Multiple Treatments of Amdro®, Bifenthrin and Orthene® for the Long-Term Suppression of Fire Ant Populations in Small Plots
Coulter Field, Brazos Co., Texas - 1999-2000

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The products Amdro® (0.73% hydramethylnon), a bait; Talstar® (0.2% bifenthrin), a granular pyrethroid and; Orthene® (75% acephate), an organophosphate dust, are all labeled for the control of red imported fire ants (*Solenopsis invicta* Buren) on ornamental turf. Amdro is labeled for use as an individual mound treatment, but is most effectively and economically used as a broadcast bait under most circumstances. Talstar is applied as either a broadcast spray or granular material, providing long-lasting suppression of both fire ant colonies and foraging workers through contact activity. It is favored by many pest control operators because of its fast action and immunity to rainfall, unlike Amdro. Orthene is most commonly used as a dry dust for individual mound treatments (IMTs) by consumers. It is both very easy to use and economical on a per colony basis. Therefore, each product has both strengths and weaknesses in controlling fire ants.

The purpose of this test was two-fold. The first was to test the short-term effectiveness of the products alone and in several combinations. The Two-Step program promoted by the Texas Agricultural Extension Service suggests applying a broadcast bait to an area, waiting a few days, then treating individual “nuisance mounds” to eliminate them quickly. Amdro and Orthene are two of the more common, effective and economical products suggested for use in this program.

The second purpose was to test the long-term suppression of the individual products and the products in combination. Talstar, bifenthrin, gives a very fast kill to ants coming in contact with it and also has a residual on the order of several months. Amdro and Orthene are broken down within a matter of days. The particular “Talstar” formulation used in this test was a 1.2% bifenthrin granular experimental compound. The ultimate goal of the test was to utilize the benefits of the Two-Step program, using Amdro and Orthene, and try to extend the time of suppression by using bifenthrin to suppress colony re-invasion. This program was referred to as the Three-Step since it involved applying a bait, followed in 24 hours by individual mound treatments, followed in six weeks by a long-residual toxicant.

Materials and Methods

The test was located at Coulter Field, the Bryan, Texas municipal airport. Soil was a sandy loam over claypan. The area is known to have high ant colony densities during the wet spring and early summer, rapidly decreasing densities as the weather becomes hot and dry, then substantial colony rebuilding and relocation once favorable weather conditions arrive in the fall. The site was chosen to test the residual activity of bifenthrin under this high re-invasion pressure.

Plots consisted of 75 ft. X 75 ft. (approx. 1/8 acre) squares with minimum 15 ft. untreated buffers on all sides to enhance and equalize re-invasion pressure. Plots were established on 7 May 1999 and pre-counts made on 13 May. Plots were arrayed from highest to lowest based on active mound counts and divided into three equal groups (replications). Only three replications were used due to limited bifenthrin test material.

The test included the following treatments:
1.) untreated control
2.) (A+O) Amdro broadcast, followed in 24 hours with Orthene individual mound treatment (IMT)
3) (O+B) Orthene IMT, followed in 24 hours with bifenthrin broadcast granules
4) (A+O+B) Amdro broadcast bait, followed in 24 hours with Orthene IMT, followed by bifenthrin broadcast granules in 6 weeks
5) (A+B) Amdro IMT, followed by bifenthrin broadcast granules in 6 weeks
6) Amdro broadcast bait only

Initial individual mound treatments and broadcast Amdro treatments were made the afternoon of 13 May. The second step of the Two-Step treatments (individual mound treatments) were made 14 May. For the 24 hour IMT treatments, all active mounds in the appropriate plots were treated, regardless of size of vigor, and the number treated was recorded. Six-week treatments with Talstar were made 24 June 1999.

All evaluations used the minimal disturbance technique. Evaluations were conducted 21 May, 7 June, 13 July 1999 and 11 January 2000. The test was discontinued after the final post-count.

Results

Mean number of active mounds (3 replications)

Treatment*	**pre-count**	**1 week**	**3 weeks**	**8 weeks**	**35 weeks**
untreated	32.7 a	21.3 a	15.3 a	12.0 a	8.3 a
A+O	33.0 a	4.3 b	0.00 b	1.0 b	4.0 ab
O+B	32.7 a	5.7 b	2.7 b	0.7 b	1.0 b
A+O+B	33.0 a	1.7 b	1.0 b	0.3 b	1.0 b
A+B	31.7 a	1.7 b	2.7 b	0.3 b	0.3 b
Amdro only	32.7 a	5.3 b	2.7 b	0.3 b	4.0 ab
F	4.43	13.47	43.25	11.81	4.53
Prob.	0.0173	0.0002	0.0001	0.0004	0.0160
R^2	0.7560	0.9041	0.9680	0.8921	0.7604
Min. sig. diff.	10.429	8.4605	3.5748	5.8503	5.9186

* Abbreviations correspond to treatment regimes outlined in Materials and Methods

Means in the same column followed by different letters are significantly different ($P < 0.05$) using SAS analysis of variance procedures and Tukey's studentized range test for mean separation.

Discussion

All treatments resulted in substantial and significant ($P < 0.05$) reductions in active mound numbers within one week of treatment. This level of suppression remained relatively constant through eight weeks post-treatment even though the number of active untreated mounds decreased by 63% versus pre-treatment levels. By 35 weeks post-treatment, the mean number of untreated mounds were a mere 27% of pre-count levels. All three treatments that received bifenthrin granules broadcast over the entire plot had significantly ($P < 0.05$) fewer active mounds than untreated control plots. The Amdro only and Amdro + Orthene IMT plots had about 50% fewer active mounds than in the untreated plots, but were statistically similar.

Weather played an important role over the course of this test. May and June of 1999 were quite moist after a fairly dry spring, resulting in the high colony densities seen in this area (260 colonies per acre). The site received rain the evening after the initial treatments, resulting in numerous new mounds the following day, compared to pre-counts. Regardless of pre-count, all active mounds in the appropriate plots were treated. It was also noticed that many of the smaller colonies, though still considered active, were already starting to show the effects of Amdro after only 24 hours. It is felt that these colonies would have died off in another day or two without additional treatment, but the protocol was followed and they were treated at 24 hours.

Rainfall virtually stopped in mid-July, making it impossible to accurately count mounds. Despite a few rains during the late fall, mounds did not reappear to any extent until a 2.5-inch rain in January 2000. Despite the rain and moderate weather, the number of mounds in untreated plots was still 30% lower than the previous counts in July, an unusual occurrence in our moderate winters.

The final evaluation suggests that a broadcast application of bifenthrin does numerically reduce colony re-invasion in the long-term. Given the weather conditions, it is difficult to say whether prevention occurred when there was still moisture available in mid-summer or when rainfall was finally received in the late fall and winter, though. Despite there being statistical differences between bifenthrin treatments and the control, there were none between any treatment regimes. The general lack of mounds may have reduced all differences considerably, but the numerical differences between all treatments and controls were slight. It is questionable whether the additional cost of a third, or even the 24-hour individual mound treatments following broadcast Amdro, would have been justified by the additional colony reductions under these conditions.