

COMMUNITY-WIDE RED IMPORTED FIRE ANT MANAGEMENT PROGRAMS IN TEXAS

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ABSTRACT

Implementation and impact evaluation of five "pilot showcase" community-wide imported fire ant management programs in Texas are presented. This approach for managing red imported fire ants achieved the following: 1) fire ant populations were reduced considerably following initial treatment; 2) control was maintained with repeat applications as necessary; 3) broadcast application of baits did not eliminate native ant populations as feared, and in some cases resulted in increased ant species diversity collected in baited cup samples; 4) pesticide cost and use were reduced for residents; 5) fire ant problems experienced by residents were reduced; 6) the level of knowledge about fire ant management options by residents increased as a result of their involvement in these programs; and, 7) residents reported a sense of accomplishment for working collectively to achieve a mutual goal and plan to continue these programs.

INTRODUCTION

In 1996, Drees et al., proposed procedures for organizing community-wide suppression programs for the red imported fire ant, *Solenopsis invicta* Buren (Formicidae, Hymenoptera), herein referred to as the "fire ant." The concept relied on the active participation of residents of city blocks or subdivisions to develop, implement, and evaluate programs for controlling fire ants in areas larger than individual properties. By treating all areas, including common areas and absentee landowner properties, re-infestation could be reduced, resulting in reduced need for insecticides, associated cost of control, and fire ant problems. However, the impact of large-scale fire ant suppression using broadcast applied ant bait products was of concern. This method has been thought to possibly cause a reduction in non-target ant populations, that could provide a biotic resistance to the establishment of high fire ant population levels.

In 1997, the Texas Imported Fire Ant Research and Management Project provided funding for the establishment of special County Extension Agents in major Texas urban counties. These individuals helped to design, implement and evaluate the impact of community-wide fire ant management "pilot" projects. The results of five of these efforts, initiated in 1998 and monitored through 2000, are presented herein. Each case documents a

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slightly different approach to the goal of implementing and sustaining such a program in different neighborhoods (i.e., middle and lower income levels, newer versus older neighborhoods), by homeowners and volunteers versus using a professional pest control operator, and using different approaches and products. Similar programs were established in Houston (Harris County), Fort Worth (Tarrant County), and Dallas (Dallas County), but are not reported here. Reports for other programs can be found on the Texas Fire Ant Project web site, <http://fireant.tamu.edu>.

MATERIALS AND METHODS

In each neighborhood, ant populations were assessed before and periodically following initial treatment. Surveys were also conducted to assess fire ant control expenditures and problems and to document the impact of the treatment program. Actual treatment regimes and methods were selected by homeowner groups, although in most cases, products were donated by manufacturers.

The Neighborhoods:

The Jade Oaks neighborhood (San Antonio, Bexar County), a relatively new development with home construction beginning during late 1996, consisted of 91 homes. The neighborhood, located in northwest San Antonio, had native grasses interspersed with live oak motts surrounding three sides. The lot size in Jade Oaks averaged 630 sq. m. (7,600 sq. ft.) including the home. Actual turf on each lot averaged 360 sq. m. (4,000 sq. ft.).

The Countryside neighborhood (San Antonio, Bexar County), an older development in north central San Antonio with 191 homes ranged in age from 15 to 25 years, had three sides of the neighborhood surrounded by homes and the other, a drainage area. The lots averaged 738.6 sq. m. (7,950 sq. ft.), including the home, with turf grass areas that averaged 495 sq. m. (5,500 sq. ft.).

The Mt. Bonnell neighborhood (Austin, Travis County) consisted of 137 homes developed in the mid 1980's, with several homes currently being re-modeled. Front yards ranged from 630 to 1,960 sq. m (7,000 to 21,780 sq ft) and averaged 810 to 900 sq. m (9,000 to 10,000 sq ft). The neighborhood was bordered by Lake Austin on the west, with properties backed by a greenbelt on the south.

The Apache Oaks neighborhood (Round Rock, Williamson County), of similar age as Mt. Bonnell, contained 72 homes. Lot sizes ranged from 450 to 900 sq. m. (5,000 to 10,000 sq. ft.), including homes.

The Mount Pleasant Housing Authority (Mount Pleasant, Titus County), funded through the U.S. Department of Housing and Urban Development (HUD), consisted of about 8.8 ha. (22 acres), containing 120 single-story units in duplexes, triplexes, and four-plexes arranged along winding streets and several cul-de-sacs. Families, comprising about 20% of the population, occupied one end of the complex, and elderly and disabled residents occupied the remainder.

Program Implementation and Evaluation Procedures:

Jade Oaks Neighborhood. Fifteen of the 91 homes (16%) in the neighborhood were randomly selected as sites for ant surveys and fire ant mound counts. Prior to treatment, on September 10, 1998, four small condiment cups, baited with small pieces of canned tuna (Hill Country Fare, San Antonio, TX), were placed in a transect across the front lawn of each lot and allowed to remain for at least 30 minutes before being collected and capped. Fire ant mounds were counted in the entire turf area of each lot, and shade cover and turf type were recorded.

On 18 September 1998, homeowners elected to conduct the Two-Step Method of fire ant control (Drees et al. 1996), broadcast-applying Amdro® Fire Ant Bait (0.73% hydramethylnon) and individual ant mound treatments of their choice only as needed. One homeowner made arrangements with a local retailer to purchase cases of product for resale to the neighborhood residents. A choice of 0.17 kg (0.38 lb or 6 oz.) or 0.45 kg (1 lb) containers of Amdro® were available in a central neighborhood location for \$5 and \$10, respectively. Scotts® brand Easy™ Hand-Held spreaders were used to broadcast the bait over the lawns. Each homeowner was instructed to apply 0.11 to 0.17 kg (4 to 6 oz) of bait based on treatable lot area of their lawn and wait 3 to 5 days before individual treatment of only nuisance fire ant mounds. For those who needed it, a second treatment was available on 7 May 1999 and a third on 22 May 2000 using a broadcast application of Amdro®.

Post-treatment mound counts and ant surveys were conducted on the same pre-treatment properties at roughly 5 weeks, 1 year, and 2 years following program initiation (Survey dates: pre-treatment - 10 September 1998, and post-treatment - 3 November 1998, 16 April 1999, 9 September 1999, and 12 October 2000). A written survey was mailed to each homeowner soon after treatment (January 1999) to gather information on fire ant problems and expenditures prior to this program, and then at 18 months post-treatment (13 March 2000) to find out any changes that may have occurred.

Countryside Neighborhood. Twenty-seven of the 191 homes (14%) in the neighborhood and one vacant median area were randomly selected as sites for ant surveys and fire ant mound counts. Ant surveys and percentage shade cover estimations were gathered in a manner similar to those described for the Jade Oaks neighborhood on 12 April 1999 (pre-treatment) and 13 March 2000 (post-treatment). Homeowner association board members elected to contract with a local San Antonio pest control company to broadcast 0.05 kg (0.11 lb or 5 oz) of PT® 370 Ascend™ Fire Ant Stopper® Bait (Whitmire Microgen, St. Louis, MO) containing 0.011% abamectin in each front lawn for a total cost of \$1,200. Homeowners were not directly charged for this service, which was conducted 24 April 1999. Homeowners were asked to treat any new fire ant mounds individually as they appeared using a treatment of their choosing. Ant surveys and fire ant mound counts were conducted at 2, 6 and 14 months post-treatment (24 June 1999, 29 October 1999 and 28 June 2000, respectively) on the same pre-treatment properties as before. A survey was mailed to each homeowner soon after program initiation (3 May 1999) and then again at 11 months post-treatment (13 March 2000) to find out any changes that occurred.

Mt. Bonnell Neighborhood. This project was initiated on 8 October 1998, when an ant survey using baited cups and fire ant mound counts was obtained from designated monitoring plots. Because lots were irregularly shaped and varied in size, 23 plot areas within randomly-selected yards were established for monitoring ants. Plots ranged in size from 42.3 to 420.5 sq m (470 to 4,672 sq ft.) and averaged 187.3 sq m (2,081 sq ft). For each ant survey at 0, 6 months, 1 year, and 2 years, respectively (8 October 1998, 20 April and 18 May 1999 and 12 October 2000), a small amount of tuna with oil (Hill Country Fare, San Antonio, TX) was placed in bait cups and captured ants were placed in one-dram vials for later identification.

Preliminary ant surveys indicated the presence of native ants that caused homeowners to select either a broadcast application of a bait product or use an individual mound treatment (Orthene®, 75 % acephate). However, most residents chose to broadcast a bait product donated by Novartis (Award®, 1.0% fenoxycarb), Wellmark International (Extinguish®, 0.5% s-methoprene), or American Cyanamid (Amdro®). Different parts of the neighborhood, as delineated by Crime-Stoppers districts, were assigned to use different bait products. The Mt. Bonnell Homeowners Association provided hand-held spreaders for the neighborhood to use. The first treatments were applied on 24 October 1998. A second treatment was applied on 16

October 1999, using Distance® Fire Ant Bait (0.5% pyriproxyfen) donated by Valent Corporation. A written survey was handed to each homeowner on initial treatment day (24 October 1998) and on the day of the second treatment, 16 October 1999.

Apache Oaks Neighborhood. Beginning on 19 May 1999, thirteen of 72 properties (18%) were selected at random for evaluation of imported fire ant mounds and the presence of other ant species. Only plots in front yards were monitored (13 plots, range 63 sq m to 477 sq m or 700 to 5,300 sq ft) averaged 216 sq m (2,400 sq ft). Imported fire ant mounds were counted on 19 May 1999, 22 July 1999, 14 April 2000 and 30 October 2000 (0, 9 weeks, 11 and 17 months, respectively) and condiment cups containing fish flavored cat food (Tender Vittles® brand Seafood Dinners, Ralston Purina Company, St. Louis, MO) were placed in yards for up to 60 minutes to attract and collect ants at 3 and 12 months post-treatment. The initial community-wide treatment date was 22 May 1999. Donated bait from product manufacturers, including Award®, Distance®, and Seige® Pro (0.73% hydramethylnon), was used to treat different parts of the neighborhood. A second treatment was applied, 29 April 2000, using Amdro® or Award®. Surveys were mailed to each homeowner prior to the initial treatment date (19 May 1999). For the second treatment, surveys were distributed at the time residents picked up bait products.

The Mount Pleasant Housing Authority. Fire ant populations were assessed by counting the number of active ant mounds in 15 randomly selected plots ranging in size from 35.01 to 258.48 sq. m. (389 to 2,872 sq. ft.) and averaging 102.96 sq. m. (1,144 sq. ft.), on September 16, 1998. Ant species were also sampled using vials baited with soft, dry cat food (Tender Vittles® brand Seafood Dinners, Ralston Purina Company, St. Louis, MO) placed in plots. Vials were allowed to sit for approximately 60 minutes before being picked up, sealed, filled with alcohol and stored for later identification and enumeration. Plot locations were referenced to unit housing number and geo-referenced by Global Positioning System (GPS) using a Trimble® XRS Pro receiver. The area of each plot was calculated to standardize ant mound count data to a per unit area value (ha.). A bait product, Amdro®, donated by American Cyanamid Corp., was applied, 17 September 1998, using a Herd® GT-77 electric seeder mounted on a John Deere 4x6 Gator utility vehicle. Post-treatment mound counts were taken on these same plots on 15 December 1998 (3 mo), 16 March (6 mo) and 22 September 1999 (1 yr). A second treatment was applied a year after the first, on 22 September 1999, using Extinguish™, a slow-acting insect growth regulator that could provide longer lasting ant suppression. A final count of active fire ant mounds was made on 15 November 2000 (2 yr). To survey residents, a simple, one-page survey was developed to help assess the different types and severity of fire ant problems. Survey forms were used only as a guide when interviewing residents who were outside and were conducted 18 September 1998 and 23 September 1999. Efforts were made to sample residents from all parts of the complex and to include young residents with families as well as the elderly.

RESULTS AND DISCUSSION

A summary of results of these programs is presented in Tables 1, 2 and 3.

Jade Oaks Neighborhood - Biological Data. Eighty-five of 91 possible homes (93%) participated in the 18 September 1998 "Fire Ant Day" (Table 1). Fire ant mounds averaged 1.18 mounds/90 sq. m. or 1,000 sq. ft. (4.7 per lawn)(Table 2) prior to treatment, and were reduced to 0.05 mounds/90 sq. m. or 1,000 sq. ft. (0.2 mounds per lawn), by 96%, in about six weeks (18 September to 3 November 1998). Baited cup ant surveys prior to treatment collected five species of ants including *S. invicta*. Post-treatment ant surveys collected only three species of ants, including *S. invicta*, at the 6-week post-treatment interval. The one-year

post-treatment baited cup survey (9 September 1999) collected five ant species including *S. invicta* with a total of three fire ant mounds (0.15 mounds/90 sq. m. or 1,000 sq. ft. or 0.2 mounds per lawn, a 96% reduction) in 15 lawns monitored. At the final two-year evaluation (12 October 2000), nine species of ants were collected including *S. invicta* whose mounds were found at an average of 0.2 mounds/90 sq. m. or 1,000 sq. ft. (0.8 fire ant mounds per lawn) in 91 lawns monitored. Non-fire ants included: an acrobat ant (*Crematogaster* spp.), *Brachymyrmex obscurior*, the formica ant (*Formica* spp.(*schaufussi*)), the false honey ant (*Prenolepis imparis*), the little black ant (*Monomorium minimum*), the pavement ant (*Tetramorium caespitum*), *Forelius mccooki*, and the big-headed ant (*Pheidole dentata*). Percentage shade cover ranged from zero to 35%, and turf grass was primarily St. Augustine with a small number of Zoysia and Bermuda grass lawns.

Table 1. Community-Wide Imported Fire Ant Management Pilot Projects in Texas.

Measure	Neighborhood Group				
	Jade Oaks	Countryside	Mt. Bonnell	Apache Oaks	Mt. Pleasant
Initiation date	10 Sept.1998	12 Apr. 1999	Sept. 1998	22 May 1999	17 Sept. 1998
Participation	85/91	187/190	119/134	68/72	120/120
Percent	(93%)	(98%)	(89%)	(95%)	(100%)
Treatment(s)	Amdro®	Ascend®	various ^a	various ^b	Amdro® & Extinguish™
Treatment costs/unit					
Pre-	\$30.50	\$22.16	\$34.72	\$55.88	\$12.50
Post-					
Treatment	\$5.00	\$6.42	\$6.00	\$6.00	\$2.00 (\$0.80)
Percent					
reduction	83	71	83	89	84

^aAmdro®, Award®, Extinguish™, Othene®

^bAmdro®, Award®, Distance®, Orthene®

Jade Oaks Neighborhood - Resident Data. Pre-treatment surveys were mailed to 91 residents of which 29 were returned for a response rate of 32%. Post surveys were mailed to 91 residents. Thirty-six of these surveys were returned for a response rate of 40%.

Pre-treatment data suggest that fire ants were a major problem with the residents of this community (Table 3). Seventy-two percent believed that fire ants should be eradicated, and 79% stated that fire ants lessen outdoor enjoyment. Eighty-three percent of respondents spent money trying to control fire ants.

A comparison of the perceived severity of the fire ant problem was conducted from the beginning of the program to the intermediate survey. Prior to treatment, 56% of residents described their fire ant problem as moderate, while 20% described the problem as severe. At the post-measure, there was a shift from moderate to minor with 65% reporting that the fire ant problem was now minor and 20% reporting a moderate fire ant problem. Only nine percent still rated their fire ant problem as severe (Table 3).

Table 2. Red Imported Fire Ant Mound Numbers, Ant Species Present Associated with Five Community-Wide Imported Fire Ant Management Pilot Projects in Texas.

Measure	Neighborhood Group				
	Jade Oaks	Countryside	Mt. Bonnell	Apache Oaks	Mt. Pleasant
Red Imported Fire					
Ant mounds/1,000 sq. ft.					
Pre-	1.18	0.15	1.70	2.27	6.8
Post-1	0.05 (5 wk.)	0.04 (2 mo.)	0.42 (6-7mo.)	0.14 (9 wks.)	0 (3 mo.)
Percent	(-96%)	(-73%)	(-75%)	(-94%)	(-100%)
Post-2	0.15 (1 yr.)	0.0 (6 mo.)	0.42 (12 mo.)	2.05 (11 mo.)	1.49 (12 mo.)
Percent	(-87%)	(-100%)	(-75%)	(-9.7%)	(-75%)
Post-3	0.2 (2 yrs.) ^a	0.03 (14 mo.)	–	0.69 (17 mo.)	0.30 (2 yr.)
Percent	(-83%)	(-81%)	–	(-69.6%)	(-95%)
Pre-	5	11	6	3	2
Post-1	3 (5 wks.)	13 (2 mo.)	6 (6 mo.)	5 (3 mo.)	–
Post-2	5 (1 yr.)	13 (6 mo.)	8 (1 yr.)	5 (1 yr.)	–
Post-3	8 (2 yr.)	13 (14 mo.)	12 (2 yr.)	–	–

^a These counts were made on all 91 lawns/lots in the neighborhood

Costs of treatment were also compared from the beginning of the program to the post measure. Half the residents responding reported spending under \$20.00 per year on products to control fire ants, while an additional 42% reported spending under \$50.00 (Table 3). The remaining 8% spent over \$50.00 per year. At the post-measure, residents reported spending less than \$50.00 above the cost of the program treatment (\$5.00 per house). Of these, the majority (68%) spent under \$20.00, with 23% spending no additional money. Measures of this program's benefits were also collected at the intermediate survey. A majority (87%) of the respondents believed that the one of the most valuable parts of the program was the reduction of fire ants. Two-thirds of the respondents felt that the neighborhood cooperation was also of value.

Countryside neighborhood - Biological Data. The low number of fire ant mounds did not necessarily warrant the broadcast application of bait insecticides. Nevertheless, the neighborhood association selected this method of application. Of 191 homes in the neighborhood, 187 (98%) participated in the 24 April 1999 "Fire Ant Day." Some residents refused to allow the bait applications on their lawns on treatment day because they had not received notification of the treatment date. Pre-treatment surveys (Table 2), 21 April 1999, revealed 11 ant species including *S. invicta*, and fire ant mound counts averaged 0.15 mounds/90 sq. m. or 1,000 sq. ft. (0.4 mounds per front lawn) in the 28 surveyed lawns. Surveys at two months post-treatment, 24 June 1999, documented 13 ant species including *S. invicta* with fire ant mound counts averaging 0.04/90 sq. m. or 1,000 sq. ft. (0.1 per front lawn) in the 28 sites. Evaluations at 6 months post-treatment (29 October 1999) trapped approximately the same numbers of ant species including *S. invicta* but no fire ant mounds were seen in the 28 sites. This may have been the result of severe drought in the San Antonio area from June 1999 until evaluations in October 1999. Evaluations at 14 months post-treatment (28 June 2000) trapped 15 species of ants including *S. invicta* with fire ant mound counts averaging 0.03/90 sq. m. or 1,000 sq. ft. (0.1 mounds per front lawn), in the 28 sites. Species collected included: the fire ant (*Solenopsis invicta*), *Paratrechina tereticauda*, *Forelius mcCooki*, *Forelius pruinosus*; a pavement ant (*Tetramorium caespitum*), five big headed ant

species (*Pheidole dentata*, *P. bicarnata vinelandica*, *P. crassicornis tetra*, *P. metallescens*, and *P. constipata*), the little black ant (*Monomorium minimum*), a carpenter ant (*Camponotus* spp.), an acrobat ant (*Crematogaster* spp.), a thief ant (*Solenopsis molesta*), and the yellow pyramid ant (*Dorymyrmex insana*). In contrast to the Jade Oaks neighborhood, the majority of shade cover in this neighborhood was provided by mature trees, which provided 35 to 80% shade cover. All lawns contained an assorted mixture of St. Augustine and Bermuda grasses.

Countryside neighborhood - Resident Data. Of surveys mailed to residents on 3 May 1999, 69 of 190 were returned for a response rate of 36%. The intermediate survey, sent 13 March 2000, yielded a response of 63 out of 190 surveys (33%).

Table 3. Community-Wide Imported Fire Ant Management Resident Survey Data.

Measure	Neighborhood Group					
	Jade Oaks		Countryside		Apache Oaks	
	Pre%	Int%	Pre%	Int%	Pre%	Int%
Fire Ant Problem ^a						
None/minor	8	65	56	92	3	61
Moderate	56	20	39	7	64	39
Severe	20	9	2	2	33	–
Neighbors have	6	6	3	–	–	–
Fire ants should be eradicated ^b						
Yes	72	–	72	–	73	–
No	28	–	28	–	27	–
Cost of Applying Products ^c						
No cost	–	23	27	60	–	19
\$1.00 - \$20.00	50	68	47	29	12	53
\$21.00 - \$50.00	42	9	19	8	52	22
Over \$50.00	8	--	8	3	36	6
Value of Project ^d						
Reducing fire ants	–	87	–	51	–	67
Knowledge of fire ants	–	40	–	21	–	24
Neighborhood cooperation	–	67	–	38	–	12

^a Jade Oaks (n=34, n=34), Countryside (n=61, n=62), Apache Oaks (n=33, n=33)

^b Jade Oaks (n=29), Countryside (n=68), Apache Oaks (n=26)

^c Jade Oaks (n=24, n=34), Countryside (n=64, n=60), Apache Oaks (n=25, n=32)

^d Jade Oaks (n=36), Countryside (n=63), Apache Oaks (n=33)

Prior to treatment, 56% of the residents reported their fire ant problem to be minor, 39% reported the problem to be moderate and 2% reported severe fire ant problems (Table 3). At the intermediate survey, 92% reported that they had a minor fire ant problem, with only 7% reporting a moderate problem. Two percent still reported their fire ant problem was severe. Pre-treatment data suggest that fire ants were a major problem with the residents of this community. Seventy-two percent believed that fire ants should be eradicated and 60% state that fire ants lessen outdoor enjoyment. Forty-three percent of the respondents spent money trying to control fire ants.

Ninety-two percent of the respondents had been spending up to \$50.00 per year to control fire ants (Table 3), and another 8% spent over \$50.00 per year. At the post-measure, 97% of

the residents reported spending no more than \$50.00 above the cost of the program treatment (\$6.42 per home). Of these, the majority (89%) spent under \$20.00, with 60% spending no additional money. Survey results indicated that 51% of the residents rated the project as 'highly valuable' in terms of helping reduce the fire ant problem, while almost 40% rated the project as beneficial to the community.

Mt. Bonnell Neighborhood - Biological Data. On 24 October 1998, 119 of 134 (89%) of the residents participated in this program (Table 1). A second treatment was made on 16 October 1999, with 127 or 137 (93%) of the residents participating. Fire ant mound numbers per yard were reduced from a mean of 1.70 mounds to 0.42/90 sq. m. or 1,000 sq. ft. (3.78 to 0.52 per monitoring plot), an 86% reduction in the 6 months from 8 October 1998 to 20 April and 18 May 1999. One year after treatment (16 October 1999), monitored plots still averaged 0.42 mounds/90 sq. m. or 1,000 sq. ft. The average number of ant species collected per plot slowly increased over time: 8 October 1998 - six species before treatment; and 18 May 1999 - eight species; and, 12 October 2000 - 12 species). Ant species present included: the red imported fire ant (*Solenopsis invicta*), a native fire ant (*S. geminata*), the little black ant (*Monomorium minimum*), at least two big-headed ant species (*Pheidole dentata*, *P. metallescens* and an unidentified *Pheidole* species) *Paratrechina vividula*, *Paratrechina longicornis*, an acrobat ant (*Crematogaster laeviscula*), *Crematogaster cerasi*, *Faelius foetidus*, *Brachymyrmex depilis* and *Forelius mccooki*.

Mt. Bonnell Neighborhood - Resident Data. Pre-treatment surveys were handed to 91 residents of which 27 were returned for a response rate of 30%. Post surveys were also handed to residents. Fifty of these surveys were returned for a response rate of 55%. Prior to treatment, 89% of the residents reported that they experienced fire ant problems in their yards. Sixty-four percent reported that their fire ant problem was moderate, and 33% stated their problem was severe (Table 3).

Before the program began, 60% of respondents rated their fire ant knowledge as 'low', while only 18% reported 'high' knowledge. At the intermediate measure, 50% of the respondents reported high knowledge of fire ants with the remaining 38% reporting 'moderate' knowledge. Seventy percent of the residents reported spending up to \$50.00 per year on pesticides or treatment services. Another 22% spent between \$50.00 and \$100.00 (Table 3).

At the post-treatment survey, respondents were asked about how well the fire ant project was working. Eighty-four percent reported that they have seen fewer ants and 80% reported that they have had fewer ant-related problems since the project was initiated. In addition, 72% said the project had saved them money. Finally, 70% of the respondents reported that they would change their treatments for fire ants as a result of the project.

Apache Oaks Neighborhood - Biological Data. A participation rate of 95% was achieved, with 68 of 72 homeowners (94%) treating their yards either themselves or using volunteers from the neighborhood association. Prior to treatment (22 May 1999), imported fire ant mound numbers ranged from zero to seven per monitored plot with an average of 2.27 mounds/90 sq. m. or 1,000 sq. ft. (3.7 mounds per plot)(Table 2). Nine-weeks after treatment (22 July 1999), only four fire ant mounds were found, averaging of 0.14 mounds/90 sq. m. or 1,000 sq. ft. (0.3 per plot). Thus, treatments coupled with hot, dry weather, resulted in a 93.8% reduction of fire ant mound numbers. Baited-cup samples documented that the fire ant was the dominant ant species present prior to treatment. The number of ant species increased from three species prior to treatment (May 1999) to five after 3 months (22 July 1999), with *S. invicta* being found in 84% of the plots prior to the program and only in 33% of the plots post-treatment (Table 3). Interestingly, the native fire ant, *Solenopsis geminata*, which was not detected prior to the initial treatment, was documented in 58% of the lots during the post-treatment sampling effort.

Other ant species collected included: *Paratrechina vivdula*, *Forelius mccooki*, *Crematogaster cerasi*, and *Brachymyrmex depilis*.

Apache Oaks Neighborhood - Resident Data. Surveys were mailed to residents during the 19 May 1999. Of surveys mailed to residents, 27 of 72 were returned for a response rate of 37%. Prior to treatment, 64% of the residents reported their fire ant problem to be moderate while 33% reported severe fire ant problems (Table 3). At the post-treatment survey, 61% reported that they no longer had a fire ant problem or that it was minor, while 39% reported a moderate problem and none of the residents reported a severe fire ant problem. No residents reported severe ant problems at the intermediate measure. Pre-treatment data suggest that fire ants were a major problem with the residents of this community. Seventy-three percent believed that fire ants should be eradicated, and 69% stated that fire ants lessen outdoor enjoyment. Eighty-one percent of the respondents have spent money trying to control fire ants.

Sixty-four percent of the respondents had been spending up to \$50.00 per year to control fire ants, and another 36% spent over \$50.00 per year (Table 3). At the post measure, 94% residents reported spending no more than \$50.00 above the cost of the program treatment (\$6.00 estimated treatment cost per yard). Of these, the majority (88%) spent under \$30.00, with 19% spending no additional money. Survey results indicated that 67% of the residents rated the project as 'highly valuable' in terms of helping reduce the fire ant problem.

The Mount Pleasant Housing Authority - Biological Data. The housing complex encompassed a total of 8.8 ha (22 acres), with approximately two-thirds of that area being paved or buildings, giving a total treatable area of roughly 3.2 ha (8 acres). At a cost of \$8.00 per pound of bait product, treatment cost was about \$96 per year or about \$0.80 per unit ($8 \text{ ac} \times 1.51\text{lb/ac} \times \$8 = \$96/120 \text{ units} = \$0.80/\text{unit}$).

Fire ant mounds numbers averaged 6.8/90 sq. m. or 1,000 sq. ft. or 265 mounds per acre) before initial treatment, 17 September 1998 (Table 2). At one month following initial treatment, 23 of 30 active mounds in monitored plots were concentrated in only three plots, which were subsequently retreated with Amdro®. By three months post-treatment, the number of active mounds in plots was reduced to zero. By 12 months, the number of active mounds had risen to 1.5 mounds/90 sq. m. or 1,000 sq. ft., but was still only 27% of pre-count levels. The area was treated with Extinguish™ at that time. The final mound count on 15 November 2000, 26 months after the project's inception and 14 months since the Extinguish treatment, found only 13 mounds (0.30 mounds/90 sq. m. or 1,000 sq. ft.), all of which were concentrated in seven of the 15 plots. Baited vial samples taken at test initiation (16 September 1998) revealed *S. invicta* presence in all but one sample which contained a *Dorymyrmex* species.

The Mount Pleasant Housing Authority - Resident Data. Fifteen percent of the residents were interviewed; 18 and 12, in 1998 and 1999 respectively. The first question usually asked of residents was, "How big a problem are fire ants in this neighborhood?" Results from 1998, before the start of treatments, showed that 77% of residents felt that fire ants were a "severe" or "moderate" problem. None of the residents surveyed in 1999 felt that fire ants were a "very bad" problem, and only 33% considered them a "moderate" problem. On a scale of 0 to 3 with "0" being no problem and "3" being a very bad problem, the mean answer in 1998 was 2.1, or "moderate". In 1999, that mean had dropped a full point to 1.1, or only a slight problem. In response to the question, "How much do you spend per year controlling fire ants now?," the mean (using range midpoints) dropped from \$12.50 in 1998 to \$7.08 in 1999, a 36% reduction. Finally, we asked residents whether they would be willing to pay, and how much, to be part of a program. Not surprisingly, those that felt that the Housing Authority should pay increased from 25% in 1998 to 43% in 1999. The amount people were willing to pay also dropped from \$4.50 in 1998 to \$3.00 in 1999. Evidently, more residents were willing to pay more when the

fire ant problem was bad. When the problem subsided, they tended to shift their very limited resources elsewhere.

CONCLUSIONS

Community-wide fire ant management programs reported here can be considered a success in several ways: 1) in all cases, fire ant populations were reduced considerably following initial treatment; 2) control was maintained with repeat applications as necessary (Note: the effects of all products used in treatments are reported collectively by neighborhood program); 3) broadcast application of baits did not often eliminate native ant populations as feared, and in some cases resulted in increased ant species diversity collected in baited cup samples; 4) pesticide cost and use were reduced for residents a result of the community-wide fire ant management approach (Note: the cost of broadcast-applying a fire ant bait product to a neighborhood reduced the need for additional individual mound treatments by homeowners); 5) fire ant problems experienced by residents were reduced; 6) the level of knowledge residents reported of fire ant management options increased as a result of their involvement in these programs; and, 7) residents reported feeling a sense of accomplishment for working collectively to achieve a mutual goal and plan to continue these programs.

The treatments used in each community-wide fire ant management pilot program were selected by their own representatives and depended, in part, on the level of fire ant infestation and presence of native ant species. Regardless, most elected to use bait-formulated products because of their ease of application and relatively low cost.

Age of a neighborhood and its ecological structure appeared to play a role in fire ant infestation levels. Older, stable and shaded neighborhoods harbored relatively low numbers of fire ants and mounds. Shade coverage and age of Jade Oaks compared to versus Countryside neighborhoods support this observation. Conversely, newly-constructed neighborhoods with ongoing construction, immature shade trees and newly sodded lawns harbored more fire ants and mounds. Landscape disturbance, ample sunlight, regular turf irrigation (moisture) and low native ant populations were factors favoring higher fire ant infestation levels.

Lard et al. (1999) documented that fire ant damage and control attempts in the household, golf course, school, and city park sectors cost more than \$580 million in Austin, Dallas, Fort Worth, Houston and San Antonio, Texas, in 1998. Households had a total annual expenses of \$526 million. The costs by expenditure items were as follows: fire ant control and treatment, \$301.5 million; repairs, \$80.6 million; cost of equipment replacement, \$152 million; and medical treatment, \$47.2 million. The goal of the Texas Imported Fire Ant Research and Management Project is to reduce fire ant populations to a level that eliminates this insect as a serious pest in terms of economic losses and health threats. Managing fire ants on a community-wide basis allow progress towards reaching this goal.

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