

**Management Practices for Red Imported Fire Ant Populations on
Texas Army National Guard Grounds
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Camp Swift, Camp Bowie, Fort Wolters and other training camps in the eastern two-thirds of Texas are infested with the red imported fire ant, *Solenopsis invicta* Buren. At each training camp, there exists a series of firing ranges: a Pistol Range; an M-16 Range; an M-60 Range; and, a Known Distance Range (KDR). Red imported fire ants from mounds near the foxholes and sandbags endanger troops during practice, stinging some individuals and causing potential medical problems.

This project is an ongoing trial that was first initiated in the fall of 1998 by Dr. Jerry Cook, an entomologist now at Sam Houston State. It is designed to determine the best management practices for controlling the red imported fire ant by evaluating the application of commercially available fire ant baits on Texas Army National Guard firing ranges. An Integrated Pest Management (IPM) program has been designed that will allow the Texas Army National Guard to meet their goal of reducing pesticide use and allow managers to select specific products best suited to these efforts.

Materials and Methods

Three sites were chosen to conduct the evaluations: Camp Swift, Camp Bowie, and Fort Wolters. These sites differed in both climates and red imported fire ant densities. Two commercially available baits were chosen: Extinguish™ (active ingredient- 0.50% (s)-methoprene) and Amdro® (active ingredient- 0.73% hydramethylnon). At each training camp, a series of firing ranges were evaluated for red imported fire ant infestation: a Pistol Range, an M-16 Range, an M-60 Range, and a Known Distance Range. The timing of the treatments was determined by the level of infestation and climatic conditions. Due to a severe lack of rainfall in the fall of 1999 and a lack of visible fire ant mounds, treatments were not initiated until the spring of 2000.

Camp Swift. The firing ranges at Camp Swift were evaluated for red imported fire ant infestation on Feb. 28, 2000. Only one range- the Known Distance Range (KDR) had a sufficient number of mounds to conduct a replicated test. Test plots were established on the 100-yard firing line so that the total treatment plot area was approximately 36 by 408 ft. There were 40 firing stations; each designated with sandbags and a numbered steel plate. Each of the four treatment plots was composed of 10 firing stations, approximately 102 by 36 ft. An untreated control plot was established on the 200-yard firing line and was approximately the same size.

An initial count was conducted to determine the number of active red imported fire ant mounds (**Table 1**) in the treatment plots and control plot. Mounds were determined active if a defined number of fire ants rose to the surface after light disturbance. A treatment of Amdro®

(0.73% hydramethylnon) was then applied to the plots at rate of 1.5 lbs per acre using a Cyclone 1C1 hand-held seeder. Post-treatment evaluations were conducted at 8, 16, and 24 weeks.

The cantonement area was also evaluated for red imported fire ant infestation on Feb. 28, 2000, and found to be heavily infested - especially next to the buildings. An initial count was conducted to determine the number of active red imported fire ant mounds that were in contact with the base of the buildings (**Table 2**). A hopper blend (1:1 ratio) of Amdro® (0.73% hydramethylnon) and Extinguish™ (0.50% (s)-methoprene) was applied around the cantonement area at a total rate of 1.5 pounds per acre (0.75 lb Amdro and 0.75 lb Extinguish). Post-counts of mounds in contact with the buildings were conducted at 8, 16, and 24 weeks post-treatment.

Camp Bowie. The firing ranges at Camp Bowie were evaluated for red imported fire ant infestation on April 14, 2000 and the Pistol Range was determined to have a sufficient number of mounds to conduct a replicated test. The test plots were established on the firing line for a total treatment plot size of approximately 250 by 12 ft. There were 16 firing stations; each designated with a wooden post. Three treatment plots were established - each approximately 60 by 12 ft. The control plot was located on the south side of the Pistol Range and was approximately the same size.

An initial count was conducted to determine the number of active red imported fire ant mounds (**Table 3**) in the treatment plots and control plot. Mounds were determined active if a sufficient number of fire ants rose to the surface after light disturbance. A hopper blend (1:1 ratio) of Amdro® and Extinguish™ was then applied to the plots at a total rate of 1.5 lbs per acre (0.75 lb Amdro and 0.75 lb Extinguish). Post-counts were then conducted at 8 and 16 weeks post-treatment.

The cantonement area was also evaluated for red imported fire ant infestation on April 14, 2000 and was moderately infested. A hopper blend (1:1 ratio) of Amdro® and Extinguish™ was applied around the cantonement area as described above.

Fort Wolters. The firing ranges at Fort Wolters were evaluated for red imported fire ant infestation and the M-16 Bravo Range was determined to have a sufficient number of mounds to conduct a replicated test. There were 40 firing stations; each designated with sandbags and a numbered steel plate. The treatment plot was established on the firing line for a total treatment plot size of approximately 412 by 12 ft. An untreated control plot was located near the Combat Pistol Range and was approximately 45 by 40 ft.

An initial assessment was conducted to determine the number of active red imported fire ant mounds (**Table 4**) in the treatment plots and control plot. Mounds were determined active if a sufficient number of fire ants rose to the surface after light disturbance. A hopper blend (1:1 ratio) of Amdro® and Extinguish™ was then applied as described for Camp Bowie. Post-treatment assessments were made after 8 weeks. The cantonement area was evaluated for red imported fire ant infestation and was moderately infested. It was also treated with the hopper blend.

Results

Camp Swift. At 24 weeks post-treatment, the application of Amdro® had reduced active mound numbers by 68 percent (100% percent control in two of the plots). The mound counts in the untreated plot dropped almost 43 percent (**Table 1**). Control of red imported fire ant mounds near buildings within the cantonement area was very successful. The average reduction around 20 buildings was approximately 94 percent (**Table 2**).

Table 1. Number of active red imported fire ant mounds- Known Distance Range.

Treatment Plot	Initial (2/28/00)	8 Weeks (4/21/00)	16 Weeks (6/16/00)	24 Weeks (8/10/00)	Maximum % Reduction
1	14	3	7	0	100.0
2	6	2	2	0	100.0
3	10	1	7	4	60.0
4	9	4	8	8	11.1
Untreated	21	29	32	12	42.9

Table 2. Number of active red imported fire ant mounds in contact with buildings in the cantonement area.

Building Number	Initial	8 Weeks (4/21/00)	16 Weeks (6/16/00)	24 Weeks (8/11/00)	Maximum % Reduction
200	6	4	1	1	83.3
201	15	5	1	3	80.0
202	3	0	0	0	100.0
203	7	1	2	1	85.7
210	2	1	1	0	100.0
211	19	2	3	3	84.2
212	5	1	2	1	80.0
220	2	1	1	0	100.0
221	11	4	2	1	90.9
222	6	3	1	0	100.0
230	0	2	0	0	100.0
231	11	0	3	0	100.0
232	3	1	1	0	100.0
240	4	3	0	0	100.0
241	13	0	1	0	100.0
242	6	0	0	0	100.0
243	4	1	0	0	100.0
250	4	2	1	0	100.0
251	7	5	2	0	100.0
252	21	26	17	6	71.4
Mean	7.45	3.10	1.95	0.90	93.8

Camp Bowie. The number of red imported fire ant mounds on the Pistol Range at Camp Bowie were reduced an average of approximately 84 percent 16 weeks after treatment with a hopper blend of Amdro® and Extinguish™. The untreated plots dropped 37.5 percent (**Table 3**)

Table 3. Number of active red imported fire at mounds- Pistol Range.

Treatment Plot	Initial (4/14/00)	8 Weeks (6/9/00)	16 Weeks (8/11/00)	Maximum % Reduction
Plot #1	24	11	3	87.5
Plot #2	25	19	8	68.0
Plot #3	27	13	1	96.3
Untreated	8	15	5	37.5

Fort Wolters. Eight weeks after treatment, the number of red imported fire ant mounds on the M-16 Bravo Range at Fort Wolters was reduced by approximately 90 percent. The untreated plots dropped over 83 percent due to extreme high temperatures and a lack of precipitation (**Table 4**).

Table 4. Number of active red imported fire ant mounds- M-16 Bravo Range.

Treatment Plot	Initial Count (6/8/00)	8 Weeks (8/1/00)	Maximum % Reduction
M-16 Bravo Range	30	3	90.00
Untreated	42	7	83.33

Discussion

The project was initiated in the fall of 1999, but due to a lack of rainfall, which prevented fire ant mound building activity, the treatments were delayed until the spring of 2000. The density of red imported fire ant mounds varied between firing ranges within each camp also, due to the geographic variations of the soil and vegetation, climatic conditions, and due in some part to treatments applied the previous year by Dr. Jerry Cook.

Data taken from the Known Distance Range at Camp Swift (**Table 1**) shows plot number 4 having a much higher mound density when compared to plots 1, 2, and 3. This is because targets 30 to 40 (which comprised plot 4) were not often used. This resulted in less traffic on plot 4, which allowed for less compacted soil, more moisture and more vegetation. These conditions provided a more suitable habitat for red imported fire ants and thus, yielded higher mound densities compared to other plots after treatment, probably as a result of re-infestation. By treating plot 4 as an outlier, mound reduction is nearly 87 percent, as compared to 68 percent when plot 4 is included. This leads to an important consideration for managers when treating areas with high re-infestation pressure- treating larger areas can reduce the opportunity for re-infestation by reducing the re-invasion pressure on the outside of the treatment area.

Hopper blend treatments around the cantonement areas were also successful in reducing mound densities, providing a **94 percent** reduction in mounds in contact with buildings at Camp

Swift (**Table 2**). However, one exception was building 252. While the number of fire ant mounds in contact with building 252 were eventually reduced; the data reveals an unusually slow rate of reduction. The data shows a sharp reduction in mound numbers between 16 and 24 weeks post-treatment, which is a characteristic of the slow effects of the active ingredient (s)-methoprene in the insect growth regulator, Extinguish™ (typically 3 to 6 months). Observations notes taken in the field at 8 and 16 weeks reveal that the effects of an insect growth regulator were apparent- lack of brood coupled with an abundance of large workers and reproductive alates. From this information, it is believed that an uneven mixing of the baits, Amdro® and Extinguish occurred, which would have led to an uneven ratio of bait being applied. With only a small amount of Amdro being applied, the effects of Extinguish took several months to begin working. The data from the cantonement area points out an important thing to remember when using the hopper blend treatment - when properly applied, the hopper blend treatment can provide the manager with both the rapid control characteristics of Amdro and the long term suppression characteristics of Extinguish.

The hopper blend of Amdro® and Extinguish™ at a rate of 1.5 lbs per acre proved to be an effective treatment in reducing fire ant mound numbers on Texas Army National Guard firing ranges. Mound densities at the three bases were reduced by an average of 81percent (**Table 5**). While the hopper blend treatments were successful in reducing the fire ant densities, the lack of rainfall and extreme heat across the state also contributed to this decline as is evident by the dramatic decline of the untreated plots (especially Fort Wolters, **Table 4**).

Table 5. Total percent reduction of active red imported fire ant mounds using a hopper blend of Amdro® and Extinguish™ at a rate of 1.5 lbs per acre, calculated per acre.

Texas Army National Guard Base	Number of Mounds (Calculated per Acre)		Average Percent Reduction
	Pre-Treatment	Post-Treatment	
Camp Bowie (Pistol Range)	1104	174	84%
Camp Swift (Known Distance Range)	116	36	68%
Fort Wolters (M-16 Bravo Range)	264	26	90%
Total	1484	236	81%

Temperature and precipitation extremes like those experienced over the summer of 2000 force red imported fire ants to significantly reduce their activity. Foraging primarily occurs during the cooler temperatures of the night and with a lack of available water and the reduction in foraging activity, fewer resources are available for the colony. The colony produces less brood, saving their limited resources for better conditions. Mound building is reduced to a minimum while the fire ants burrow deep into cooler soil. When conditions become favorable again, fire ants resume normal activities.

These adverse weather conditions also play a role in determining the optimum conditions for applying baits. Since temperature and precipitation extremes reduce foraging activity by red

imported fire ants, the success of bait applications can be affected. The best method to determine if fire ants are foraging is to put out a small pile of bait and monitor it for 15 minutes to one hour. If a sufficient number of ants are recruited to the bait pile, then conditions are favorable for a bait application. Optimum foraging by red imported fire ants usually occurs when the soil is moist, and the temperature is between 65 and 90 degrees Fahrenheit under sunny skies. Baits should not be applied if precipitation is expected within 24 hours of treatment or the bait may be ruined. If conditions are not favorable for a bait application, then treatment should be delayed.

While bait applications can be made any time of the year that conditions are favorable, the Texas Extension Service promotes the application of baits in the fall months, typically September and October. Bait applications in the fall are advantageous for several reasons. Baits take several weeks to months before the effects become evident. Applying bait in the fall reduces the chance of problem encounters with fire ant mounds because both people and the ants are not as active outside as they would be in spring months. By the time spring arrives, ant populations should be suppressed. This is not to say that bait must only be applied in the fall. In the event that conditions do not permit a fall treatment, as was the case for this project, a spring treatment is recommended (typically between the months of March and May), so long as conditions are favorable. While the effects of a spring treatment still take weeks to become evident, maximum suppression can be achieved by summer.

About two percent of the human population can react to stings enough to need medical attention, with a smaller percentage having life-threatening reactions. Red imported fire ants are a serious health risk because they endanger troops near foxholes and sandbags. The benefit of using a broadcast treatment for fire ants is the ability to treat large areas with a minimal amount of pesticide and labor while reducing health risks. It is essential that the management program be ongoing and that mound densities are monitored and follow-up treatments are applied. Continuation of the Integrated Pest Management program will allow the Texas Army National Guard to meet their goal of reducing pesticide use and provide managers with information on selecting specific products best suited to these efforts.