Treating and dragging pastures for management of imported fire ants and their mounds

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The red imported fire ant, *Solenopsis invicta* Buren (Hymenoptera: Formicidae), impacts livestock pastures in several ways, including presenting a medical threat to animals particularly during birthing. Also the tall, hardened fire ant mounds developed to house fire ant colonies can be a physical hazard and affect field machinery such as cutters and hay baling equipment. When economic losses occur or when tall ant mounds affect the aesthetic value of the land, suppression of imported fire ants may be warranted.

Suppression of ant populations can be achieved by using registered ant bait insecticides such as Amdro Pro® containing 0.73% hydramethylnon, when broadcasted using a vehicle mounted Herd GT-77 model seeder. Although previous studies have shown that this treatment generally provides 80 to 90 percent elimination of ant mounds within about 6 weeks of treatment, the insecticide alone does not affect the mound structures built by the ants. Dragging or disking pastures using appropriate equipment is recognized as an effective method to temporarily reduce mound height. However, the effect of dragging alone to suppress active ant mound numbers remains a point of discussion due to lack of supporting data.

This two year demonstration was conducted to document the effect of broadcast application of fire ant bait, dragging, and the combination of bait treating plus dragging compared to an untreated control plot.

Methods and Materials

2006. This demonstration was conducted in a 30 acre horse pasture in Lucas, TX (Figure 1). Four plots each measuring 548 ft by 100 ft were established on June 2, 2006. The total area of each plot was 54,800 square feet or 1.28 acres. Four treatments were evaluated in this trial: an untreated control, drag only, treatment and drag, and treatment only. Ant mounds were assessed in each plot by counting the first 15 active ant colonies located in a 12 foot wide swath through the center of each plot. The height of each mound was measured using a yard stick to the nearest inch. This ensured that mound density (mounds per acre), mean and standard deviation of mound height could be calculated.

Two plots (plots 2 and 4) were broadcast treated using hydramethylnon (AmdroPro®) fire ant bait, applied at a rate of 1.5 lbs/acre, so 1.93lbs was applied for the 1.28 acre plots. The Amdro Pro® was applied using a Herd Sure-Feed Broadcaster Model# 778U 06089, with a 0 plate. The spreader was mounted to the back of a pickup truck and we attempted to maintain a speed of 10 mph when the bait was applied. On June 19, 2006, Kendall Nicholson, a local landowner, dragged a harrow weighing around 500 pounds over plots 2 and 3. Ant mound assessments made 1 and 3 weeks after initiating the demonstration as described above. On July 18, 2006, Kendall Nicholson then dragged plots 2 and 3 with a small disc (Figure 2). Two more ant mound assessments were made, with the 6 week assessment made as described above and the final 10 week assessment made similarly, but using a 30 ft wide transect due to very low

ant mound numbers. In addition, all mounds were measured for height with ant activity noted during the 10 week evaluation, reducing the sample size from 15 ant active mounds.

2007. On March 6, 2007, Kendall Nicholson dragged plots 2 and 3 with a small disc. Then plots 2 and 4 were retreated with Amdro Pro® on March 22, 2007, using method described above. Ant mounds were assessed prior to retreatment of Amdro Pro® and then on April 20th, May 4th, May 18th, June 22nd and August 7th. For the mound assessment within each plot, the first 15 active ant colonies were located within a 12 foot wide swath through the center of each plot. Then the height of each mound was measured using a yard stick to the nearest inch. This ensured that mound density (mounds per acre), mean and standard deviation of mound height could be calculated.

Results and Discussion

2006. Although a rain occurred several weeks following treatment, the summer of 2006 was extremely dry in the Dallas County area. There was a total of 6 inches of rain from June to the end of August. The lack of rain and the black gumbo soil in this pasture made dragging using either a harrow or shallow disc less effective than desired. Furthermore, ant colonies appeared to be nesting deeper in the soil and re-construction of surface mounds following dragging was minimal.

Data obtained from this demonstration are presented in Table 1. Treatments using Amdro Pro® required the usual six week period before reducing mound numbers. During the 6 week post-treatment evaluation, no active ant colonies were found within dragged plots (Plots 2 and 3). At 10 weeks following treatment, on October 19, 2006, only a few active mounds (3 in 5490 sq ft of 30 ft wide swath detected or 4.3 mounds per acre) were found in the treated and dragged plot, and no active ant colonies were detected in the dragged only plot. However, even in the untreated control plot, active ant mound numbers had dramatically declined in both the dragged only and untreated control plot to 13.2 and 23.8 mounds, respectively. Notably, the dragged only plot contained fewer mounds than the untreated plot.

Mound height was dramatically reduced due to dragging (harrow and later with a shallow disc) reducing mound height from 5.5 inches $\pm$ 6.1 SD to 0.9 inches $\pm$ 0.8 SD in the dragged only (Plot 3) and 5.1 inches $\pm$ 1.6 SD to 1.1 inches $\pm$ 0.8 SD in the dragged and treated (Plot 2) in the first week of the trial. Mound height in the treated only (Plot 4) and untreated control (Plot 1), non-dragged plots remained high and fluctuated somewhat during the course of the 10 week demonstration. As expected, bait application alone had no effect on the height of dirt mounds across the field whether occupied by ants or not. At week 10, there was a marginal difference between height of treated only plot versus untreated control (5.4 inches $\pm$ 2.1 SD in the untreated control plot 1 versus 5.4 inches $\pm$ 1.5 SD in the treated control plot 4).

Mound height was not assessed during the 6 week post treatment evaluation due to an absence of active fire ant mounds in treated and dragged and dragged only plots (Plots 2 and 3), and data recorded as NA (not applicable). For this reason, both active and non-active ant mounds were counted and measured during the 10 week evaluation.

2007. Even though other evaluations were conducted for this demonstration, mound height was not assessed due to an absence of active fire ant mounds in the treated

and dragged and dragged only plots (Plots 2 and 3) with data recorded as NA (not applicable). Late spring and early summer rains resulted in lush grasses for the last evaluation on August 7, 2007, although the temperature was over 100° F. For this evaluation, Plot 1 (Untreated Control) contained 4 mounds, 4.5 $\pm$ 2.1 Standard Deviation (S.D.) inches in height inches in height; Plot 2 (Treated and Dragged) contained 1 mound, 3 inches tall; Plot 3 (Dragged Only) contained 2 mounds, 4 inches in height; and, Plot 4 (Treated) contained 7 mounds, 4.14 $\pm$ 1.46 S.D. inches in height. Tall grasses may have prevented detection of additional small ant mounds. The dragging and treating plot resulted in the fewest ant mounds per 1.28 acre (548 square feet) plot. Interestingly, Plot 4, treated with AmdroPro™ fire ant bait 4.5 months prior to this evaluation had the highest number of active ant mounds. This side of the pasture has been observed to have a higher numbers of smaller ant mounds, possibly representing a transition to multiple queen or polygyne fire ants. Without dragging, mounds are often re-colonized by migrating ant colonies when vacated by previous inhabitants. It was unfortunate that during the second year of this two-year trial, conditions were unfavorable for "normal" mound re-building and/or erosion of vacated ant mounds in this demonstration. The soil type and topography in this location, consisting of heavy black clay soil in an area with natural depressions due to a subsurface lime stone layer prevented clear documentation of the effects of dragging, treating and the combination of practices (Figure 3).

Figure 1. Infested 30 acre pasture with red imported fire ant mounds found in Lucas, TX prior to the intitation of the trial.

Figure 2. Tractor dragging a small disc over the red imported fire ant mounds in plots 2 and 3 during the pasture trial in Lucas, TX.

Figure 3. Picture of 30 acre horse pasture in Lucas, TX after the conclusion of the two-year treating and dragging trial.

Table 1. Height (in inches) of red imported fire ant mounds before and following treatment and/or dragging, Lucas Pasture, Dallas Co., TX, initiated on June 2, 2006 and concluded on August 7, 2007.

2006

	Initial	1 week	3	6 week	10 week
Plot 1, Untreated Control	6.4	6.9	7.6	8.1	5.4
Plot 2, Treated and Dragged	5.5	0.9	1.6	NA	NA
Plot 3, Dragged	5.1	1.1	2	NA	4.5
Plot 4, Treated	5.6	5.7	5.9	4.5	5.4

2007

	Initial	4 week	6	12 week	20 week
Plot 1, Untreated Control	6.0	4.2	3.9	3.2	4.5
Plot 2, Treated and Dragged	3.0	NA	NA	NA	3.0
Plot 3, Dragged	3.5	NA	3.3	NA	4.0
Plot 4, Treated	6.1	3.7	4.3	3.0	4.1