Deltamethrin Dust for the Control of Individual Colonies of Red Imported Fire Ants

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With the recent regulatory actions regarding some active ingredients (diazinon, chlorpyrifos) available for use in individual mound treatments of red imported fire ants (*Solenopsis invicta* Buren), many other products are being considered as replacements. One already available in stores is Bengal® UltraDust® Fire Ant Killer, a 0.05% deltamethrin dust formulation. As a dust, this product has the advantage of being applied dry, thus avoiding the need extra step of irrigation after product application.

Objective: Test the effectiveness of dry-applied deltamethrin dust for the control of individual fire ant colonies.

Materials and methods

The test site was an ungrazed, mowed area located at Coulter Field, the Bryan municipal airport. Fire ant density was about 400 active mounds per acre. A strip, 30 feet wide and indeterminate length was first established. To take advantage of high mound density two parallel strips were established. Beginning at one end of each strip all active fire ant mounds were marked with a single color surveyor's flag until the first 10 were marked. This set of 10 mounds was considered a plot. Flag color was changed for the next 10 mounds and so on until a sufficient number of plots were marked. Other flags were placed along the edge of the strip between plots to define the length, and therefore area, of each plot. Plot lengths were arrayed from shortest to longest, then divided into four equal sets (replications).

Treatments were assigned within replications so that the total lengths (areas) of each treatment was as equal as possible. In this way, there was a replication of high-density plots, two of medium-density and one of low-density. Total area for all treatments was approximately the same to help equalize the chances of colony re-location/shattering within plots and re-invasion pressure from outside plots.

Treatments were applied on October 20, 2000. Since this product was added to a concurrent test, untreated mounds were irrigated with one gallon of water per mound. Weather during application was cloudy, with temperatures in the 70's. The ants were very active with brood visible near the tops of mounds. Evaluations were conducted using the minimal disturbance technique. Mound activity was determined by the best judgement of the evaluator relative to activity of untreated mounds in the prevailing weather and soil conditions.
Treatments included: deltamethrin 0.05% dust, 1 Tablespoon/mound dry; diazinon 5.0% granules, ½ cup/mound followed by 1 gallon water drench; untreated control.

Post-treatment evaluations were conducted on October 21 (24 hours), 23 (3 days), 27 (7 days), November 5 (14 days) and November 17 (one month). Plots were surveyed at 7 days and one month for the presence of new mounds. To better use valuable research space, this test was combined with "Two Formulations of Granular Permethrin for the Control of Individual Colonies of Red Imported Fire Ants " (p.64). Appropriate data were extracted and analyzed separately using PC SAS analysis of variance procedures with means separated using Tukey's studentized

range (HSD) test, $P < 0.05$.

Results and Discussion

As shown in **Table 1**, at one day, deltamethrin showed significantly ($P<0.05$) fewer active mounds than in untreated control plots, but significantly ($P<0.05$) more compared to diazinon-treated plots. The numerical difference persisted to day three, but differences were not statistically significant ($P<0.05$). After some rain, there was little difference between the two treatments by 7 days and both were significantly ($P<0.05$) lower than untreated controls.

Between the 7 and 16-day evaluations, the entire region received over six inches of rainfall. The area around Coulter Field received 6 inches in one night with an additional 4 inches in succeeding days. Consequently, the soil was saturated for the remainder of the test and many marked mounds were barely recognizable. Continued rains resulted in a substantial drop in untreated mound numbers, as well. By 16 and 30 days, there were no active mounds in plots of either treatment and both were significantly ($P<0.05$) lower than untreated controls. Deltamethrin plots had numerically more new mounds than diazinon plots and were similar to levels in untreated plots at 30 days. This resulted in deltamethrin being statistically similar to untreated plots at 30 days, while diazinon remained significantly ($P<0.05$) lower than untreated plots. It must be mentioned that, by chance, all deltamethrin treatments were in the "high" row of plots. These plots had less standing water than those in the other row and, in general, had more colonies migrate into them.

This product was easy to use and eventually gave similar control to the diazinon standard, now discontinued for residential use by the EPA, but complete control was slower and appeared to need rainfall. Though not supported statistically, there were also concerns based on numerical differences and field observations about colony relocation due to the slow activity.

Table 1. Results of mound evaluations: all treatments, 10 mounds per plot treated, 4 replications. Bryan, TX, treated October 20, 2000.

	Mean number of active mounds								
Treatment	1 day	3 day	7 day	7 day new	7 day tot	16 day	30 day	30 day new	30 day tot
untreated	9.25 a	9.25 a	8.25 a	2.25 a	10.50 a	7.25 a	5.00 a	4.25 a	9.25 a
deltameth.	2.50 b	2.25 b	0.50 b	3.50 a	4.00 b	0.00 b	0.00 b	5.00 a	5.00 ab
diazinon	0.00 c	0.50 b	0.25 b	2.50 a	2.75 b	0.00 b	0.00 b	0.75 a	0.75 b
F	62.89	18.57	23.65	3.43	8.69	53.72	20.60	2.68	7.21
P	0.0001	0.0014	0.0007	0.0825	0.0102	0.0001	0.0010	0.1309	0.0161
R^2	0.9813	0.9393	0.9517	0.7410	0.8787	0.9781	0.9450	0.6908	0.8573
MSD.	1.6570	2.9597	2.5822	2.4789	4.2322	1.5761	1.7714	5.2274	4.7559

Means in the same column with the same letter are not significantly different. Means separated by Tukey's studentized range (HSD) test, $P < 0.05$. df = 6.

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