

**Evaluation of Different Rates and Formulations of Bifenthrin for the
Control of Individual Red Imported Fire Ant Colonies
Brazos Co., Texas - 1997**

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Two formulations of the pyrethroid compound bifenthrin (Talstar® Flowable and SPG97-003) were applied to mounds of the red imported fire ant (*Solenopsis invicta* Buren) to test their effectiveness and speed in eliminating ant activity. Each formulation was applied at three different rates. Spectracide® 5% diazinon granule, was used as a standard treatment for comparison.

Materials and Methods

The test was located in western Brazos County, Texas in an ungrazed pasture with an infestation in the 200-300 mounds per acre range. Plots were established by marking two 30-foot wide strips 20 feet apart and of indeterminate length. Within each strip, beginning at one end, 10 active fire ant mounds were marked with wire surveyor's flags of a single color. The next set of 10 mounds was then marked with another color and so on, alternating colors, until 32 plots of 10 mounds each had been marked in the two rows. Flags were placed along one edge of the plots at the midpoint between sets of mound-marking flags, thereby delineating the boundaries of each plot.

Plot lengths were measured and recorded. Lengths were then arrayed from highest to lowest and divided into 4 sets (replications) of 8 plots each. Within each replication, treatments were assigned randomly to plots. The total lengths of the 4 plots of each treatment were then summed. Treatments were then re-assigned within replications as needed so that the total plot length of all treatments were as equal as possible. In this way, bias was reduced in plot assignment and the area available for ant re-invasion was roughly equal for all treatments.

Treatments were applied 26 September 1997, beginning at 8:30 a.m. The weather was clear with temperatures reaching a high of about 85EF in the afternoon and the soil was fairly moist allowing for visibly "worked" soil on active mounds. The following treatments were applied:

<u>Treatment</u>	<u>Conct.</u>	<u>Amount</u>	<u>Application Method</u>
Bifenthrin			
SPG97-003 (gran.)	0.05%	1 cup/mound	+ 1 gal. water drench
SPG97-003 (gran.)	0.05%	½ cup/mound	+ 1 gal. water drench
SPG97-003 (gran.)	0.05%	¼ cup/mound	+ 1 gal. water drench
Talstar Flowable	7.9%	0.592 ml/mound, 12.5 ppm	1 gal. solution
Talstar Flowable	7.9%	1.184 ml/mound, 25 ppm	1 gal. solution
Talstar Flowable	7.9%	2.368 ml/mound, 50 ppm	1 gal. solution
Diazinon (gran.)	5%	1/3 cup/mound	+ 1 gal. water drench
Control		none	1 gal. water drench

Talstar Flowable was mixed in batches of 10 gallons each and applied by means of sprinkler cans with the breaker heads removed so that the water stream would break through the mound crust. Irrigation of granular treatments and untreated control mounds were made with the same sprinkler cans with the breaker heads attached to avoid washing away the granular material.

Evaluations were made at 3, 7, 13 and 34 days post-treatment. Plots were surveyed for satellite mound formation at 34 days. Evaluations were conducted by lightly disturbing the mound with a sharpened tool handle or small shovel. A mound was considered active if a number of ants rose to the surface in a defensive manner within 15 seconds of disturbance. Results were analyzed using PC SAS ANOVA and Tukey's studentized range test for mean separations ($P < 0.05$).

Results

Mean number of active mounds per plot of 10 treated or as indicated

Treatment	3-day	7-day	13-day	34-day	34 sats*	34 tot*
Control	9.25 a	9.00 a	8.50 a	8.50 a	3.00 a	11.5 c
SPG 1 cup	0.00 c	0.25 b	0.00 b	0.00 b	2.50 a	2.50 b
SPG 0.5 cup	1.00 c	0.00 b	0.00 b	0.75 b	2.75 a	3.50 b
SPG 0.25 cup	3.00 b	1.50 b	0.75 b	0.75 b	2.25 a	3.00 b
TF 12.5 ppm	0.00 c	0.25 b	0.00 b	0.00 b	1.25 a	1.25 b
TF 25 ppm	0.00 c	0.00 b	0.00 b	0.00 b	1.00 a	1.00 b
TF 50 ppm	0.00 c	0.00 b	0.00 b	0.00 b	1.50 a	1.50 b
Diazinon	0.50 c	0.00 b	0.00 b	0.00 b	0.50 a	0.50 b
F	42.87	41.33	25.91	32.83	2.69	19.59
P	0.0001	0.0001	0.0001	0.0001	0.0270	0.0001
Min. sig. diff.	1.9644	1.9365	2.338	2.054	2.5699	3.2074

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

* sats = satellite or unmarked mounds found within plot; tot = active marked + sat mounds

Discussion

Both bifenthrin formulations significantly ($P < 0.05$) reduced active mound numbers versus water-drenched control mounds at all rates on all evaluation dates. The 1/4 cup rate of SPG97-003 had significantly more active mounds than the other treatments at day 3. Otherwise, all bifenthrin and diazinon treatments were statistically similar at all evaluation dates. There were no significant differences in satellite/new mound formation at 34 days post-treatment and control plots had significantly more total mounds than all treatments on that date.

All Talstar Flowable treatments produced 100% control within 3 days of treatment and throughout the test. The one active mound found on day 7 was borderline in activity and may have been the result of an abortive colonization attempt after nearly a week of rains.

The bifenthrin granular formulation, SPG97-003, showed a numerical, if not statistical rate response. The 1/4-cup rate yielded only 70% control at 3 days. The number of active mounds continued to decline, but, unlike the other granular and flowable rates, never reached 100% control. The 1/2-cup rate was also slower to work than the 1-cup rate, but did reach 100% elimination of ant activity in treated colonies at 7 days post-treatment. Surprisingly, the 1-cup rate had one active mound appearing at 7 days. This mound was observed to have a fairly large number of ants crawling among a pile of moist granular material. The mound returned to having no ant activity by 13 days.

From an ease-of-use standpoint, the Talstar Flowable needed the usual safety precautions when mixing any chemical, but produced rapid, thorough control. The granular material was easier to handle, but 1 cup of material per mound, even on these rather large mound structures, seemed excessive. A 1/4-cup seemed inadequate for some of the larger mounds and produced less than satisfying results. The 1/2-cup rate seemed to be a reasonable amount and produced good, though not outstanding, control. Though the application of the granular material itself was quick and easy, watering the granules in was just as time-consuming as using the Flowable drench, with slightly poorer results. One of the main problems with general use of granular materials is failure to irrigate after application, resulting in colony relocation and consumer dissatisfaction.