (containing avermectin) and sulfuramid, in four laboratory red imported fire ant colonies. Each colony received cups containing approximately 2.232 g bait by volume (6 ml bait at roughly 0.372 g/ml), 24 June 1991. Colonies were monitored and exposure of the baits was terminated when one bait cup was emptied (three hours or less). The weight of bait remaining in cups was determined and results were analyzed using ANOVA and the Least Significant Difference test at P#0.05.

Results

All individual mound treatments except for Logic produced statistically similar reductions in ant activity ratings (Table 1). The 2-day post-treatment decline in ant activity in Amdro and sulfuramid treated mounds was surprisingly rapid for bait-formulated materials. Significant reduction in ant activity in Logic-treated mounds relative to untreated mounds did not occur until 8 weeks following treatment. Numerically, mounds treated with Spectracide and drenched with water resulted in the greatest reduction of ant activity.

Evaluation of treatment efficacy using the number of occupied (“active”) mounds per plot (not the rating scale) for analysis provides similar results (Table 2). However, this analysis indicates that there is a numerical trend for the 1990 lot of Amdro to reduce mound activity more slowly than did the 1991 lot. Furthermore, the Spectracide treatment produced reductions significantly more quickly than did the 1990 lot of Amdro.

The turf area on which this test was conducted was mowed routinely by city services and was not

watered. Drainage was excellent and resulted in a rather dry terrain even after heavy rains. The density of fire ant mounds on this site was rather low for this area, averaging 115 mounds per acre (ranging from 147 to 97) with an average mound diameter of 25.1 cm. Low mound density and dry conditions resulted in little migration of colonies and little detectable reinfestation of treated plots. The average plot size, containing 5 fire ant mounds, was 0.044 acre (24.8 ft radius).

Results of the bait product preference test are as follows:

<u>Product</u>	<u>Active ingredient</u>	<u>ml bait remaining*</u>
Amdro® (lot 91)	hydramethylnon	0.28b
Black Flag® Fire Ant Ender	avermectin	0.80b
Logic®	fenoxycarb	0.90b
sulfuramid	sulfuramid	1.93a

LSD (N=4; P#0.05) =0.634

* means followed by the same letter are not significantly different according to the Least Significant Difference test (P#0.05).

Ants removed significantly less sulfuramid bait from the cups than other product formulations tested. Numerically, ants removed the most Amdro.

Acknowledgment

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Table 1. Efficacy of individual mound treatments for the red imported fire ant, Coulter Field, Bryan, Texas, 1991.

Mean level of fire ant mound activity*

	Pre-treat.	----- -	----- -	Post-treatment	----- -	----- -
	12 June 0 day	14 June 2 day	19 June 1 week	26 June 2 weeks	11 July 4 weeks	8 Aug. 8 weeks
Untreated	2.4a	2.2a	2.1a	1.3a	1.2a	1.1a
Logic [®]	2.3a	2.0a	2.1a	0.9a	1.1a	0.4b
Amdro [®] 91	2.2a	0.5b	0.2b	0.2b	0.1b	0.2b
Amdro [®] 90	2.3a	0.6b	0.3b	0.5b	0.1b	0.1b
sulfuramid	2.2a	0.4b	0.0b	0.5b	0.0b	0.3b
Orthene [®]	2.3a	0.2b	0.2b	0.0b	0.1b	0.0b
Spectracide [®]	2.3a	0.2b	0.0b	0.0b	0.0b	0.0b
<i>f</i>	<i>0.3411</i>	<i>36.769</i>	<i>56.763</i>	<i>8.670</i>	<i>7.969</i>	<i>3.680</i>
<i>P</i>	<i>0.9059</i>	<i>0.0000</i>	<i>0.0000</i>	<i>0.0002</i>	<i>0.0003</i>	<i>0.0146</i>

* All mounds in circular plots, replicated 4 times and containing 5 fire ant mounds each were rated on a scale of 0 to 3 with 3 being most active upon disturbance. Mean values followed by the same letters are not significantly different according to ANOVA and the Duncan's Multiple Range Test (P#0.05).

Table 2. Efficacy of individual mound treatments for the red imported fire ant, Coulter Field, Bryan, Texas, 1991.

Mean level of fire ant mound activity*

	Pre-treat.	----- -	----- -	Post-treatment	----- -	----- -
	12 June 0 day	14 June 2 day	19 June 1 week	26 June 2 weeks	11 July 4 weeks	8 Aug. 8 weeks
Untreated	5.0	5.0a	4.8a	3.3a	3.3a	2.5a
Logic®	5.0	5.0a	4.8a	2.5a	2.8a	1.0b
	5.0	2.0bc	0.5bc	0.5b	0.3b	0.5b
	5.0	2.3b	1.3b	0.3b	0.3b	0.3b
	5.0	2.0bc	0.0c	0.3b	0.0b	0.5b
	5.0	1.0bc	0.5bc	0.0b	0.5b	0.0b
	5.0	0.5c	0.0c	0.0b	0.0b	0.0b
<i>f</i>	---	14.653	69.909	8.2290	9.660	4.213
<i>P</i>	---	0.0000	0.0000	0.0002	0.0001	0.0080

* All mounds in circular plots, replicated 4 times and containing 5 fire ant mounds each were rated activity upon disturbance. Mean values followed by the same letters are not significantly different according to ANOVA and the Duncan's Multiple Range Test (P#0.05).