Impact of Chlorpyrifos (Lorsban®) Treatments of Pecan Tree Trunks and the Orchard Floor

Charles L. Barr, Extension Associate
Bastiaan M. Drees, Extension Specialist and Associate Professor
and William O. Ree, Jr., Extension Agent - Pest Management (Pecans)

The red imported fire ant (Solenopsis invicta, Buren) is a known predator of many arthropod species including beneficial insects. In pecan production, the presence of entomophagous insects has been shown to be important in the suppression of damaging insects such as aphids. Fire ants have been shown to "tend" aphids, consume their honeydew, move them to new locations and protect them from natural enemies by consuming parasitized aphids and preying upon aphid predators such as green lacewing larvae. Consequently, the presence of foraging fire ants in pecan tree canopies is thought to aggravate aphid outbreaks. This study was undertaken in an attempt to document the impact of removing fire ants from pecan tree canopies on aphid and aphid predator densities.

Materials and Methods

On July 1, 1991, a block of pecan trees was selected for testing at the Royalty Pecan Orchard, in Burleson County, Texas. The areas consisted of three adjacent blocks, each measuring 9 trees across and 10 trees long. Tree spacing was 36 feet, giving a total ground area of approximately 8 acres. The varieties were mixed within each block and included: Cheyenne, Kiowa, Gracross, and Desirable.

The first, westernmost, block was treated by spraying the individual tree trunks with a Lorsban® 50W (chlorpyrifos) solution using a hand-carried pressure sprayer. The rate used was based on the registered concentration for treating peach tree borer (Lorsban 4E is registered for use at a rate of 3 qts. per 100 gal. Thus, Lorsban 50W rate was determined to be 6 lbs per 100 gal. or 0.96 oz. per gal.). A band from ground level to approximately 4 feet was sprayed to runoff on each tree. The second block was left as an untreated control and the third was treated with Lorsban 15G® (chlorpyrifos) at a rate of 6.7 lbs. per acre using a truck-mounted electric broadcast spreader to distribute the material across the orchard floor.

Fire ant activity was monitored using olive oil-soaked index cards measuring 1" x 1". These cards were stapled to selected trees and allowed to stand for approximately one hour before the number of ants were counted from each card. Cards on trunk-sprayed trees were placed above the spray line and on the ground. Cards in the other two blocks were placed approximately 3 feet above ground level except on Aug. 23 when ants were also sampled on the ground between trees. A minimum of 5 trees and/or ground locations were monitored for ant activity from each treatment area on July 17, 19, 23 and September 26, 1991. Resulting data were analyzed using the Student's *t* test (P # 0.05).

Because of their susceptibility to yellow pecan aphids, 'Cheyenne' variety trees were selected and

marked for monitoring. Aphid counts were made by counting the number of aphids on 5 randomly-selected compound leaves from each of the five marked trees per treatment area. Aphid predators such as green lacewing larvae and adults and lady beetle larvae and adults were evaluated by counting the number of compound leaves it took to find three insects on each of the marked trees. Results were analyzed using Analysis of Variance (ANOVA)(P # 0.05) and means were separated using the Least Significant Difference (LSD) test.

Results and Discussion

Ant activity was found to be erratic and generally low during this trial resulting in high variability of monitoring result data. Thus, few statistical differences were documented. Lorsban 4E application to trunks of pecan trees on July 1 eliminated ant activity on July 17 and August 23:

Mean no. (± S.D.) fire ants on olive oil-soaked card

Date	**On tree trunk**	**On ground**
July 17	0.0	5.0 ± 8.7
August 23	0.0	5.3 ± 12.6

By September 26, ant activity on tree trunks has resumed.

Lorsban 15G applied to the orchard floor eliminated ant activity on August 23 (0.0 ants found on 6 cards versus 6.0 ± 10.3 on trunks in the Lorsban 15G treated area and 2.5 on the orchard floor in the untreated area). However, ant activity on tree trunks in the Lorsban 15G treated area was dramatically higher than in the untreated are on July 19 (Table 1). A possible explanation for these observations is that ants in mounds at the base of trees were not affected by the treatment. Since these ants could not forage on the treated orchard floor, foraging activity on tree canopies intensified. Since the focus of this trial was on aphids and aphid predators, ant activity was not monitored prior to treatment. Therefore, it is not possible to speculate on ant activity between treatment areas versus after treatment.

No significant differences were documented for aphid or aphid predator densities between treatments (Table 2). However, the trunk treatment area harbored numerically fewer aphids and the orchard floor treated area (where trees were found to have significantly more ant foraging activity) contained fewest aphid predators, July 16. These values are, at least, consistent with the theories about the impact of red imported fire ants on aphid outbreaks.

In summary, results presented here are inconclusive and do not clearly document fire ant aggravation of aphid outbreaks. Perhaps the treatments were applied too late in the season to have an affect on the early stages of an aphid infestation or high temperatures and dry conditions during the Texas summer months depressed the impact of the fire ants. Applications applied earlier in the season might have a greater impact. One interesting observation to be gained from this trial is that Lorsban 15G applied to the orchard floor may well aggravate fire ant foraging in

pecan canopies. Such a treatment could be a useful tool in further investigations into the interrelationship between the red imported fire ant, yellow pecan aphids and aphid predators.

Table 1. Red imported fire ant activity on pecan trunks following Lorsban® (chlorpyrifos) treatments, Royalty Pecans, Burleson County, Texas, 1991.

Mean no. (± S.D.) ants on olive oil-soaked cards

Treatment	**July 17 (n=5)**	**July 19**	**Aug. 23 (n=6)**	**Sept. 26 (n=6)**
Lorsban 15G to orchard floor	37.0 ± 37.5	24.2 ± 15.9* (n=39)	6.0 ± 10.3	---
Lorsban 50W to tree trunks	0.0	---	0.0	2.6 ± 3.1
Untreated	16.2 ± 18.2	2.9 ± 3.3* (n = 13)	5.3 ± 4.3	8.3 ± 10.6

* indicates significant difference using the Student's *t* test)(P # 0.05).

Table 2. Aphid and aphid predator densities in pecan trees in red imported fire ant treatment areas, Royalty Pecans, Burleson County, Texas, 1991.

Mean number yellow pecan aphids per compound leaf

Treatment	July 5	July 16	Aug. 29
Lorsban 15G to orchard floor	12.20 a	1.72 a	1.28 a
untreated	10.92 a	1.88 a	3.68 a
Lorsban 50W trunk spray	9.64 a	0.48 a	3.72 a
f-ratio	*0.229*	*2.202*	*0.824*
P	*0.792*	*0.1216*	*0.4450*
LSD (SSD5 %)	*7.646*	*1.476*	*4.401*

Number of compound leaves needed to detect aphid predators

Treatment	July 5	July 16	Aug. 29
Lorsban 15G to orchard floor	4.45 a	1.53 a	1.93 a
untreated	7.13 a	3.07 a	1.93 a
Lorsban 50W trunk spray	6.33 a	3.07 a	2.73 a
f-ratio	*0.859*	*2.206*	*0.671*
P	*0.4343*	*0.1230*	*0.5194*
LSD (SSD5 %)	*4.276*	*1.515*	*1.634*