

## **Evaluation of Extinguish® for Fire Ant Control in Pecans article for The January 001 Issue of “THE PECAN PRESS”**

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This month's article is the second of a two part series on the impact of fire ants in a pecan management system. In last month's article we reviewed the results of a survey/questionnaire that was distributed to 305 Texas producers and homeowners during 2000. This month's column will summarize some of the field data collected during 2000 from two study sites.

### **The Problem**

The red imported fire ant, *Solenopsis invicta* Buren, commonly infests pecan orchards in central Texas. Growers report that stinging ants are a hazard to orchard workers grafting trees and during harvest. Fire ants also damage equipment such as irrigation lines and electric motors on water pumps and in the orchard, ants can enter open sutures in the shells of fallen nuts to feed on kernels. Although no formal assessment of economic impact has been made, a recent survey found that 35 percent of the commercial growers invest \$6.00 or more per acre annually to control fire ants in their orchards.

Until recently, pecan growers had few options for controlling fire ants in pecans. Lorsban® 4E (chlorpyrifos) is registered for application to the orchard floor to temporarily reduce fire ant numbers. Studies have shown that Lorsban 4E sprayed onto tree trunks also reduce the number of fire ants entering the canopy. Logic® (fenoxycarb) fire ant bait is registered only for use in non-bearing pecan orchards.

The active ingredient in Extinguish® fire ant bait is an insect growth regulator (IGR) called methoprene. When transported back to the colony by foraging fire ants and fed to the queen, the queen stop producing viable eggs and the colony slowing dies out. The label for Extinguish states it “may be applied to, but not limited to, parks, zoos, school grounds, pastures, rangeland, citrus groves, cropland,” and many more sites (see label). Because of this extensive listing of approved application sites, Extinguish is viewed as potential product for fire ant control in pecans.

### **Project Objective**

Measure the impact of fire ant control on densities of key aphid predators and aphid densities throughout the season on pecans.

### **Methods and Materials**

To investigate the objective of this study, two commercial orchards were selected, one was the Bill Haney Orchard in Comanche County and the second orchard was the Holmes Pecan Orchard in Robertson County near Mumford, TX. At each orchard, twelve subplots were established within the orchard and each plot was randomly assigned to one of the following three treatments: Extinguish® fire ant bait, Lorsban® 4E trunk spray, or the untreated check.

*Comanche County:* Plots consisted of 12 rows of trees with about 22 trees in each row. Trees were spaced 25 ft apart in the row and rows were 30 ft apart, resulting in plots about 330 ft by 550 ft or 4.5 acres for each plot.

*Robertson County:* Plots consisted of eight rows of trees with nine trees in each row. Tree spacing was 45 by 45 ft. This resulted in plots 315 by 360 ft or 2.6 acres each.

**Treatments.** Extinguish was applied at a rate of 1.5 lbs per acre using a Herd spreader attached to all terrain vehicle. The swath width was about 30 feet and the application speed about 10 mph. *Comanche County:* Extinguish was applied once in October 1999, and twice in 2000 on June 16 and October 3. Lorsban 4E was applied at a rate of 1 pint/100 gallons of water with a hand gun attached to a roller pump and tank in the back of a pickup truck. Lorsban was applied until run-off to the trunk from the soil level up to a height of about 3 feet. Treatment dates for Lorsban 4E were October 1999 and May 3, August 8 and October 18, 2000. *Robertson County:* Extinguish was not applied until May 19, 2000 with a second application on October 12, 2000. Lorsban 4E was applied on May 12, July 24 and October 12, 2000.

**Treatment Assessment.** The effect of each insecticide treatment on fire ant densities was measured by counting mounds, trapping ants in food-baited vials and pitfall traps and counting ants on tree trunks. The impact of treatments on other arthropods was measured by counting aphids on leaves, sampling lacewings with cardboard bands, and sampling insects and spiders by fogging the tree canopies with a pyrethroid insecticide. Each method is described below.

**Mound density.** Ant mounds were not visible for counting in Comanche county due to dry weather in Oct. 1999, when the first insecticide treatments were made. Rains in late October were followed by mound building activity and allowed mound densities to be determined on Nov. 2. On this date the number of fire ant mounds were counted in two subplots each 30 by 25 ft in each plot. Mound densities were determined again the following summer on June 19, 2000 by counting the number of mounds in an area 12 ft wide and centered down the row of five trees (125 ft long). Fire ant colonies were concentrated along the drip irrigation line running between trees. No significant rainfall occurred from June through Oct. 2000, and mounds were not visible for counting until rains returned in early Nov. 2000. Mound densities were determined Nov. 12, 2000 in a subplot 125 ft long and 30 ft wide in each plot. Mound diameter was also recorded.

Mound densities were not recorded in Robertson County until March 30, 2000. Mound densities were made by counting the number of mounds in a subplot 12 ft wide and centered down a row of five trees (225 ft) in each plot. Mound density counts were repeated in the same locations on June 27, July 25 and Dec. 7, 2000.

**Ant Density at Baits.** Foraging ants were sampled using glass vials containing a piece of Tender Vitals® cat food and a piece of Jolly Rancher® gum drop candy. A single vial was placed on the ground about 12 inches from the trunk of three trees in the center of each plot. On the same three

trees, a single vial was placed in the crotch of the tree to sample ants entering the canopy.

*Direct sampling.* Tree trunks in each plot were visually searched for one minute and all ants collected with an aspirator and later identified.

*Pitfall sampling.* Four pitfall traps were placed about three feet at each cardinal point around three consecutive trees in each plot. Pitfall traps are used to sample arthropod activity on the orchard floor and as a means to sample for native ants which may not inhabit a tree but do compete with foraging fire ants on the orchard floor. Pet safe antifreeze was added to the bottom of the pitfall trap to kill and preserve ants and other arthropods falling into the trap.

**Lacewing/spider sampling.** Bands of single sided corrugated cardboard about one inch wide and three inches long were wrapped once around a terminal branch and fastened together with a plastic clothespin. The cardboard bands were a means to monitor lacewing and spider populations within the tree canopy. Lacewing larvae enter the corrugations and pupate. Spiders also construct webs inside the corrugations. A total of 10 bands were placed in each of five consecutive trees in the center of each plot. Bands remained in the orchard for about one week and then were collected and opened to observe lacewing larvae, pupae or spiders.

## Results

Not all of the samples or data have been sorted or analyzed at this time. For this article, only information on mound density, aphid populations and predator collections will be discussed.

*Mound density - Comanche County:* In November, 1999, the average number of mounds per two subplots was 9, 9, and 11.5 for the Extinguish®, Lorsban® and check treatments, respectively. Mound densities were not significantly different, confirming the expectation that the treatments applied two weeks earlier had not yet reduced mound density. At an average density of 9.8 mounds/subplot, the density of mounds was 300 per acre prior to treatment.

The following summer (June 19, 2000), densities of fire ant mounds averaged 46, 152 and 232 per acre for Extinguish®, Lorsban® and the check, respectively. This represents an 80 percent reduction in mound numbers in the Extinguish treatment and 35 percent reduction in the Lorsban treatment, relative to the check. The reduction in mound density in the Lorsban treatment may have resulted from direct exposure of colonies at the base of the trunks to the Lorsban trunk treatment. Also, ant colonies may have died due to lack of access to food in the tree canopies. An examination of the colonies for brood (immature ants) found 38 percent of the colonies in the Extinguish treatment lacked brood while only 2 to 3 percent of the colonies in the Lorsban and check lacked brood.

Fire ant densities in November, 2000, averaged only 32 per acre in the Extinguish treatment, an 89 percent reduction compared to a density of 287 mounds per acre in the untreated check. Densities in the Lorsban treatment were 238 mounds per acre, or 17 percent less than the check.

*Mound density - Robertson County.* On the initial ant mound count date, March 30 the number of mounds across the twelve plots averaged 271 mounds per acre. By the second mound density count on June 27, mound counts fell to an average of 46 mounds per acre in the Extinguish® plots, while the Lorsban® and check plots averaged over 166 mounds per acre. On July 25, mound density in the Extinguish plots averaged 25 mounds per acre while the Lorsban

and Check plots averaged 133 and 241 mounds respectively. By December 7 following some heavy November rains mound counts in the Extinguish plots rose to an average of 79 mounds per acre while the Lorsban plots increased to 192 mounds and the Check stayed about the same at 237.5 mounds per acre.

*Lacewing/spider sampling - Robertson County:* The sampling of aphid predators, primarily lacewing and spiders with cardboard bands was conducted from May 23 through September 2000. The population trend of lacewings and spiders followed the same pattern as the aphid populations, peaking on June 27 then falling off during the remainder of the season.

*Pecan aphid density - Robertson County:* Most of the information on pecan aphid population trends came from Robertson County where weekly counts were made from May 30 through September. Population trends followed the same pattern in all treatments, regardless of fire ant numbers. However, it should be pointed out that the full impact of the Extinguish® treatment had not come into play by the time aphid populations peaked. In all plots, aphid populations peaked on June 26 then crashed to low numbers by the next sample date of July 5.

## Summary

*Comanche County:* The fall application of Extinguish® resulted in an 80 percent reduction in densities of fire ant mounds the following June. Mound densities were reduced by 89 percent in November following a second application in May. It is also noted that those remaining mounds in the Extinguish plots were much smaller in size than mounds in the Lorsban® and check plots.

*Robertson County:* Fire ant mound densities in December were reduced in the Extinguish® plots by 74 percent while mound density counts in the Lorsban® and check plots were reduced only 28 and 5 percent respectively when compared to the pretreat count in March. Pecan aphid populations in the three treatment areas followed the same pattern of peaking in late June then dropping to low numbers in early July. Collections of lacewings and spiders in cardboard bands also followed the same pattern as the aphid populations. However, the initial application of Extinguish and its effect on fire ant populations and the possible impact on aphid predators and aphid populations had not come into play during the time on increased aphid activity (June) so no conclusion can be made at this time on that interaction.

As an added note, from the collection of ants in baited vials and pitfall traps during the season, 18 new county records for ant species were recorded for Robertson and Comanche counties.

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