EVALUATION OF BIFENTHRIN AND LINDANE FORMULATIONS AND APPLICATION METHODS AS INDIVIDUAL RED IMPORTED FIRE ANT MOUND TREATMENTS

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This trial was conducted to evaluate several formulations of bifenthrin, a pyrethroid insecticides, and lindane, a chlorinated aryl hydrocarbon insecticide. The bifenthrin product, Talstar®, is currently registered for fire ant suppression in nursery crops as a granular media treatment. Liquid bifenthrin and lindane formulations are not currently registered as fire ant mound drenches.

Materials and Methods

Forty plots, 30 ft. wide and varying in length, were established along an abandoned airport runway on the Texas A&M Riverside Campus, Brazos. Co., Texas. All mounds were marked with plot flags. Plots were recently mowed and flora consisted of pasture grasses. Soil was sandy loam. Plots were consecutively numbered and arrayed by length and separated into four treatment blocks (replications). Treatments were randomly assigned within blocks, with each block receiving one of each of the treatments listed below:

Formulation	Application method	Rate	Mounds/plot
bifenthrin			
Talstar® Flowable	mound drench	0.972 fl. oz.(27.6 ml.)/gal.	10
SPG95-01 (bifenthrin EC)	mound drench	0.648 fl. oz.(18.4 ml.)/gal.	10
SPG95-02 (bifenthrin ME)	mound drench	25.6 fl. oz./gal.	5
SPG95-02	mound drench	4.0 fl. oz./gal.	5
SPG95-02	mound drench	2.0 fl. oz./gal.	5
SPG95-03 (Biflex® EC)	mound drench	0.37 fl. oz. (10.5 ml.)/gal.	10
lindane			
Gamma-Mean® L.O. (4 lbs. a.i./gal.)	mound injection	9.1 ml./gal.	10
chlorpyrifos (standard)			
Dursban® 2E (2 lbs. a.i./gal.)	mound drench	0.25 fl. oz./gal.	10
untreated control			
water	mound drench	1.0 gal.	10
water	mound injection	1.0 gal.	10

Treatments were applied, 16 November 1995, using either 2 gallon capacity sprinkler cans or an injector device. Each mount treated received 1 gallon of solution.

Prior to and periodically following treatment (20, 27 Nov.,1 Dec., 4 Jan.1996, or 4, 11, 15,and

49 days after treatment, respectively), fire ant mounds were evaluated within treated plots using the minimal disturbance method, whereby mounds were slightly disturbed using a stick and considered active if 12 or more worker ants came to the surface as a general defensive response to disturbance. New mounds appearing in treatment plots were marked and counted, 20 Nov. 1995 and 4 Jan. 1996. Results were analyzed using Analysis of Variance (ANOVA) and means were separated using Tukey's Studentized Range Test ($P \leq 0.05$).

Results and Discussion

Originally, 10 mounds were scheduled for treatment with each formulation. However, due to the shortage of bifenthrin ME (SPG95-02), only five mounds were treated within each plot. The remaining mounds were marked and not further considered for monitoring and analysis.

All treatments significantly reduced the number of active red imported fire ant mounds per treatment plot (**Table 1**). Gamma-Mean® injection produced a slower response than was achieved with other treatments. Statistically, Dursban and Gamma-Mean treatments performed the same from 7 to 49 days following treatment. All bifenthrin treatments performed similarly and produced the most dramatic suppression of mound activity. No differences in new or "satellite" (Sat.) mounds occurred between chemical treatments. Of notable interest in this trial was the effect of the water injection in causing colonies to move. Plots receiving this treatment were found to have significantly fewer active treated mounds following treatment, but the total number of mounds per plot remained similar to the water drench treated plots until seven weeks after application.

Table 1. Mean number of active red imported fire ant mounds following individual mound treatments, Brazos Co., Texas, treated16 Nov., 1995.

	Mean number* of active mounds* (*of 10 or 5)/plot			
TREATMENT	4-days	11-days	15-days	49 days
Dursban® 2E	0.00 d	0.25 c	0.25 cd	0.25 c
Gamma-Mean® L.O.	2.25 c	1.00 c	2.00 c	1.00 c
Talstar® T&O	0.25 cd	0.00 c	0.00 d	0.00 d
Biflex® EC (-03)	0.00 d	0.00 c	0.00 d	0.00 d
bifenthrin EC (-01)	0.00 d	0.00 c	0.00 d	0.00 d
bifenthrin ME (-02) High	0.00 d	0.00 c	0.00 d	0.00 d
bifenthrin ME (-02) Med	0.00 d	0.00 c	0.00 d	0.00 d
bifenthrin ME (-02) Low	0.00 d	0.00 c	0.00 d	0.00 d
water drench	9.00 a	8.25 a	9.00 a	7.50 a
water inject	6.50 b	3.25 b	5.25 b	4.00 b
F-value	41.73	55.43	51.92	54.26
P	0.0001	0.0001	0.0001	0.0001
MSE	0.7815	0.3843	0.5556	0.3509
MSD	2.1501	1.5077	1.8129	1.4408
critical value =4.864				
df = 27				

	Mean number* of active mounds/plot			
	----------4 Days----------		----------49 days----------	
	Sat. only	Tot. active	Sat. only	Tot. active
Dursban® 2E	4.50 a	4.50 c	2.00 a	2.00 bc
Gamman-Mean® Inject	4.00 a	6.25 bc	0.75 a	1.75 bc
Talstar® T&O	3.50 a	3.50 c	1.75 a	1.75 bc
Biflex® EC (-03)	3.00 a	3.00 c	1.75 a	1.75 bc
bifenthrin EC (-01)	4.25 a	4.25 c	0.75 a	0.75 c
bifenthrin ME (-02) High	3.75 a	3.75 c	1.25 a	1.25 bc
bifenthrin ME (-02) Med	2.50 a	2.50 c	1.50 a	1.50 bc
bifenthrin ME (-02) Low	5.25 a	5.25 c	3.25 a	3.25 bc
water drench	5.25 a	14.25 ab	1.75 a	9.25 a
water inject	8.25 a	14.75 a	1.00 a	5.00 b
F-value	0.94	5.66	1.27	8.19
P	0.5200	0.0001	0.2918	0.0001
MSE	8.8102	10.9815	1.9843	2.4731
MSD	7.2193	8.06	3.4261	3.825
critical value = 4.864				
df = 27				

* Means in columns followed by the same letter are not significantly different using Analysis of Variance (ANOVA) and means were separated using Tukey's Studentized Range Test ($P \leq 0.05$).