Effectiveness of Hopper Blend Broadcast Baits in Unfavorable Conditions
Waller County, Texas - 2000

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The mixing of fast-acting and slow-acting broadcast baits, known as hopper blends, for the control of red imported fire ants (*Solenopsis invicta* Buren) has been shown to provide both fast control and longer duration control than either of the products used alone (Drees et al. 1994). This test was initiated just to provide additional data on various combinations of baits. However, extraordinarily hot, dry weather conditions yielded unexpected data on the action of baits, in general, as well as hopper blends.

Objective: Test the speed and duration of fire ant control using hopper blends of Amdro® and both Distance® and Clinch™ broadcast fire ant baits.

Materials and Methods

The test site was located in an ungrazed pasture in Waller County, Texas. Vegetation was a mix of moderately tall grass and forbs with clay soils. Plots consisted of 150 x 150 ft. squares with minimum 20 ft. untreated buffers on all sides. A 40-foot radius (0.115-acre) circular sample area was established in the center of each plot. Pre-counts of active fire ant mounds were taken on June 27, 2000 and plots arrayed by mound density using the method outlined in Barr et. al (2002). Mounds were evaluated using the minimal disturbance technique. Treatments were made on June 28 using EarthWay® Ev-N–Spred hand-held seeders to apply the baits. Evaluations were conducted on July 26 and December 11. Treatments included: Amdro® (0.73% hydramethylnon), Distance (0.5% pyriproxyfen), Clinch (0.011% abamectin), 50:50 hopper blend of Amdro + Distance and, 50:50 hopper blend of Amdro + Clinch, plus an untreated control. Treatments were replicated four times. Results were analyzed using SAS analysis of variance procedures with means separated using Tukey's studentized range (HSD) test, $P < 0.05$.

Results and Discussion

The summer of 2000 was one of the hottest and driest on record for Texas. In the region where the test was located, there were over 40 days of 100°F+ temperatures, culminating around Labor Day with three consecutive days of temperatures around 110°F. Furthermore, the area received virtually no rain from May through September. By the time of test initiation in late June, highs had been in the mid 90's with no rain for at least three weeks. Field notes indicated that fire ant foraging ceased around 10:00 a.m. and did not resume until about 7:45 p.m.

Table 1 and **Figure 1** show results of this test. No treatment performed statistically different from untreated control plot data except Distance at 5 months after application. Active mound numbers in untreated plots remained steady for the first month, but doubled by the 6-month evaluation. Amdro alone performed very poorly compared to what is usually seen. Active mounds were reduced by only about 55% initially, then numbers rebounded at the same rate as those in untreated plots. At the other extreme, plots treated with Distance continued an almost linear decline that was barely noticeable at 1 month. The hopper blend of Amdro + Distance

produced an initial drop similar to that of Amdro alone, but, rather than rising like Amdro or falling like Distance, remained almost constant between the 1 month and 6 month readings.

Though the weather foiled our attempts at good ant control, the extremely variable conditions and fortunate timing allowed us to see some interesting product behavior that yielded insights on the mechanics of the ant-bait relationship. It is likely that Amdro performed poorly simply because there were not enough ants foraging to pick up a lethal dose and eliminate the colony. As shown by other skip-swath and reduced rate experiments with pyriproxyfen (see A Field Comparison of Five Broadcast Baits Applied at Full Rate, as Hopper Blends and as Skip-Swaths, this publication, p.42), Distance performed well at active ingredient doses well below what is listed on the label. In a previous test, for instance, the Spectracide formulation of pyriproxyfen (0.05%) was applied at 3 lbs./acre, yielding better than 90% control. Therefore, the total active ingredient applied in that test was one-fifth what was applied in this test (3 lb @ 0.05% Spectracide vs 1.5 lb @ 0.5% Distance) (Barr and Best, 1999).

Maximum control in Amdro+Distance plots was less than for either Amdro or Distance alone. One explanation is that workers from some colonies recovered a sub-lethal dose of both Amdro and Distance granules and remained unaffected. Effective dosage may have been dependent on colony size. Large colonies may have diluted a given number of granules or small colonies may not have been foraging actively. Assuming a finite number of foraging workers and number of granules recovered in all plots, and an equal chance of either granule being recovered, it stands to reason that half of the granules in A+D plots were Amdro. As known from skip-swath work (Drees et al, 1994), control with Amdro is proportional to the amount applied, which is seen here. The remaining half of granules were Distance. Their activity was not evident until six months later, as in Distance only plots.

Table 1. Mean number of active red imported fire ant mounds in 0.115-acre plots, 4 replications. Waller Co. TX, treatments applied June 28, 2000.

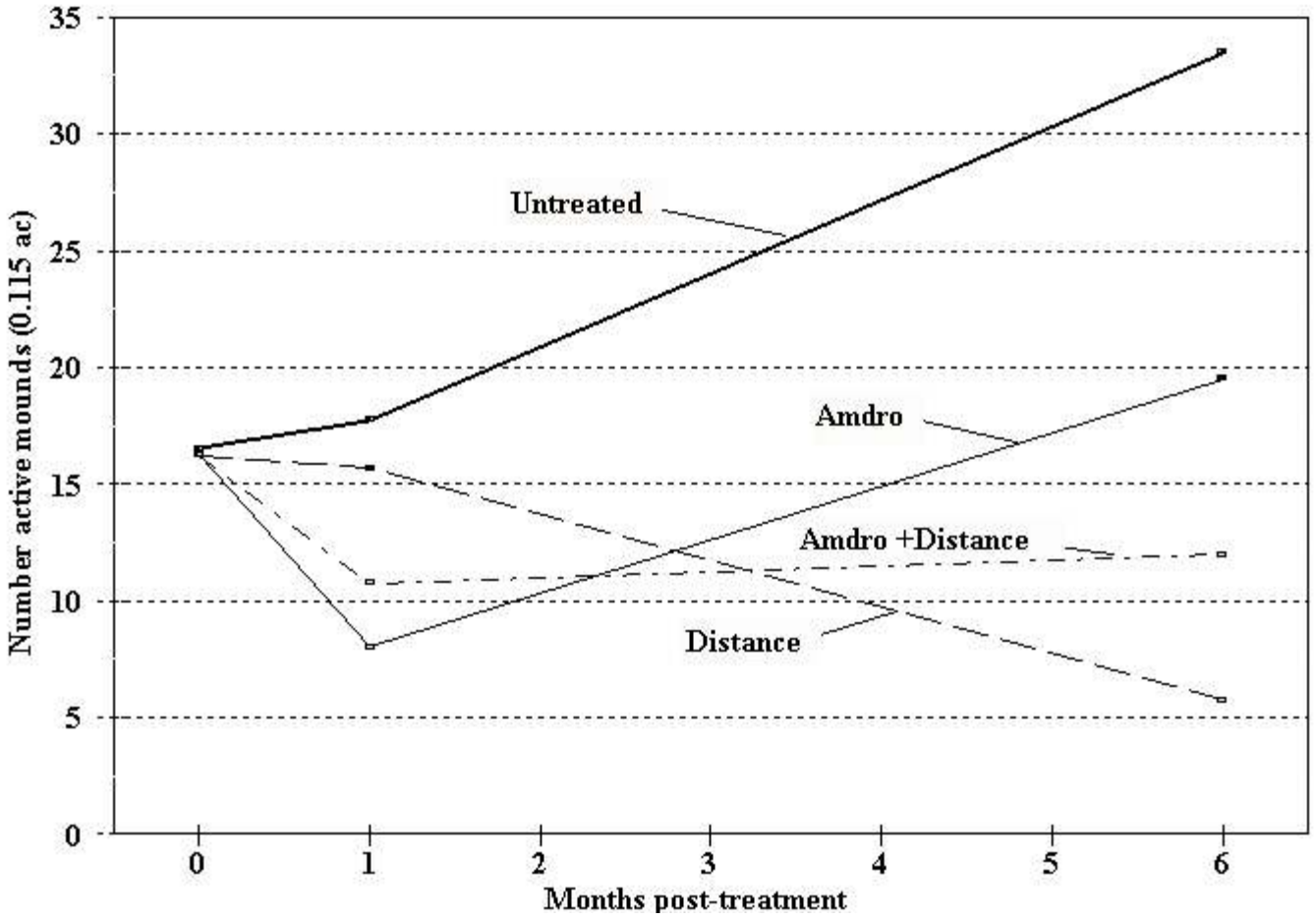
Treatment	Pre-count	One month	5 months
untreated	16.50 a	17.75 a	33.50 a
Amdro	16.25 a	8.00 a	19.50 ab
Distance	16.25 a	13.50 a	5.75 b
Clinch	16.75 a	12.00 a	21.25 ab
Amdro:Distance	16.25 a	10.75 a	12.00 ab
Amdro:Clinch	16.50 a	12.00 a	20.00 ab
F	0.02*	2.97	3.00
P	0.9998	0.0332	0.0320
R^2	0.9296	0.6127	0.6150
MSD	6.6098	14.746	24.49

Means in the same column with different letters are significantly different ($P < 0.05$) using SAS analysis of variance and Tukey's studentized range (HSD) test. df = 15

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

Due to heat and drought, it is likely that visible active mound numbers dropped to near zero between the one month and six month readings. Therefore, Figure 1 should be viewed only as an illustration of trends.

This field trial showed that IGR-based baits, such as Distance, offer a sort of "safety net" for hopper blends under adverse bait treatment conditions. Observations of plots in 300-acre pastures



following an Amdro + Extinguish hopper blend treatment in the summer of 2002 showed similar results (unpublished). At two months post-treatment, it was apparent that Amdro had controlled most of the colonies. However, in several plots, there were active mounds that had either no brood or reproductive brood only - an indicator that an IGR had taken effect, but the remaining workers had not died off completely. So, in addition to the added duration of control IGR-based baits bring to hopper blends, they also add a greater margin for error in terms of ant foraging and weather conditions.

Figure 1. Mean number of active mounds in 0.115-acre plots.

Literature Cited

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