

## **Evaluation of Bushwhacker™ Fire Ant Killer, a boric acid based bait product**

Bastiaan M. Drees, Associate Professor of Entomology  
and Extension Specialist,  
Charles L. Barr, Extension Associate  
and S. Bradleigh Vinson, Professor of Entomology

Texas A&M University System

Bushwhacker™ Fire Ant Killer, a product of Bethurum Research and Development, Inc. (P.O. Box 3456, Galveston, Texas 77552), is a formulation containing 18% boric acid as the active ingredient. The product is formulated as a bait composed of 45 ingredients, including cheese, milk, sugar and powdered dry shrimp (The Galveston News, July 26, 1989). Bushwacker was registered by the Environmental Protection Agency (EPA Reg. No. 59977-1) and the Texas Department of Agriculture (EPA EST. No. 59977-TX-1) in 1991.

**Laboratory trials.** There has been little research conducted to confirm the effectiveness of the product. S.D. Porter (unpublished) conducted laboratory evaluation with the product at the Department of Zoology at the University of Texas. Boric acid baits were found to kill large numbers of fire ant workers and larvae. However, queens and pupae were not eliminated, and most treated colonies resumed brood production after 3 to 5 weeks. Porter concluded that “boric acid is not a suitable toxicant for large-scale or long-term control programs.”

**Background Field trials.** Data supporting the performance of Bushwhacker treatments under field conditions was obtained by the Texas Department of Agriculture under the direction of Roger Mulder, Fire Ant Activity Manager of Pest Management Programs, by Agricultural Inspector Mel L. Clark (unpublished data provided by Bethurum Research and Development, Inc.) In an “unofficial” trial, several acres of fire ant infested land owned by Mr. Kenneth Fielder in Dayton, Texas, were treated using three pounds Bushwhacker per acre during the week of June 16, 1988. Prior to treatment, 36 fire ant mounds were documented along six transects (16 without worker brood). By September 19, 1988, only 9 mounds (6 without worker brood) were documented along the same transects. No untreated control plots were reported to have been established or monitored during this trial.

A similar, “official,” test was conducted on the Murff Turf Farms, Inc. in Harris County on April 26, July 20, and September 21 1989. In this trial, 10 acres were treated with 2 pounds Bushwhacker per acre. M. L. Clark (unpublished report and Bushwhacker Associates, Inc. videotape) reported the number of fire ant mounds along 48 transects for each date. The total of active fire ant mounds decreased from 498 to 45 and then to 13 through the ant mound monitoring dates. Again, no untreated control plot was reported to have been established or monitored.

To our knowledge (pers. Comm. Verne McFarlin, Efficacy Reviewer, EPA; 703/305-5407) and from personal communication with George Bethurum, these data were the only efficacy trials

submitted to the Environmental Protection Agency to document product performance prior to obtaining registration.

The three trials reported here were conducted in an attempt to evaluate the effectiveness of Bushwhacker for suppressing fire ants using comparisons between Bushwhacker-treated and untreated plots or areas. The first test simulated large-scale applications using a broadcast treatment of 1 pound Amdro<sup>®</sup> (hydramethylnon) per acre as a treatment standard; the second simulated a small-scale, homeowner-type situation; and the third was an individual mound treatment.

## **Materials and Methods**

All treatments made in these trials used material from Bushwhacker BATCH 1 07 5 1 91 (EPA Reg. No. 59977-1; EST. No. 59977-TX-1) in 1991.

**Large-Plot Field Test.** This trial was conducted on the J.B. Evans Turf Farm in Algoa, Texas. A standard treatment, Amdro, was compared to the labeled rate of Bushwhacker. On 31 July 1991, three, one acre, square plots were marked on an area of dense, managed turf. The untreated plot was centrally located and the insecticide treated plots were located more than 200 feet apart. Counts of mounds with fire ant activity were made using a 108 foot long string to circumscribe a circle within each of the test blocks. The total number of mounds with activity was recorded for each quadrant within each circle, approximating an area of 0.21 acre per quadrant subplot. Mound activity was determined by light disturbance with a wooden tool handle. Counts were taken during the morning hours while ants were active. Mound density was uniform, with roughly 100 mounds per acre across the site, indicating a moderate infestation of possibly polygyne (multiple-queen) fire ants. Subsequent evaluations (September 3, 1991, October 29, 1991 and March 16, 1992) were made in an identical manner.

Bushwhacker was applied at the labeled rate of 3 pounds per acre using two, hand-held, Cyclone<sup>®</sup> 1C1 broadcast seeders. One applicator took half the material and began crossing the plot in swaths approximately 8 feet wide. The other applicator began at the opposite corner and crisscrossed the plot in a direction perpendicular to the first. This method assured a very thorough and even application of the bait. An adjacent one-acre plot was treated with Amdro at a rate of 1 to 1.5 pounds per acre. The third plot was left untreated to serve as a control. Subplot data were analyzed for each ant mound monitoring date using Analysis of Variance (ANOVA). Mean (average) values were separated using the Least Significant Difference (LSD) separation of means at a probability level of 0.05.

**Small-Plot Field Test.** This trial was initiated on July 18, 1991 in a greenbelt park managed by the city of College Station, in the Raintree subdivision. The area is a power line right-of-way approximately 200 feet wide and is lined on both sides by homes. Four 0.25-acre circular plots were marked with a 15 foot buffer between plots. The plots were divided in half and the rectangle defined by the extremities of one of the semi-circles in each plot was treated with the material. The treatment area therefore, approximated yard-sized rectangles, 58 by 116 feet (0.154

acre or 6,728 sq. ft.). The other half of each plot was left untreated as a control. Bushwhacker was applied using a Cyclone 1C1, hand-held, broadcast seeder at the label rate of 3 pounds per acre. On July 23 a second, identical application was made as directed on the label. All mound evaluations, (August 16, 1991, September 11, 1991, October 17, 1991, and March 18, 1992), were made by counting the active mounds in each quadrant of the 0.25-acre circle using the minimal disturbance technique. Resulting active mound counts were analyzed using the Students *t* test at  $P \# 0.05$ .

**Individual Mound Treatment Field Test.** This trial was initiated on September 11, 1991 on the earthen dam impounding Lake Somerville in Burleson County. The area is well drained, mowed, native grassland with a moderate fire ant infestation. A 0.25 acre circular plot was marked and divided into quadrants. All mounds in each 2,642 sq. ft. (0.0606-acre) wedge-shaped quadrant were first counted, then treated with one heaping teaspoon of Bushwhacker per mound. A similar plot located more than 150 feet away from the treated plot was left untreated and used as a control. All mound evaluations (October 21, 1991, November 25, 1991, and March 17, 1992) were made using the minimal disturbance technique. Data were analyzed using the Students *t* test at  $P \# 0.05$ .

## **Results**

**Large-Plot Field Test.** Following treatment, no significant differences in the number of active red imported fire ant mounds were documented between the Bushwhacker and untreated plots (Table 1). The broadcast Amdro treatment significantly reduced active mound numbers 88, 68 and 83 percent at 5 weeks, 3 months and 7 months respectively following application relative to the untreated plot.

**Small-Plot Field Test and Individual Mound Treatment Tests.** No significant differences were documented between Bushwhacker and untreated areas throughout the monitoring period (Table 2 and 3).

## **Discussion**

Bushwhacker Fire Ant Killer was difficult to apply as directed. Initially, a homeowner-type, wheeled broadcast fertilizer spreader with a rotating wire agitator was tested. The product was packed down by the wire and all flow was quickly blocked. A homeowner-type, wheeled fertilizer drop spreader was also tried, but it's flow could not be restricted enough to apply the label rate. Auger-type applicators as described on the product label are unavailable. Consequently, applications were made using Cyclone Model 1C1 seeders that have vibrating agitator gates. Application was difficult and required much agitation of seeders since the formulation was of uneven consistency and tended to cake up on the vibrating metering plate. Instructions for individual mound application are not provided on the current product label.

The product label states that effects of treatments should begin to occur from 6 to 8 weeks

following treatment. No significant reduction in number of fire ant mounds was documented following Bushwhacker treatments throughout the monitoring periods of these three trials (Tables 1, 2, 3). Based on these results, Bushwhacker Fir Ant Killer had no effect in reducing numbers of active red imported fir ant mounds in treated areas. Fire ant activity is known to be extremely seasonal. During hot, dry periods of the year, fire ant activity is dramatically reduced. Further, population densities often fluctuate and the potential of various products to cause a significant reduction in ant populations can only be determined with the use of carefully controlled test.

### **Acknowledgment**

The authors are grateful for the assistance provided by Mark Smith and Dr. William Johnson, County Extension Agents in Galveston County.

**Table 1.** Mean number of active red imported fire ant mounds per 0.21 acre subplot, J.B. Evans Turf Farm, Algoa, Texas, 1991.

Mean no. ( $\pm$  S.D.) active mounds\*

<u>Treatment</u>	<u>Pre-count</u>	<u>5-week</u>	<u>3-month</u>	<u>7-month</u>
Bushwhacker	18.7500 a	27.2500 .b	26.0000 .b	39.5000 .b
Amdro	17.0000 a	4.5000 a.	5.7500 a.	5.5000 a.
Check	30.0000 a	37.2500 .b	18.2500 .b	32.7500 .b
<i>F-ratio</i>	<i>3.515</i>	<i>22.398</i>	<i>25.351</i>	<i>69.124</i>
<i>Probability</i>	<i>0.0976</i>	<i>0.0016</i>	<i>0.0012</i>	<i>0.0001</i>
<i>LSD 5 %</i>	<i>13.021</i>	<i>12.272</i>	<i>7.022</i>	<i>7.492</i>

\* Means followed by the same letter are not significantly different using ANOVA and Least Significant Difference Test at P = 0.05.

**Table 2.** Mean number of active red imported fire ant mounds per 0.154 acre plot, Raintree Subdivision, College Station, Texas, 1991.

Mean no. ( $\pm$  S.D.) active mounds\*

	<u>pre-count</u>	<u>4 weeks</u>	<u>9 weeks</u>	<u>13 weeks</u>	<u>8 months</u>
Control	10.375 $\pm$ 3.2923	10.875 $\pm$ 3.3991	10.000 $\pm$ 4.1404	15.625 $\pm$ 4.9262	23.000 $\pm$ 6.9898
Bushwhacker	12.125 $\pm$ 3.5632	12.125 $\pm$ 5.0267	8.250 $\pm$ 2.4928	13.250 $\pm$ 4.1662	26.500 $\pm$ 7.0508
<i>t =</i>	<i>-1.0203</i>	<i>-0.5826</i>	<i>1.0242</i>	<i>1.0412</i>	<i>-0.9971</i>
<i>Prob.*</i>	<i>.1625</i>	<i>.2847</i>	<i>0.1616</i>	<i>0.1577</i>	<i>0.1678</i>

\* Probability of greater than 0.05 indicates no significant difference using the Student's *t* test.

**Table 3.** Mean number of active red imported fire ant mounds per 0.0606 acre subplot, Somerville Lake, Texas, 1991.

---

Mean no. ( $\pm$  S.D.) active mounds

	<u>pre-count</u>	<u>5 weeks</u>	<u>3 months</u>	<u>6 months</u>
Control	9.250 $\pm$ 2.6300	10.250 $\pm$ 2.7538	10.750 $\pm$ 2.9861	18.500 $\pm$ 5.0662
Bushwhacker	12.500 $\pm$ 5.1962	12.250 $\pm$ 4.9917	9.500 $\pm$ 1.7321	17.250 $\pm$ 4.9244
<i>t</i> =	<i>-1.1161</i>	<i>-0.7016</i>	<i>0.7242</i>	<i>0.3538</i>
<i>Prob.</i> *	<i>0.1535</i>	<i>0.2546</i>	<i>0.2481</i>	<i>0.3678</i>

\* Probability of greater than 0.05 indicates no significant difference using the Student's *t* test.

---