

Comparison of Broadcast Treatment Vs. Spot Treatment of Indoxacarb for the Control of the Red Imported Fire Ant, *Solenopsis invicta* Buren

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The sting of red imported fire ants, *Solenopsis invicta* Buren (Hymenoptera: Formicidae), can be fatal, so residents who live in areas where fire ants are common should know effective means for control. When treating for red imported fire ants, bait applications are often used. Fire ant bait products consist of corn grit containing soybean oil and insecticide. The fire ant workers pick up the bait particle, extract the toxic oil, and feed it to the queen and other ants (Merchant and Drees 2006). Broadcasting fire ant bait or treating individual ant mounds are the two most common ways to use these products to obtain control (Drees et al. 2002). In this trial, we wanted to evaluate if broadcasting a fire ant bait containing indoxacarb is as effective as placing out manufactured ant bait stations containing indoxacarb at controlling fire ant populations.

Materials and Methods

On October 16 2009, on the grounds of Myers Park in McKinney, TX, twelve plots, each measuring 100 by 100 feet (0.25 acre) were established (**Fig. 1**). Twenty foot buffers were established on all sides of the plots. The three treatments evaluated in this trial were: 1) untreated control; 2) broadcast application of Spectricide® Fire Ant Killer Plus Preventer Once N Done™ Bait (0.016% indoxacarb) at 5 lb per 0.25 acre plot; and 3) a "grid-spot" application of Spectricide® Ant Shield® outdoor killing stakes (0.05% indoxacarb) where bait stations were applied on a 30 ft by 30 ft grid, so 9 bait stations were placed within a 0.25 acre plot (**Fig. 2**). Within each plot, a 40 ft radius circular sub-plot was created and active red imported fire ant mounds were counted. Pre-treatment counts of active fire ant mounds were taken within each plot beginning at 12 p.m. with temperatures at 75° F and winds 0-5 mph. Active mounds were counted within each plot by disturbing suspected mound sites with a stick to determine activity. Mounds were considered active if many (dozens of) worker ants were observed within 15 seconds. All active fire ant mounds within the plot were counted and recorded. The mound counts were blocked and arrayed from the highest to the lowest mean number of active mounds per sub-plot and blocked into four replications or blocks. Treatments were randomly assigned within each replication. In addition, ant activity within the plots was evaluated by placing 10 slices of hot dogs around the 40 foot circle sub sampling plot and rating the ant activity after 1 hour from 0-10 (0= no activity; 1=10 ants; 2= 20 ants; 3=30 ants; 4=40 ants; 5=50 ants; 6=60 ants; 7=70 ants; 8=80 ants; 9=90 ants; 10=100+ ants).

Treatments were applied on October 18, 2009 from 10:35 a.m. to 1:45 p.m. with temperatures between 75-81° F. Broadcast treatments of 5 lbs of Once 'N Done® fire ant bait were applied using a Scott's® Handy Green II hand-held spreader (US Patent No. 5, 285, 971). The plots were evaluated at 3, 7, 14, 28 and 47 days post treatment using the minimal disturbance method, where suspected mound sites were disturbed and considered active if many (dozens of) worker ants were observed within 15 seconds.

Also, ant activity within the plots was evaluated using as described above. Data were analyzed using SPSS Analysis of Variance (ANOVA) test with means separated using Duncan's Multiple Range Test at $P \leq 0.05$ (SPSS for Windows, Lead Technologies, Version 13.0).

Results and Discussion

At the pretreatment observation, there were no significant differences found between the number of active mounds in treated and control plots (**Table 1**). However at the 3 and 7 day post treatment observations, both the bait station and broadcast treated plots had significantly less active fire ant mounds compared to the untreated control plots. At 14 and 28 day observations, the broadcast plots had significantly fewer active fire ant mounds compared to the bait station and untreated control plots; the bait station treated plots had significantly less active fire ant mounds compared to the untreated control plots. At the 47 day observation, both the bait station and broadcast treated plots had significantly less active fire ant mounds compared to the untreated control plots.

For the mean estimated numbers of foraging worker ants at food lures, there were no significant differences during the pre-treatment observation between the activity in the treated and untreated plots (**Table 2**). At the 3, 14, 28 and 47 day observations, there was significantly less activity in the treated plots compared to the untreated control plots. Overall, there was less activity in the bait station treated plots even though it was not significantly different than the broadcast treated plots.

In conclusion, there were fewer active fire ant mounds within the broadcast treated plots. Additional observations are required to document the full potential of these pre-manufactured bait stations as a method for fire ant control. The indoxacarb active ingredient was removed from the bait stations, since the final weight of the bait stations decreased overall by 2.47 grams compared to the initial weight of the stations. If these stations are effective for fire ant control, they could present a faster, easier and hassle free way for homeowners to decrease populations within their areas. This method could be simpler than broadcast application of a bait formulation which requires an application device, and dispensing insecticide from contained bait stations may reduce environmental exposure to the insecticide.

Table 1. Number of active red imported fire ant mounds found after treating with indoxacarb at Myers Park, McKinney, TX.

Treatment	Precount	3 Days	7 Days	14 Days	28 Days	47 Days
Broadcast Treatment	12.75a	9.75a	4.75a	3.25a	2.50a	3.25a
Bait Station Treatment	12.75a	7.75a	5.75a	5.25b	4.25b	2.50a
Untreated Control	13.00a	12.50b	11.50b	11.25c	10.25c	9.00b
<i>df</i>	2	2	2	2	2	2
<i>F value</i>	0.01	9.10	38.22	99.84	56.64	46.69
<i>Significance</i>	0.99	0.01	0.00	0.00	0.00	0.00
<i>Mean Square</i>	0.08	22.75	53.08	69.33	66.08	50.58

^aMeans followed by the same letter within the same column were not significantly different using Analysis of Variance (ANOVA) and means separated using Duncan's Multiple Range Test at $p \leq 0.05$ (SPSS, Windows 11.5).

Table 2. Mean estimated numbers of red imported fire ant workers at food lures from 0 to 10 (0 to 100 ants) found on 10 hot dog slices around the 40ft diameter circle in each plot at Myers Park, McKinney, TX.

Treatment	Pre-count	3 Days	14 Days	28 Days	47 Days
Broadcast Treatment	4.00a	3.94a	4.38a	4.25a	2.38a
Bait Station Treatment	5.76a	4.13a	3.04a	3.20a	1.75a
Untreated Control	7.00a	7.69b	6.95b	6.75b	4.38b
<i>df</i>	2	2	2	2	2
<i>F value</i>	2.64	24.15	20.41	5.68	7.03
<i>Significance</i>	0.13	0.00	0.00	0.03	0.01
<i>Mean Square</i>	9.09	17.86	15.82	13.30	7.52

^aMeans followed by the same letter within the same column were not significantly different using Analysis of Variance (ANOVA) and means separated using Duncan's Multiple Range Test at $p \leq 0.05$ (SPSS, Windows 11.5).

Figure 1. Testing site for fire ant bait trial testing indoxacarb in Myers Park, McKinney, TX.



Figure 2. Indoxacarb bait station placed in a 30 foot by 30 foot grid pattern in a ¼ acre plot in Myers Park, McKinney, TX.



Literature Cited

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