

# IMPACT OF LOGIC® FIRE ANT BAIT (FENOXYCARB) ON RED IMPORTED FIRE ANT MOUND NUMBERS, HEIGHT AND DIAMETER

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Potential economic loss caused by the presence of tall, hardened mounds produced by the red imported fire ant, *Solenopsis invicta* Buren, in pastures is related to mound height, diameter and numbers. Mound height and hardness is due primarily to soil type and character. The impact of a broadcast application of Logic® Fire Ant Bait on fire ant mounds in an unimproved, ungrazed pasture was examined in the trial reported here.

## Materials and Methods

Four 1.0 acre square plots (208 ft. sides) were established in an unimproved pasture on the Lionberger Farm in Austin County, Texas, 24 July 1992. Within each plot, the number, height and diameter of all mounds (occupied and unoccupied) attributed to red imported fire ant activity were measured in ½ acre circular plots (83 ft. diameter circle), recording total mound numbers by half-circle (1/4 acre) increments within each plot.

Logic® (fenoxycarb) Fire Ant Bait was applied using an ATV-mounted electric-driven Herd® Seeder at a rate of 1.5 lbs. formulated product per 1.0 acre on two plots. The remaining two plots were left untreated.

Plots were evaluated again on 4 June 1993 using methods described above. However, mound totals were recorded for entire ½ acre circular plots rather than by 1/4 acre plot halves. Results of pre- and post-treatment monitoring efforts were analyzed using the Student's *t* test at  $P \leq 0.05$ .

## Results

Mound numbers: Before treatment, no significant differences occurred between ant mound numbers in treatment and untreated control plots (Table 1). In untreated plots, fire ant infested mounds numbered 29 per acre, increasing to 37 (Table 2) by the following year (11 months). The number of mounds (occupied plus unoccupied) in untreated plots averaged 60 per acre. Unoccupied mound numbers were similar to infested mound numbers (25 in 1992 and 29 in 1993), indicating that only about one half of the visible mounds in the field were infested with fire ants. In plots treated with Logic® Fire Ant Bait, ant occupied mounds were reduced by 79% (29 in 1992 to 6 in 1993). The number of detectable unoccupied mounds was also reduced 57% (from 37 to 16).

Mound height: This unimproved pasture had mixed soil types from sandy to clay-type soils. Ant

occupied and unoccupied mounds in untreated plots averaged 3.02 inches high in 1992 (pre-treatment) to 5.40 inches (post-treatment)(Tables 1 & 2). Height of fire ant mounds is known to change through the season and from year to year depending on environmental conditions.

Generally, height of ant occupied and unoccupied mounds was found to be similar. In only a few plot comparisons was ant occupied mound height found to be significantly higher than the height of unoccupied mounds. This situation is to be expected since ant mound building activity continues to increase mound height by bringing new soil to the surface as galleries in the mound are being excavated. Only in plot #2, following the application of Logic®, was the height of unoccupied mounds found to be significantly higher than infested ant mounds (Table 2). In the other Logic®-treated plot, there was a numerically similar trend.

Before treatment, mound height in Logic® plots was found to be significantly higher than in untreated plots (3.84 versus 3.19 inches, respectively)(Table 1). One year (11 months) following treatment, mound height in Logic® treated plots had been significantly reduced relative to those in the untreated plots (4.17 versus 5.86 inches, respectively) (Table 2).

Mound width: Width of all mounds averaged 15.67 inches. No significant differences in width were documented between occupied and unoccupied mounds (Tables 1 & 2).

In untreated plots, mound width increased from 1992 to 1993. Mound width changes over time as a result of the same conditions that influence mound height. Before treatment, in Logic® treated plots, mound diameter was found to be wider than mounds in untreated plots (16.48 to 16.41 versus 14.34 to 14.16 inches, respectively)(Table 1). One year (11 months) following treatment, however, ant mound width in Logic® treated plots was significantly less than that of untreated mounds (13.33 versus 15.67 inches, respectively)(Table 2).

## **Discussion**

Potential impact of reduced mound height on harvesting equipment: Tall, hardened fire ant mounds interfere in hay harvesting operations by damaging equipment. Sickle bar-type cutters are known to break or become inoperable after hitting the hardened mounds. Disc-type (Kountz) cutters are designed and marketed to withstand impact from hitting mounds. However, when conditions are wet, even disc-type cutters are reported to be unsuccessful in cutting through the taller mounds. As a consequence, operators must occasionally resort to raising cutting height to avoid equipment damage and delays caused by broken or clogged machinery. Raising cutting height results directly in a reduction of hay yield for that cutting.

Methods to reduce fire ant mound numbers and average mound height, such as the annual application of an approved fire ant bait product, can reduce the probability of equipment damage or the need to raise cutting height. NOTE: Logic® Fire Ant Bait is not currently approved for use in hay pastures.

The sum height (mound number x mean occupied and unoccupied) of fire ant mounds in plots one

year (11 months) following the application of Logic® to this unimproved, ungrazed pasture was 91.1 inches. In untreated plots the sum of mound height was 356.4 inches. The use of Logic® had reduced this sum by 74.4 percent.

Potential impact of reduced mound width: Although actual yield losses caused by mounding activities of the red imported fire ant have not been documented, the theoretical impact of loss of forage production can begin to be estimated. During this trial, when ant mound width was measured, little forage production occurred on the freshly worked ant mounds. At other times of the year, ant mounds tend to support more forage production, perhaps as a result of aerated soil and increased nutrient levels. However, the total area denuded by ant mounding activities could, at least temporarily, reduce forage production.

The average radius of untreated mounds on this trial was 7.835 inches or 192.85 sq. inches. The total area of forage production lost in this pasture by fire ant mounding activities was  $192.85 \times 66 = 1,2728.34$  sq. inches, or 0.002029 acres ( $= 1,2728.34$  sq. in./6,272,640.0 sq. in/acre), representing a potential 0.2 percent reduction in hay yield.

The sum width (mound number x mean occupied and unoccupied) of fire ant mounds in plots one year (11 months) following the application of Logic® to this unimproved, ungrazed pasture was 293.3 inches. In untreated plots the sum of mound width was 1,016.3 inches. The use of Logic® had reduced this sum by 71 percent. Note: The density of mounds in this trial was relatively low compared to most pastures.

Economic implications: The direct economic loss due to the presence of fire ant mounds in a hay production system is related to a combination of cutting height, the total area on which forage production is not occurring due to ant mounding activities and the value of the forage crop. The current cost of a single application of Logic® (material, equipment plus labor) is estimated to be roughly \$10.00 per acre. Only where the potential economic loss due to a fire ant infestation exceeds the cost of treatment is the use of this ant suppression method justified in agricultural production.

Indirect impacts of a fire ant infestation in a hay production system include: 1) potential medical problems of field workers when encountering this medically important insect; 2) United States Department of Agriculture Quarantine regulations prohibiting the shipment of fire ant infested hay to uninfested areas; 3) aesthetic effects of ant mounding activities in a pasture. These factors are much more difficult to measure economically, but may be important in determining a producer's treatment decision.

**Table 1.** Red imported fire ant mound numbers, height and diameter in an unimproved pasture, Austin County, Texas.

Treatment	Number	Height (in.)	Diameter (in.)
<b>Pre-treatment 24 July 1992</b>			
untreated control			
total			
occupied	29/acre (7,8,7,7)	3.19 ± 1.32**	14.34 ± 3.05
unoccupied	25/acre (7,8,4,6)	2.82 ± 1.42	14.16 ± 3.10
plot 1			
occupied	15/0.5 acre (7,8)	3.10 ± 1.42	
unoccupied	15/0.5 acre (7,8)	2.37 ± 1.45	
plot 3			
occupied	14/0.5 acre (7,7)	3.29 ± 1.25	
unoccupied	10/0.5 acre (4,6)	3.50 ± 1.13	
Logic® Fire Ant Bait			
total			
occupied	29/acre (8,6,9,6)	3.84 ± 1.52*,**	16.48 ± 4.18
unoccupied	37/acre (6,8,13,10)	3.26 ± 1.08*	16.41 ± 4.08
plot 2			
occupied	14/0.5 acre (8,6)	4.18 ± 1.68*	
unoccupied	14/0.5 acre (6,8)	2.89 ± 1.02*	
plot 4			
occupied	15/0.5 acre (9,6)	3.80 ± 1.59	
unoccupied	23/0.5 acre (13,10)	3.37 ± 0.96	
Occupied + unoccupied:			
untreated control	54/acre	3.02 ± 1.37*	
Logic® Fire Ant Bait	66/acre	3.51 ± 1.31*	
total	120/2.0 acres	3.37 ± 1.40	

\* Indicates significant difference between mean couplets using the Student's *t* test ( $P \leq 0.05$ ).

\*\* Indicates significant difference between means so marked using the Student's *t* test ( $P \leq 0.05$ ).

**Table 2.** Red imported fire ant mound numbers, height and diameter 11 months following a broadcast application of Logic® (fenoxycarb) Fire Ant Bait in an unimproved pasture, Austin County, Texas.

Treatment	Number/acre	Height (in.)	Diameter (in.)
<b>Post-treatment, 4 June 1993</b>			
untreated control			
total			
occupied	37/acre	5.86 ± 2.02*,**	15.89 ± 4.15
unoccupied	29/acre	4.81 ± 1.62*	16.27 ± 4.56
plot 1			
occupied	22/0.5 acre	5.77 ± 2.41	
unoccupied	16/0.5 acre	4.59 ± 2.15	
plot 3			
occupied	15/0.5 acre	6.00 ± 1.31*	
unoccupied	13/0.5 acre	4.77 ± 1.48*	
Logic® Fire Ant Bait			
total			
occupied	6/acre	4.17 ± 1.60*,**	13.33 ± 3.72
unoccupied	16/acre	4.13 ± 1.63*	13.19 ± 2.34
plot 2			
occupied	0/0.5 acre	0.00 ± 0.00*	
unoccupied	10/0.5 acre	3.90 ± 0.88*	
plot 4			
occupied	6/0.5 acre	4.17 ± 1.60	
unoccupied	6/0.5 acre	4.50 ± 2.51	
Occupied + unoccupied:			
untreated control	66/acre	5.40 ± 1.92	
Logic® Fire Ant Bait	22/acre	4.14 ± 1.92	13.33 ± 3.72*
untreated (pre- + post-)	186/3.00 acres		15.67 ± 3.99*

\* Indicates significant difference between mean couplets using the Student's *t* test ( $P \leq 0.05$ ).

\*\* Indicates significant difference between means so marked using the Student's *t* test ( $P \leq 0.05$ ).