Control of Imported Fire Ant Colonies by Field Removal

Bastiaan M. Drees, Professor and Extension Entomologist

In "The Texas Two-Step Method: Do-it-yourself Fire Ant Control for Homes and Neighborhoods" (Merchant and Drees, 2000, L-5070, Texas Agricultural Extension Service, Texas A&M University) and some popular magazines (Organic Gardening, April 2001), one non-chemical control option discussed encourages people to remove fire ant colonies by digging them up and then placing them in a bucket containing soapy water to drown the ants. This trial was conducted to determine if this method actually eliminates field colonies from the landscape as a method of imported fire ant control.

Materials and Methods

Four pairs of plots of various sizes were established, November 15, 2000 (150 by 15 ft. or 2,250 sq. ft. pair; 30 by 30 ft. or 900 sq. ft. pair; 39 by 48 ft. or 1,872 sq. ft. pair; and 75 by 75 ft. or 5,625 sq. ft. pair). Each plot contained 6 red imported fire ant mounds. In one of each pair of plots, ant colonies were removed by shoveling them into a 5 gallon plastic bucket until all visible brood and most of the worker ants had been eliminated from the field location. Colonies in the other pair of plots was slightly disturbed to determine ant activity and presence of brood (larval and pupal stages). All ant mound sites were marked for later observation. At 5, 11, 19, 35 and 51 days (Nov. 20, 26, Dec. 4, 20, 2000 and Jan. 5, 2001) after establishing this trial, marked mound sites were monitored for ant mounding activity to determine if colonies had been successfully removed from the field. On Nov. 22, 2000 due to the many active ant mounds in plots where colonies were removed, an effort was made to physically remove even more of the colonies remaining.

Data were analyzed using the Student's *t* test ($P \leq 0.05$) to compare mean numbers of imported fire ant mounds from "dug" versus control plots and "new" mounds appearing within treatment plots for each post-treatment evaluation date and for of these dates combined. Percent "control" was calculated for each evaluation date by dividing the number of ant active mounds from treated ("dug") plot means by active mound numbers in untreated plots, subtraction the total from 1 and multiplying by 100. Similarly, percent change in the number of "new" ant mounds detected in each plot was calculated, and finally the percent change was calculated for the "total" ant mound per plot means.

Results and Discussion

Field Removal: This trial was conducted during a period of cool temperatures, with several night temperatures approaching freezing during previous nights, and the temperature of the day this trial was established was less than 60 degrees F and overcast. Two of the plots were established in morning hours (8:30 to 9:45 a.m.), and two were established in the afternoon (2:30 to 4:00 p.m.). Colonies removed from the field were either taken into the laboratory for further studies or placed into a single pile 150 ft. from any of the plot sites. One colony removed from the

field was drowned in soapy water as described below.

To remove imported fire ant colonies from the field without being stung in the process is a challenge and a concern for anyone trying to follow directions for this "control method." With temperatures below 60 degrees, the cold-blooded ants move much more slowly. To prepare to dig colonies, protective clothing, such as rubber gloves and boots, liberally dusted with baby powder (corn starch or talcum), reduces the probability of being stung by "angry" worker ants. The shovel handle and inner surface of the 5-gallon bucket were also dusted with baby powder using a large ball of cotton to apply the dust. Fire ant workers can not crawl up vertical surfaces dusted with baby powder as long as the powder remains dry and in place.

After identifying active ant mounds, they were removed by digging them from the soil and placing the ant-containing soil into the 5-gallon bucket. In the case of small to medium sized ant mounds (4-6 inches in diameter), only ½ to 3/4 of the bucket was filled with soil. In the case of large mounds (12 to 18 inches in diameter), ant-containing soil filled the bucket or required two buckets-full to remove the field colony. Because temperatures had been cool, ants and brood were found to be deep in the soil, with "pockets" of brood being found 6 to 9 inches below soil level. During warmer, sunny periods, brood and ants would be expected to be closer to the mound surface and colonies easier to remove. However, they would be moving much faster, increasing the probability of being stung. Data from the 5 day "post-treatment" evaluation indicated most sites from which ant colonies were dug still had ant colony activity. Therefore, a second attempt was made to remove ant-containing dirt from the site. The diameters and depths of holes dug to remove ants were measured on the day the trial was terminated, January 5, 2000, and averaged 17.2 inches wide by 6.4 inches deep (per plot: 13.3 inches wide by 5.2 inches deep; 17.5 by 7.6; 20.8 by 6.7; 17.2 by 6.2), with a range from 10 to 24 inches wide and 4 to 10 inches deep.

"Drowning ants": To "drown" ant colonies, 2.5 gallons of water were added to a second 5-gallon bucket and 6 fl. oz. Dawn liquid dishwashing (2 fl. oz. per gallon detergent was added and stirred. The soapy water was then added to the ant-and-soil-containing bucket. This technique eliminated sloshing or splashing of water and allowed the proper amount of soapy water to be added to whatever volume of ant-containing-soil was in the bucket. Ant activity was eliminated within a matter of minutes using this technique, as expected.

Control of Field Colonies by Digging and Removal: Five days (Nov. 20, 3:15 p.m.) from removal of ant colonies, plots were inspected (**Table 1**). Rain and cool nights, near freezing, had occurred during this period. However, high temperatures in the afternoon were in the low 60's. In most sites, ants and brood were seen nesting on the upper, sun-lit, edge of the hole. In only a few sites where mounds had been removed ants were not present. Presence of queen ants was not determined. Plots in sandier soil with larger colonies had more active mounds. In heavy black clay plots with smaller (>6 inch diameter) mounds, less ant activity was noted. Evidently, a single attempt at field removal of colonies on a cool day was not very successful.

Throughout the 51 day monitoring period, percent "control" of ant mounds dug out of field plots ranged between 8.6 and 43.4 percent (**Table 1**), although the sites from which colonies were removed did appear to have far fewer ants than were associated with untreated ant colony sites. No significant differences were found between treatments ("dug" versus untreated) for any date except on the 5 day post-treatment date (3.50 $\pm$ 1.73 "dug" versus 5.50 $\pm$ 0.58 "untreated check"; t = -2/1909; P = 0.0355; d. f. = 6). For the analysis of data for all post-treatment sampling dates, were was a statistically significant 27.9 percent reduction of ant mound numbers per plot between "dug" (3.75 $\pm$ 1.80) versus "untreated check" (5.20 $\pm$ 0.6959) (t = -3/3667; P = 0.0009;

d. f. = 38). Although not significantly different, there were generally, more "new" ant mounds observed in plots from which colonies were removed throughout this period (ranging from 13.3 to 46.5 percent more "new" ant colonies), suggesting that ants remaining after their colonies were disturbed by digging most likely moved to a new, nearby site to construct a new, "satellite" ant mound. As a result, the actual "control" of imported fire ant colonies per unit area ("total" of treated or dug plus "new" ant colonies) ranged from 14.1 percent reduction to a 12.8 percent increase in colony numbers over the monitoring period.

These results do not support a management suggestion for physical removal of imported fire ant colonies from the field by shoveling them into a bucket as a non-chemical control method, whether one drowns the ants after collection or not. Different results could be obtained if this trial were to be repeated at a different time of the year, under different environmental conditions or in sites with different soil types or ant forms (the ants in these sites were assumed to be the polygyne or multiple queen form of the red imported fire ant).

Despite care taken to avoid being stung by the ants, this researcher experienced some stings in carrying out this trial. Therefore, this method of "control" should be discouraged by anyone with a sensitivity to insect stings and venom.

Table 1. Elimination of red imported fire ant from field plots by shoveling ant mounds into a 5-gallon plastic bucket, Brazos Co., Texas, on Nov. 15, 2000.

	Fire ant mounds per field plot/6 ant mounds (replicated 4 times) Days following colony removal						
	Pre- Nov. 15	5 days Nov. 20	11 days Nov. 26	19 days Dec. 4	35 days Dec. 20	51 days Jan.5, 2001	
Field removal	6	5.3	3.5	3.0		3.8	3.3
"New" mounds -	0	1.3	4.3	5.3		7.5	4.8
Total	6	6.6	7.8	8.3		11.3	8.1
Untreated	6	5.8	5.3	5.3		5.0	4.5
"New" mounds -	0	1.3	2.3	4.5		5.3	3.8
Total	6	7.1	7.3	9.8		10.3	8.3
Percent "Control"							
Treated mounds	-	8.6%	34.0%	43.4%	24.0%	26.7%	
"New mounds"	-	0.0	-46.5	-15.1	-13.3		-20.8
Total	-	14.1	-12.8	10.2	-8.8	12.0	

*Re-dug colonies, Nov. 22