

**EVALUATION OF CHLORPYRIFOS SURFACE APPLICATIONS
TO A PECAN ORCHARD FLOOR
FOR SUPPRESSION OF THE RED IMPORTED FIRE ANT**

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Chlorpyrifos (Lorsban® 50 WP and Lorsban® 15G) is registered for treatment of pecan orchard floors for suppressing the red imported fire ant, *Solenopsis invicta* Buren. Previous work (Drees et al. 1989; Barr et al. 1991) has demonstrated that orchard floor chlorpyrifos treatments suppress ant foraging and mound building activities for a period exceeding the treatment-to-harvest interval for the use of this insecticide. These treatments could be useful to reduce ant activity during the harvest period and to protect equipment such as drip and sprinkler irrigators. Since the primary affect of surface chlorpyrifos applications is to suppress ant foraging and other surface activity, little reduction in ant mound numbers is expected unless treatments are routinely applied.

This trial was conducted to evaluate a new formulation of chlorpyrifos, a wettable gel (75 WG), one that contains no organic solvents, and to determine whether the suppressive affect on foraging red imported fire ants produced by this formulation was similar to the conventional formulation, Lorsban® 4E.

Materials and Methods

This trial was conducted at Royalty Pecans in Burleson County, Texas, which has trees planted on a 45 ft. spacing. The test site was shredded twice before treatment plots were established. Twenty plots, 90 by 90 ft. or 5,400 sq. ft. (0.1239 acre) were established, 9 June 1995, and the number of active red imported fire ant mounds were counted in each plot using the minimal disturbance method. Plots were arrayed from highest to lowest active ant mound numbers and divided into four blocks or replicates. Treatments were randomly assigned to a plot within each block. Treatments were confined to plots 60 by 90 ft. in size (5,400 sq. ft. or 0.1239 acre) due to limited test material. Treatments were applied, 13 June 1995, using a Continental Belton Sprayer with a 50 gal. tank and a 12 ft. boom fitted with eight FanSpray 8003 nozzles mounted two feet above the ground, using 20 gal. solution per acre applied at 40 psi and traveling at 2 mph. Treatments included:

1. Lorsban® Wettable Gel 0.5 lb a.i./acre = 160 g in 5 gals. water/plot
(Lorsban® 75WG; EF-1315; 75% w/w chlorpyrifos; lot #PM1241; 500 gms. sample)
2. Lorsban® Wettable Gel 1.0 lb a.i./acre = 340 g in 5 gals. water/plot
3. Lorsban® 4E 0.5 lb a.i./acre = 58.1 mls. in 5 gals. water/plot
(Lorsban® 4E (44.9% chlorpyrifos); EPA Est. 62719-1N1; JB15161601)
4. Lorsban® 4E 1.0 lb a.i./acre = 116.1 mls. in 5 gals. water/plot
5. Untreated control

Before and periodically following application (0, 7, 14, 21 and 28 days), the number of foraging fire ants attracted to twelve 1 by 1 inch olive oil-soaked index cards were counted within an hour after placement. Cards were placed in three transects across each plot (4 cards in a line down the center, and 4 each on two lines on either side of the middle transect) when temperatures were mild. At three weeks after treatment, number of active ant mounds within each plot were again counted, although only a subsample of the plot (20 by 90 ft. swath) was surveyed. Results were analyzed using analysis of variance (ANOVA) and means separated using Tukey's Studentized Range Test ($P \leq 0.05$).

Results and Discussion

No statistical differences in ant mound numbers (**Table 1**) or foraging ant response to olive-oil cards (**Table 2**) was found between sets of treatment plots prior to treatment. Initially, all chlorpyrifos treatments significantly suppressed ant foraging activity. The higher rates of Lorsban® 4E and Lorsban® 75 WG suppressed activity to a greater degree for the first 2 weeks following application. The low (0.5 lb. a.i./acre) rate of Lorsban® 4E began to lose effectiveness at two weeks after treatment. By the third week, ant numbers attracted to oil-soaked cards were similar between the untreated plots and all chlorpyrifos treatments except the high concentration (1.0 lb. a.i./acre) of the 75 WG formulation.

Active ant mound numbers in treated plots were numerically suppressed in chlorpyrifos-treated plots, but were not eliminated. At three weeks after treatment, significant suppression of ant mounds resulted from Lorsban® WG applied at 1.0 lb. a.i./acre (**Table 2**). Overall, the Lorsban® 75 WG applied at 1.0 lb. a.i./acre suppressed foraging to the greatest degree over the 4 week monitoring period, while Lorsban® 4E applied at 0.5 lb. a.i./acre was the least effective. The "new" 75 WG formulation performed as well or better than the conventional 4E formulation. During treatment, however, we noted that the Lorsban® 75 WG formulation is not quite as easy to use as the 4E formulation. We found the wettable gel difficult to measure accurately since it was hard to "pour" or scoop and tended to "pack down". It was also so light as to be easily blown by the wind. The dry gel was also very difficult to place directly into the spray tank. It required vigorous stirring and agitation to break up the buoyant clumps. This problem was alleviated by first mixing the gel with a small quantity of water to form a slurry in a separate container, then pouring and rinsing the slurry into the spray tank.

Literature cited

- Drees, B. M., C. L. Barr, W. Ree and D. Rue. 1989. Effect of insecticide applied to pecan tree trunks and the orchard floor for the suppression of the red imported fire ant (Hymenoptera: Formicidae) in Upper Coast District Entomological Result Demonstration Handbook 1988-1989. Texas Agricultural Extension Service, pp. 54-57.
- Barr, C. L., B. M. Drees. 1991. Impact of chlorpyrifos (Lorsban®) treatments of pecan tree trunks and the orchard floor. in Red Imported Fire Ant Result Demonstrations/Applied Research 1990-1991. Texas Agricultural Extension Service, pp. 54-57.

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Table 1. Number of active red imported fire ant per plot prior to 13 June 1995 treatment (90 by 90 ft. plots) and three weeks following treatment (a 20 by 90 ft. subsample within the 60 by 90 ft. of plots actually treated), Royalty Pecan, Burleson Co., Texas.

Treatment and rate	Number of active mounds/total ^a	
	<u>Pre-count*</u>	<u>3 weeks**</u>
Untreated control	104.75 a	15.75 a
Lorsban® 4E 0.5 lb. a.i./acre	106.25 a	8.25 ab
Lorsban® 1.0 lb. a.i./acre	102.75 a	5.50 ab
Lorsban® WG 0.5 lb. a.i./acre	101.25 a	7.25 ab
Lorsban® WG 1.0 lb. a.i./acre	103.00 a	5.25 b

<i>F</i>	10.81	2.50 (treatment = 3.42)
<i>P</i>	0.0002	0.0779
MSE	30.250	21.567
MSD	12.396	10.467
d.f. = 12		
Crit. Val. = 4.508		

^a Means followed by different letters are significantly different using analysis of variance (ANOVA) and means separated using Tukey's Studentized Range Test ($P \leq 0.05$).

Table 2. Number of foraging red imported fire ant workers attracted to twelve 1 by 1 inch olive oil-soaked cards within an hour, placed in treatment plots on a pecan orchard floor, Royalty Pecans, Burlleson County, Texas, treated 13 June 1995.

Treatment and rate	Mean no. ants per 12 oil-soaked cards ^a				
	Pre-count	1 week	2 weeks	3 weeks	4 weeks
Untreated control	114.25 a	283.25 a	136.00 a	180.75 a	427.50 a
Lorsban® 4E 0.5 lb. a.i./acre	86.00 a	25.25 b	65.25 ab	116.25 ab	256.25 ab
Lorsban® 1.0 lb. a.i./acre	83.00 a	0.25 b	12.50 b	69.50 ab	119.00 b
Lorsban® WG 0.5 lb. a.i./acre	101.75 a	12.50 b	56.25 b	85.75 ab	199.00 b
Lorsban® WG 1.0 lb. a.i./acre	84.00 a	0.00 b	5.00 b	36.00 b	116.25 b
<i>F</i>	0.28	9.93	6.23	2.80	5.60
<i>P</i>	0.9485	0.0004	0.0030	0.0567	0.0047
MSE	2237.458	3652.758	1061.641	2701.558	6813.775
MSD	106.61	136.22	73.439	117.15	186.05
d.f. = 12					
Crit Val. = 4.508					

^a Means followed by different letters are significantly different using analysis of variance (ANOVA) and means separated using Tukey's Studentized Range Test ($P \leq 0.05$).