

**EFFECT OF RED IMPORTED FIRE ANTS
ON WILDLIFE (RODENT) POPULATIONS
LAKE CONROE DAM, MONTGOMERY COUNTY, 1994:
FIRE ANT MOUND MONITORING AND SUPPRESSION PROGRAM**

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Initial results of a two-year project to document the impact of the red imported fire ant, *Solenopsis invicta* Buren, on wildlife populations are reported. Large plots were established and maintained in which fire ants were suppressed using a biannual application of Amdro® Insecticide Bait (hydramethylnon). This product was selected because of its rapid reduction of fire ant numbers (80 percent in 3 to 5 weeks) and minimal effects on ants outside treated plots. Results from rodent trapping efforts in these plots are to be compared to those from untreated plots. The value of conducting long-term research using this plot design and potential methods of optimizing a sequential bait treatment program using a theoretical re-treatment threshold are discussed.

Materials and Methods

Ten plots, 620 to 656 ft. long and 240 ft. wide (approximately 3.47 acres) were established. On 24 May, 1994, alternating plots were treated with a broadcast application of Amdro® Insecticidal Bait (Lot #310401E, 0.73% hydramethylnon), using 5.2 lbs. (1.5 lbs./acre) of the bait formulation per plot using a tractor mounted Herd Model GT-77 spreader. Each treatment plot was covered with eight 30 ft. wide swaths. The weather was partly cloudy and temperature was 80-87°F. Grass was dry during treatment (10:15 am to 12:15 pm).

Fire ants were monitored by counting the number of active mounds along three 30 by 160 ft. (0.11 acre) transects, starting and ending 40 ft. from the edge of each plot, using the minimal disturbance method, May 25, 1994. Treatment plots were treated a second time on 6 October 1994 and the effects of the treatment were monitored on 18 November. Results were analyzed using the Students *t* test ($P \leq 0.05$).

Results

Mean numbers of active fire ant mounds were not statistically different: 20.33 versus 17.07 for treated and untreated control plots, respectively (d.f. = 17; $P = 0.4141$; $F = 1.11$)(Table 1). One month following treatment, Amdro® treated plots had significantly fewer active ant mounds than the untreated control plots (1.67 versus 8.73 for treated and untreated control plots, respectively (d.f. = 17; $P = 0$; $F = 99999.99$)), an 80.9 percent reduction. During the week of 16 October 1994, Montgomery County received flooding rains (31 inches of rain). The lower

subplots/transects may have been flooded temporarily. However, the remaining area in this trial was not flooded. The 6 October treatment resulted in 86 percent reduction in numbers of fire ant mounds in treated plots versus untreated plots by 18 November (67/472).

Discussion

Results from monitoring the number of active fire ant mounds using the minimal disturbance method reported here are being correlated with results of methods to monitor foraging ant recruitment to bait stations by Jim Martin. Correlations results will help improve decision making in fire ant suppression programs.

Long-term fire ant suppression studies are seldom undertaken. However, such studies are helpful to document potential resistance of fire ants to insecticides. Although physiological resistance to insecticides is not anticipated to occur in fire ants because of their long reproductive cycle, behavioral resistance and avoidance of bait-formulated products remains a concern, particularly in light of recent resistance to cockroach bait formulations (Pennisi 1993). Long-term suppression program monitoring is also useful for documenting successful treatment programs utilizing sequential treatments of one or more insecticide as in the two-step method (Merchant and Drees 1993). These programs are often initially based on the combined results of short-term studies. Finally, long-term studies are required to document long-term ecological and economic effects caused by fire ants and/or fire ant treatments. Changes in fauna and flora are not expected to occur quickly.

Sterling (1984) discussed the concept of action levels and inaction levels. As economic injury levels (EILs) are developed for the red imported fire ant in agricultural situations, the concept of an economic threshold (ET) or action level (set below the EIL to allow action to be taken before that level is reached) will become a useful method to improve decision-making in fire ant management programs. The inaction level, justifying no chemical treatment for the cotton boll weevil occurs when four or more red imported fire ants are collected per 10 samples of cotton plant terminals using the beat bucket method (Knutson et al. 1993). Re-treatment thresholds that differ from the economic threshold for an initial treatment are established for certain pests such as the cotton bollworm and tobacco bollworm (Knutson et al. 1993). This integrated pest management (IPM) concept can also be useful for managing the red imported fire ant.

In the development of re-treatment thresholds for applying bait-formulated products for the suppression of the red imported fire ants, there is a need to consider cost (per mound and per acre), fire ant biology, desired level of suppression in time, and residual suppression provided by the treatment. The approximate per acre cost of a conventional fire ant bait treatment is \$10.00 per acre and a reasonable average cost of an individual mound treatment is \$0.50 (ranging from \$0.17 to over \$1.50). Using this price, one could treat about 20 mounds at \$0.50 for the price of one \$10.00 broadcast treatment. Treatment using a broadcast bait application is already discouraged in areas with less than 20 mounds per acre based on concerns for non-target ants (Drees and Vinson 1993). Fire ant foraging must occur in the treatment area in order for particles from a broadcast bait treatment to be collected, carried back to mounds and fed to the colony.

Therefore, a reasonable re-treatment threshold for bait products may be 20 to 30 or more mounds per acre.

There are a number of potential reasons for broadcast bait treatment failures. These include: 1) stale product and fertilizer blends; 2) low rate and poor coverage; 3) no ants actively foraging at time of treatment (too hot or too cold) or rain during or shortly after treatment; 4) contact insecticide applied sometime prior to treatment, suppressing foraging activity; 5) occurrence of flooding after application of a slow-acting bait causing treated colonies to float or migrate in or out of the treated area; 6) high initial mound density requiring additional applications to achieve acceptable suppression levels; and 7) no ants present because of successful prior treatments. If a product claiming to provide long-term suppression is applied when no ants are present to collect the bait, the bait quickly degrades in the environment and the possibility of rapid recolonization of ants begins shortly following application. Use of re-treatment thresholds, rather than use of a calendar-based treatment schedule can prevent this likelihood and optimize time between treatment intervals. This method can take advantage of natural environmental and seasonal ant suppression conditions such as periodic droughts and freezing winter conditions.

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Table 1. Active fire ant mounds in 30 by 160 ft. (0.11 acre) transects across treated and untreated 3.47 acre plots, Lake Conroe Dam, Montgomery Co., Texas 1994.

<u>Transect</u>	<u>Plot (Treated/Untreated)</u>									
	<u>1T</u>	<u>2U</u>	<u>3T</u>	<u>4U</u>	<u>5T</u>	<u>6U</u>	<u>7T</u>	<u>8U</u>	<u>9T</u>	<u>10U</u>
24 May 1994										
A	31	21	15	19	21	14	22	6	17	16
B	28	21	14	15	34	18	30	24	8	21
C	7	8	11	7	25	20	20	29	22	17
A-C	66	50	40	41	80	52	72	59	47	54
27 June 1994										
A	1	8	0	6	0	22	1	6	3	9
B	1	10	2	13	4	13	0	2	3	4
C	3	15	2	7	2	10	0	7	3	9
A-C	5	33	4	26	6	45	1	15	9	22
18 Nov. 1994										
A	2	8	0	38	6	43	0	31	10	25
B	4	21	1	31	11	53	5	16	1	38
C	3	39	12	50	7	42	4	22	1	15
A-C	9	68	13	119	24	138	9	69	12	78