

**The Active Ingredient Indoxacarb as a
Broadcast Bait for the Control of Red Imported Fire Ants**
Palestine Airport, Anderson Co., Texas - 2002

Charles L. Barr - Extension Program Specialist, Fire Ant Project

Indoxacarb, an oxadiazine class of novel chemistry manufactured by DuPont, acts as a sodium channel blocker. The ingested toxicant causes very rapid cessation of feeding (a few hours in Lepidopterans) and death within 48 hours. Animal and environmental toxicity is very low and the active ingredient has been labeled for use on vegetables and other crops around the world. Since its primary path is through ingestion, it seemed to lend itself well to bait applications at very low dosages, such as are found in baits used to control red imported fire ants, *Solenopsis invicta* Buren.

Objective: Determine effectiveness of indoxacarb broadcast bait for the control of fire ants.

Materials and Methods

The test site was located at the municipal airport of Palestine, Texas in central east Texas. The airport consists of two perpendicular, asphalt runways 4,000 and 5,000 feet long arranged at right angles to each other to form a cross. They are connected by several asphalt taxiways. The entire site is mowed at least once per year with strips adjacent to the runways mowed more frequently. Soil at the site is generally sandy. The great majority of red imported fire ant mounds are located in the somewhat heavier fill soil within 20 feet of the pavement, though few were found in actual contact with the pavement.

Plots were arranged to use as many runway lights as possible as plot end markers. Plots along unlighted taxiways were measured and marked with small pieces of rope nailed into the ground. These were also fixed with a GPS unit. Plots were 200 feet long (the distance between lights) with a 10 foot untreated buffer at each end. One long edge of every plot was in contact with pavement. Plots were 60.5 feet wide for a total treatment area of 0.25 acres (180 x 60.5 feet). Sample areas consisted of the strip of land 20 feet wide, adjacent to the pavement along one long edge, and 10 feet inside the treatment area at the ends. Total sample area: 3,200 ft.² (160 x 20 feet = 0.073 acres).

Mounds were evaluated using the minimal disturbance technique. Mounds were lightly disturbed with a pointed tool handle and ant reaction observed. A mound was considered active if a sufficient number of ants appeared at the surface, compared to the reaction of mounds in untreated areas, given the prevailing weather conditions. Evaluations were completed before 1:00 p.m. during the summer to avoid false negative readings due to the heat. Pre-counts were conducted on June 4, 2002 and treatments applied on June 11. Bait treatments were applied by hand using Earth-Way® Ev-N-Spred rotary seeders, while granular products were applied using a Warren's T-7II spreader. Post-treatment counts were taken on June 20 and 27, July 11 and 23, August 12, September 11, October 16 and December 18.

Treatments for this test were assigned based on pre-count active mound numbers for all plots established at the test site (total of 18 treatments, 72 plots) using the method outlined in Barr et. al (2002) to help compensate for initial mound count variability. All treatments were replicated four times. One Amdro plot was paved over during airport renovation after the four week evaluation. For Week 6 through Month 6 this missing observation was calculated using the

formula $tT + bB - G / (t-1)(b-1)$ where t = number of treatments (6); T = sum of observations in treatment; b = number of blocks (4); B = sum of observations within block and; G = sum of all measurements (Ott 1988). Appropriate raw data were extracted from the larger trial then analyzed using SAS ANOVA procedures with means separated using Tukey's Studentized Range (HSD) Test, $P < 0.05$.

Table 1. Broadcast treatments. Palestine, Texas Municipal Airport, 2002

Active ingredient	Product/carrier	Formulation	Application Rate
indoxacarb	N/A	0.025% conv. bait	1.5 lbs./acre
indoxacarb	N/A	0.05% conv. bait	1.5 lbs./acre
indoxacarb	N/A	0.1% conv. bait	1.5 lbs./acre
hydramethylnon	Amdro [®]	0.73% conv. bait ¹	1.5 lbs./acre
s-methoprene	Extinguish [™]	0.5% conv. bait	1.5 lbs/acre
bifenthrin	Talstar [®] 2G	0.2% granular	100 lbs./acre
untreated	N/A	N/A	N/A

¹ Conventional bait = soy bean oil formulated on defatted corn grit.

Results and Discussion

Table 2 shows the results of the test. All rates of indoxacarb showed significantly ($P < 0.05$) fewer active mounds than in the untreated plots at one week post-treatment through two months. After this point, re-invasion began to occur and statistical differences began to lessen. There were no statistical differences and few numerical differences between the rates of indoxacarb, though the "86" rate was slightly the poorer of the three.

Table 2. Results of red imported fire ant mound evaluations: 3,200 ft.² plots, 4 replications. Palestine, TX. Treatments applied June 11, 2002.

Treatment	Mean number of active mounds								
	Pre	1 wk	2 wk	4 wk	6 wk	2 mo	3 mo	4 mo	6 mo
untreated	16.50 a	16.75	14.75	11.25	15.75	12.50	11.75	16.50	17.50 a
indox 86	15.75 a	1.25 b	1.75 b	3.00 b	2.75 b	2.50 b	3.25	7.75 a	7.00 ab
indox 87	15.75 a	0.75 b	0.00 b	0.25 b	2.00 b	2.00 b	1.75 b	7.50 a	6.50 ab
indox 88	16.00 a	0.25 b	0.50 b	2.00 b	2.00 b	4.50 b	3.00	10.50	12.75 ab
hydrameth.	15.75 a	4.00 b	0.75 b	3.50 b	6.00 b	4.00 b	7.75	10.75	9.25 ab
methoprene	16.00 a	16.25	8.25	5.25	2.25 b	1.00 b	0.00 b	3.50 a	3.25 b
bifenthrin	16.75 a	3.25 b	2.00 b	0.75 b	2.50 b	2.75 b	5.50	9.50 a	7.25 ab
F	0.08*	8.43	6.39	5.76	5.15	6.57	3.24	1.06	1.64
P	0.9978	0.000	0.000	0.000	0.001	0.000	0.016	0.437	0.1786
R ²	n/a	0.808	0.761	0.742	0.720	0.766	0.618	0.345	0.4500

MSD	6.7803	10.26	8.871	7.059	9.13	9.131	9.112	15.88	14.194
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Means in the same column with the same letter are not significantly different. Means separated by Tukey's studentized range (HSD) test, $P < 0.05$. $df = 18$.

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

Hydramethylnon (Amdro), which performed statistically similar to indoxacarb, and bifenthrin (Talstar) showed similar, though not as dramatic mound reductions. S-methoprene (Extinguish), on the other hand, did not show significant differences ($P < 0.05$) until the two month evaluation, as would be expected from an IGR, but effects persisted through six months. These results are typical of fast versus slow acting bait products and the contact insecticide Talstar.

The notable finding of this test is how fast and how thoroughly the indoxacarb formulations eliminated mound activity. Though not statistically different, indoxacarb had consistently fewer active mounds than hydramethylnon on all dates through four months (With the exception of one mound in the Indox. 88 plots at 2 months.) The Indox 87 treatment even achieved 100% control at two weeks with the Indox 88 having a total of only two mounds in all four plots on this same date.

This was the first field test conducted in Texas on an indoxacarb bait. Results were very encouraging as to its continued development into a marketable product. A fall test was conducted with these same materials and provided some interesting results. (See Indoxacarb Bait Effects on Mound Activity and Foraging by Red Imported Fire Ants earlier in this publication, p. 1).

Literature Cited

- Barr, CL and RL Best. 2002. Product evaluations, field research and new products resulting from applied research. SW Ento. Supplement 25:47-52
- Ott, L. 1988. An introduction to statistical methods and data analysis. PWS-Kent Pub.Co., Boston. p.732.

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