High Volume Broadcast Application of Hydramethylnon for the Control of Fire Ants

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Broadcast bait products are widely available for the control of red imported fire ants (*Solenopsis invicta* Buren). Despite marketing campaigns and research showing broadcast baits to be the most cost-effective means of suppressing fire ant populations (Barr et al. 2000), roughly 80% of homeowners persist in using individual mound treatments, mostly contact insecticides according to marketing surveys done by several bait manufacturers. One reason proposed for this consumer resistance is the relatively small quantity of bait that is needed. Consumers are used to spreading 50 lb. of fertilizer and 10 or 20 lbs. of granular insecticide across their yard, making a cup of broadcast bait spread on a typical yard seem rather anemic. Another point of resistance is that broadcasting bait at such a low rate requires the purchase of special equipment, albeit relatively inexpensive equipment.

Excel Marketing (a division of Ambrands), current retail marketers of Amdro® Fire Ant Bait, commissioned this trial to study the effectiveness of Amdro "diluted" to an application rate of roughly 20 lbs per acre, while maintaining the same active ingredient application rate. A past study of this kind was disappointing (Drees et al. 1995). It is known that Amdro must be applied close to its label rate to be effective (Drees et al. 1993) and it was felt that so much material might satiate the appetite of a colony before it received adequate active ingredient to eliminate it. Nevertheless, the study was undertaken with two formulations of hydramethylnon applied at 21.75 lbs per acre.

This trial was combined with Different Ratios of s-Methoprene and Hydramethylnon Baits as Hopper Blends for the Suppression of Red Imported Fire Ants (p.28) to save effort and space by combining common treatments.

Objective: Test the effectiveness of reduced active ingredient - increased application rate hydramethylnon formulations in controlling fire ants.

Materials and Methods

The test was located at the Wharton Municipal Airport in Wharton County, Texas, about 50 miles south of Houston. The site was mowed regularly and kept free of livestock and human disturbance as part of normal airport operations. Soil was a heavy black clay that produced well-defined fire ant mounds, making for easier evaluations.

Plots were designed to take advantage of runway lights as plot edge markers, thus minimizing the chances of marker damage by mowers. Runway lights were spaced at 190 feet, so to give a 40 foot untreated buffer between plots, plot dimensions were 170 X 65 feet (11,050 ft^2, 0.25 acre), running lengthwise adjacent to the pavement. Most mounds were found in the 10 foot strip between the pavement and marking lights, so the sample area was a swath 170 X 45 feet (7,650 ft^2, 0.18 acre), adjacent to the pavement. Plots contained a minimum of 10 active mounds at the

pre-count. Counts were arrayed from highest to lowest, divided into four equal groups (replications) and treatments assigned within replications so that the total number of mounds for each treatment was as equal as possible.

Plots were established and pre-counted on May 9, 2001. Treatments were made between 7:30 and 9:30 a.m., May 17, 2001 using a hand-held Earth-Way Model 2700 "belly bumper" spreader. Weather at the time of treatment was partly cloudy, 80°F with a strong cross-wind. Considerable dew was present on the grass. Ants were foraging actively.

Evaluations were conducted on 21, 24 and 31 May, 7, 21 and 28 June, 12 July, 9 August, 5 September and 15 November (3 days, 1, 2, 3, 5, 6, 8, 12 and 26 weeks respectively.) The scheduled 4 week evaluation was postponed due to torrential rains from tropical storm Allison. Evaluations were conducted using the minimal disturbance technique in which mounds were disturbed with a pointed tool handle. If a number of ants rose to the surface in a defensive manner, the mound was considered active.

Treatments included:

1) untreated control
2) Amdro® A - 0.0335% hydramethylnon, applied at 21.75 lbs/acre
3) Amdro B - 0.73% hydramethylnon factory mixed, applied at 21.75 lbs/acre (19:1 dilution)
4) Amdro D - 0.73% Amdro mixed immediately prior to application with blank corn grit (19:1 dilution), applied at 21.75 lbs/acre
5) Amdro Fire Ant Bait only, 0.73% hydramethylnon, applied at 1.5 lbs./acre

The "dilute" treatments all applied 0.0073 lbs. hydramethylnon active ingredient per acre. The Amdro FAB treatment was applied at 0.01095 lbs a.i. per acre to maintain the standard 1.5 lbs/acre application rate. Reducing applications to 1 lb/acre is difficult due to spreader limitations and is somewhat inaccurate in practice. Appropriate data were analyzed separately using SAS ANOVA procedures with means separated by Tukey's studentized range (HSD) test, $P < 0.05$. Model included treatment and replication effects.

Results and Discussion

As seen in **Table 1**, at 1 week post-treatment, all Amdro-based treatments had similar significantly ($P \leq 0.05$) fewer active mounds than the untreated control, a trend which continued to 12 weeks post-treatment. Average reduction versus untreated was 66% at one week. At two weeks, average control had increased to 75% and, by three weeks, control had increased to *at least* 98.5%, with Amdro A showing 100% control, compared to untreated plots on each date respectively. Active mound numbers in treated plots remained steady through 8 weeks, though untreated mound numbers continued on a steady decline due to increasing temperatures and lack of rainfall. At 12 and 16 weeks, there were no significant differences due to very few mounds in any plot and some variability within plots of each treatment. The area received rain in October, resulting in a four-fold increase in untreated mound numbers by the end of the test. Mound numbers in all plots increased dramatically, but still had significantly ($P \leq 0.05$) fewer active mounds than the untreated plots with average control of 56% on that date. Throughout the test, there were no significant differences and very small numerical differences between the different formulations of hydramethylnon.

Results of this test indicate that, despite a 20-fold increase in product application rate for the same amount of active ingredient, ants recovered enough product to result in colony elimination.

All “dilute” formulations gave statistically as good or better control than Amdro alone. In November 2001, a 0.0036% hydramethylnon product - Amdro® Fire Ant Bait Yard Treatment, similar to the “Amdro A” used in this trial, received EPA registration and appeared on the retail market in 2003. It will be applied at a rate of 1 lb. per 2,000 square feet.

Table 1. Results of red imported fire ant mound evaluations: 0.18 acre sample area, 4 replications. Wharton Airport, applied May 17, 2001.

	Mean number of active mounds										
Treatment	Pre	Day 3	Week 1	Week 2	Week 3	Week 5	Week 6	Week 8	Week 12	Week 16	Week 26
untreated	14.00 a	5.50 a	9.00 a	7.00 a	5.25 a	5.50 a	4.75 a	3.00 a	2.50 a	4.25 a	18.00 a
Amdro A	14.25 a	4.00 a	4.00 b	1.75 b	0.00 b	0.00 b	0.00 b	0.50 b	1.25 a	2.50 a	9.50 b
Amdro B	13.75 a	4.25 a	2.75 b	0.25 b	0.25 b	0.25 b	0.00 b	0.00 b	0.25 a	0.75 a	8.00 b
Amdro D	13.75 a	4.50 a	2.75 b	1.00 b	0.75 b	0.75 b	0.50 b	0.25 b	1.25 a	1.75 a	9.25 b
Amdro	14.50 a	3.50 a	2.75 b	1.25 b	0.75 b	1.00 b	0.25 b	0.50 b	0.25 a	1.75 a	5.25 b
F	0.25*	0.50	5.92	4.65	9.25	8.53	18.37	2.94	1.65	1.55	8.54
P	0.9064	0.8178	0.0038	0.0099	0.0005	0.0007	0.0001	0.0486	0.2126	0.2410	0.0007
R^2	0.9046	0.2257	0.7755	0.7307	0.8436	0.8327	0.9146	0.6316	0.4906	0.4747	0.8328
MSD	2.9601	6.0195	4.379	4.3206	2.4517	2.7527	1.633	2.4517	2.6187	3.7488	6.5483

Means followed by different letters in the same column are significantly different ($P \leq 0.05$) using SAS analysis of variance procedures. Means separated using Tukey's studentized range (HSD) test. df = 12

* F and *P* values are for treatment effects only. Replication $P = 0.0001$ due to stratification of mound densities.

Literature Cited

C. L. Barr, Summerlin W., M. Drees, B.M.. 2000. A Cost/Efficacy Comparison of Individual Mound Treatments (IMT) Versus Broadcast Baits. 1997-1999 Result Demonstration Handbook. Tx. Ag. Extension Service, Bryan, Texas.

B.M. Drees, C. L. Barr and D. McGregor. 1995. Evaluation of Amdro® (hydramethylnon) formulations for suppression of red imported fire ants. 1994-1995 Result Demonstration Handbook. Tx. Ag. Extension Service, Bryan, Texas.

B. M. Drees, C. L. Barr and M. E. Heimer. 1993. Skip-swath application of Amdro® and Logic® broadcast baits for the suppression of the red imported fire ant. 1993-1994 Result Demonstration Handbook. Tx. Ag. Extension Service, Bryan, Texas.

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