

Evaluation of Skip-Swath and Hopper Blend Applications of Extinguish_{TM} for Red Imported Fire Ant Control

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Previous research with broadcast fire ant baits has shown that a 50:50 hopper blend of Amdro[®] (0.73% hydramethylnon) plus Logic[®] (1.0% fenoxycarb), an insect growth regulator (IGR), produces both rapid control of fire ants characteristic of Amdro and long-lasting control characteristic of Logic. In similar tests, it was also found that skip swath applications of Logic, broadcasting bait in 30 foot swaths on 60 foot centers (0.75 lb./ac. total), gave almost identical control to full rate, full coverage applications (1.5 lbs./ac.). Skip swath applications of Amdro yielded about half the control as full coverage applications, however.

This field trial was conducted in conjunction with the large plot spinosad rate test in a pasture east of Bryan, Texas (see Rate Test of Spinosad-based Broadcast Bait for the Suppression of Red Imported Fire Ants in Large Plots). Amdro, as well a set of untreated plot, was included as a standard in the spinosad test. To take advantage of the available space, it was decided to include hopper blend and skip swath treatments of Extinguish_{TM} (0.5% s-methoprene), a newly released IGR-based fire ant bait, that has the distinct advantage of almost unrestricted use sites on the label. Previous research on Extinguish showed it to be as effective, but also as slow to work, as Logic, so it was tested as a 50:50 Amdro hopper blend to speed its action. Because of the potential use of Extinguish in agriculture, it was hoped that skip swath applications would perform well so that treatment costs could be cut in half, making it more possible to economically justify its use in pastures and other crops.

Materials and Methods

The test site was located approximately eight miles east of Bryan, Texas in Brazos County. Applications were made to an ungrazed pasture consisting of heavy clay soil. The area was just emerging from a record-breaking drought during the summer of 1998. Though the pasture was very rough due to large, visible fire ant mounds, most of the mounds were unoccupied by ant colonies. Those that were, usually contained rather small colonies nesting on only a portion of the mound structure.

Square plots, 210 x 210 feet (approx. one acre) were laid out in an irregular pattern following fence lines and the shape of the pasture. Plots were established with adjoining boundaries. A 0.25 acre sampling area was established in the center of each plot using 3/8" reinforcing rod as a permanent center marker which allowed for a treated buffer of at least 45 feet between a sampling area and the nearest plot border.

Active ant mound numbers were determined on 9 October 1998 using the minimal disturbance technique. Plots with a suitable number of mounds were arrayed from highest to lowest and divided into four equal groups (replications). Treatments were assigned within replications so that the total number of mounds for each treatment (total of four replications) were as equal as

possible. Treatments were applied 13-14 October using a Red Ball® seeder mounted on a John Deere 4x6 ‘Gator utility vehicle. Weather during application was mild and sunny and ants were actively foraging.

Treatments for this portion of the test included:

| <u>Treatment</u> | <u>Rate</u> | <u>Application</u> |
|---------------------------------|--------------------|-------------------------|
| untreated control | – | – |
| Amdro® (0.75 hydramethylnon) | 1.5 lbs/acre | full broadcast coverage |
| Extinguish™ (0.5% s-methoprene) | 1.5 lbs/acre | full broadcast coverage |
| Amdro+Extinguish 1:1 blend | 1.5 lbs/acre total | full broadcast coverage |
| Extinguish skip swath | 0.75 lb/acre total | 25 ft. skip swath |

Post treatment evaluations were made on 28 October, 11 November and 14 December 1998 and 1 April 1999. Evaluations were made using the minimal disturbance technique. In late March we were notified that the site had been sold to the poultry farm adjacent to the property and was to be used for litter disposal. Within two weeks of the final evaluation, the land was plowed and the site had to be abandoned.

Results

Mean number of active mounds in 0.25 ac. circle, 4 replications

| <u>Treatment</u> | <u>pre-count</u> | <u>2 weeks</u> | <u>4 weeks</u> | <u>8 weeks</u> | <u>24 weeks</u> |
|------------------|------------------|----------------|----------------|----------------|-----------------|
| untreated | 15.75 a | 26.75 ab | 24.50 a | 27.25 a | 19.25 a |
| Amdro full | 15.75 a | 6.75 b | 6.75 bc | 5.75 b | 2.25 b |
| Extinguish full | 18.25 a | 32.50 a | 20.75 abc | 17.50 ab | 4.00 ab |
| Extinguish+Amdro | 18.25 a | 4.50 b | 4.50 c | 3.25 b | 1.75 b |
| Extinguish skip | 17.75 a | 37.50 a | 22.00 ab | 25.50 a | 12.25 ab |
| <i>F</i> | 35.16 | 6.48 | 6.93 | 6.74 | 3.55 |
| Prob. | 0.0001 | 0.0026 | 0.0019 | 0.0022 | 0.0263 |
| R ² | 0.9535 | 0.7907 | 0.8017 | 0.7971 | 0.6746 |
| Min. sig. diff. | 6.5838 | 24.376 | 16.311 | 18.139 | 10.159 |

Means in the same column followed by different letters are significantly different ($P < 0.05$) using PC SAS ANOVA and Tukey’s studentized range test for mean separations.

Discussion

Both the Amdro and Extinguish+Amdro had significantly ($P < 0.05$) fewer active fire ant mounds at only two weeks post-treatment versus the untreated plots through the remainder of the test. Numerically, the Extinguish+Amdro treatment was the superior treatment for the entire test, including the spinosad treatments not included in this analysis. The unusually fast activity is

probably due to the small, summer weakened colonies. There was a slight decrease in the number of active mounds at 24 weeks post-treatment. It is suspected that this is due to the activity of the Extinguish and/or larger colonies where the queens were killed by Amdro, but it took several months for the remaining workers to die.

It took until the 24 week evaluation for the full rate Extinguish to show even a numerical reduction in active mound numbers. Because of high variability within plots and shortened monitoring period, it never achieved a statistically significant ($P < 0.05$) difference versus untreated plots, but numerically, the full rate of Extinguish was similar to the Amdro and Extinguish+Amdro treatments by the end of the test.

The Extinguish skip swath treatment only showed a 36% reduction in active mound numbers versus untreated plots by the end of the test. It is possible that these numbers could have decreased further, but it is unlikely given that worker brood was seen in most of the active mounds at the final evaluation.

To fully appreciate the implications of these results, one must compare them to the Amdro hopper blend and skip swath application results of Logic. Logic + Amdro produced similar, rapid control. However, Logic as a skip swath application has shown almost identical control to full rate, full coverage applications where Extinguish did not. Both Extinguish (s-methoprene) and Logic (fenoxycarb) are insect growth regulators, but are very different compounds in terms of their environmental stability. Fenoxycarb is relatively stable in the environment and it can persist in laboratory ant colonies (in the workers' crops) for months. Methoprene, on the other hand, is a relatively unstable compound. Therefore, it is possible that skip swath activity is the result of active ingredient transport within worker ants, rather than or in addition to, forging of ants into treated areas. An unstable compound would either not persist within workers once consumed or in the environment waiting to be picked up.

Other slow-acting fire ant baits with the active ingredients pyriproxyfen and abamectin are now on the market. Results from this test suggest that combining them with Amdro may speed their activity, as it does Logic and Extinguish. However, these same results suggest that these other compounds must be evaluated individually, particularly in regard to skip swath and/or reduced rate applications.