

## **NouGuard® as a Fire Ant Repellent on Tree Trunks**

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Fire ants commonly forage in the canopies of trees where they are considered a nuisance and/or hazard to anyone working in the tree or simply standing below. It is common to see feeding trails on the trunks of almost every tree in a pecan orchard, indicating that there is some food source in the canopy that the ants are exploiting. NouGuard® is a material containing 0.64% capsaicin and capsaicinoids, the “hot” in peppers. This field trial was designed to test the effectiveness of a trunk band spray of NouGuard in keeping fire ants from crossing from the ground into tree canopies.

**Objective:** Determine if the capsaicin-based product Nougard prevents ants from crossing a sprayed barrier on pecan tree trunks.

### **Materials and Methods**

The test site was a non-bearing pecan orchard with a known fire ant infestation. Tree canopies were not touching insuring that no ants crossed from one tree to another. Weeds, brush and low-hanging limbs surrounding the trunk were cleared to prevent ant access to the trunk by means other than the trunk itself. To detect ant presence, a one-by-one inch olive oil-soaked index card piece (bait card) was stapled to each tree trunk. After about one hour, the number of ants on each card were either counted, for very low numbers, or estimated, when many ants were present. This procedure was followed for all evaluations. Pre-counts were conducted on 24 May 2000 in the late afternoon. Approximately 120 trees were evaluated, since a certain number of “zeros” were expected.

Results were tabulated and trees with fewer than five ants on a card were not included in the test. A map was made of the test section of the orchard, including individual tree pre-counts. Trees were grouped into plots of five trees each, based mainly on physical proximity to each other to help avoid confusion during treatment application. Treatments were then assigned to each plot so that each treatment contained a plot with low ant numbers, two with moderate ant numbers, and one with high ant numbers. Therefore, each treatment had four replications of five trees each, a total of 20 trees.

Treatments included: 1) NouGuard, 0.64% capsaicin and capsaicinoids, applied undiluted; 2) Concern® Citrus Home Pest Control (5.9% d-limonene); 3) Lorsban® 4E, (44.9% chlorpyrifos) mixed at a rate of 1 quart per 100 gallons of water, (18 ml / 2 gal water); 4) untreated control

The NouGuard was applied by Mr. Gary Higby a technical representative of NTI International, the manufacturers of NouGuard. The product was applied using a small hand-held pressure sprayer in two bands, each 6 - 8" wide, 18 - 24" apart leaving an untreated area between the two bands where the bait cards were placed at about waist level. The reasoning behind this method was to prevent ants from coming up the tree-trunk from the ground and down from the canopy. This was a particular concern during the first few days of the test since it was felt that a number of ants would be trapped in the canopy and show up on the bait card, even if the repellent

was working to prevent ant access from the ground.

Concern® Citrus Home Pest Control was applied according to label directions using 25 - 30 pump sprays (product container) per tree in a band approximately six inches wide at chest level. The Lorsban was applied using a pump pressure sprayer around the entire trunk from ground level to a height of approximately four feet, sprayed to runoff (Barr et al. 1991). Bait cards were placed well above the treatment lines (chest to shoulder high) for these two products and untreated trees.

Evaluations using bait cards were conducted at 24 hours, 8, 21 and 35 days post-treatment. Data were analyzed using PC SAS analysis of variance procedures and with means separated by Tukey's studentized range (HSD) test ( $P < 0.05$ ).

### Results and Discussion

Results in **Table 1** indicate that NouGuard treated trees had significantly ( $P < 0.05$ ) fewer ants than untreated trees at 24 hours and 8 days post-treatment. However, NouGuard had significantly ( $P < 0.05$ ) more ants than Lorsban treated trees at 24 hours and numerically more ants than Lorsban through the remainder of the test. Concern showed little, if any, difference in ant numbers versus the untreated control trees at all post-treatment evaluations. NouGuard showed significantly ( $P < 0.05$ ) fewer ants than Concern-treated trees at 8 days post-treatment.

**Table 1.** Results of red imported fire ant foraging on 1 x 1 inch olive oil-soaked bait card evaluation (20 trees per treatment). Burleson Co., TX. Treated May 24, 2000.

Mean number of ants per card (% control)					
Treatment	Pre-count	24 hours	1 Week	3 Weeks	5 Weeks
untreated	60.00 a	32.85 a	29.85 a	29.65 ab	72.25 a
NouGuard	48.50 a	13.45 b	14.35 bc	23.80 ab	63.25 ab
Concern	45.50 a	30.25 a	28.80 ab	38.00 a	56.75 ab
Lorsban	47.00 a	0.50 c	0.40 c	13.65 b	36.30 b
F	0.75	19.72	11.88	5.15	4.27
P	0.526	0.0001	0.0001	0.0027	0.0077
R <sup>2</sup>	0.2874	0.4377	0.3193	0.169	0.1443
MSD	28.381	12.698	14.979	16.753	27.461

Means in the same column followed by different letters are significantly different ( $P < 0.05$ ) using PC SAS analysis of variance procedures. Means separated using Tukey's studentized range (HSD) test. ANOVA df = 3, Tukey df = 76.

The analysis in **Table 2** shows that there were no significant ( $P < 0.05$ ) differences in the number of "infested" trees (those with any ants on bait cards) between NouGuard and untreated trees. Lorsban treatments showed significant ( $P < 0.05$ ) reductions in infested trees versus all

other treatments throughout the test. Concern, which was included because of its label directions, “Spray perimeter of home generously to make a barrier of protection,” showed no reduction in the number of infested trees.

**Table 2.** Analysis of fire ant presence on trees - 4 replications per treatment, 5 trees per replication.

Treatment	Mean number of infested trees of 5 treated (% control)			
	24 hours	1 Week	3 Weeks	5 Weeks
untreated	5.00 a	5.00 a	5.00 a	5.00 a
NouGuard	4.75 a (5.0%)	4.25 a (15.0%)	5.00 a (0%)	5.00 a (0%)
Concern	5.00 a (0.0%)	5.00 a (0.0%)	5.00 a (0%)	5.00 a (0%)
Lorsban	0.75 b (85.0%)	1.00 b (80%)	2.50 b (50%)	4.25 b (15%)
F	59.71	16.26	5.77	9
P	0.0001	0.0002	0.0111	0.0021
R <sup>2</sup>	0.9372	0.8025	0.5906	0.6923
MSD	1.1337	1.9869	2.185	0.5248

Means in the same column followed by different letters are significantly different ( $P < 0.05$ ) using PC SAS analysis of variance procedures. Means separated using Tukey’s studentized range (HSD) test. ANOVA df = 3, Tukey df = 12.

Numbers in parentheses indicate percent reduction (or gain) compared to untreated control.

Clearly, NouGuard reduced the number of ants observed on bait cards at 24 hours and one week post-treatment. It did not, however, substantially reduce the number of “infested” trees at any point. A tree was considered infested if even one ant was observed on a bait card. Field notes indicate that there were ants walking on NouGuard-treated surfaces as early as the 24-hour evaluation and feeding trails on NouGuard-treated surfaces by the three-week evaluation.

According to the manufacturer, NouGuard has performed considerably better in other tests on other sites, such as in citrus orchards and around structures. There could be several reasons for the poor performance in this test. Please keep in mind that these are speculative.

An obvious potential cause is the nature of the surface to which NouGuard was applied. Pecan tree bark is rather thick and rough so it would be difficult to apply any product to every crack and potential path for a fire ant. However, ants were observed crossing treated patches of bark. The bark is also quite corky and absorbent. The NouGuard, being oil-based, was absorbed quickly. The treatment bands were still quite visible at the end of the test, in fact. This absorbency may have reduced the product’s effectiveness by tying up or de-activating some of the repellent compounds. It was possible to smell NouGuard from several feet away at the 1 week and 3 week evaluations, though odor producing compounds may not be the ones responsible for repellency.

Ant behavior and biology may have also played a role in NouGuard’s performance. The

orchard in which the test was conducted has a very high ant population. A figure of 200 mounds per acre is a conservative estimate. Ant populations of this density can create intense foraging pressure. These ants routinely, if not continuously, forage in the tree canopies, so there is obvious “incentive” for them to continue. While trying to avoid being anthropomorphic, something keeps the ants going into the trees, even when there is an abundance of other food on the ground, such as dead grasshoppers (that were also in great abundance) and the presence of honeydew coating every surface under the trees. This “incentive” may be strong enough to make the ants cross a repellent barrier. Ants in the other tests may have been just routinely foraging, rather than focused on a food source, and been easily repelled.

An explanation more in line with accepted fire ant biology, is the presence of pheromone-marked feeding trails. The ants undoubtedly had well marked feeding trails on many trees. These trails may not have been physically erased or masked by the NouGuard and they were strong enough to keep the ants following them, though trail pheromones are relatively volatile and short-lived. It is also possible that, even if the trails *were* erased, ants coming down out of the trees laid new trails as they tried to get back to their colonies, which were followed by subsequent recruits.

In summary, NouGuard applied to pecan tree trunks in 6-8 inch “barrier” bands appears to have some repellent action against fire ants for a week or so, when repellency is defined as a reduction in the number of ants present at a food source. However, if it is defined as a complete lack of ant presence at a food source, repellency is only about 15%, at best. Pecan orchards are not the primary target market for NouGuard. Therefore, further testing should be conducted on surfaces such as painted wood, brick, concrete and smooth bark that are more representative of the structural and agricultural settings for which NouGuard is intended.

### **Literature Cited**

Barr, CL, BM Drees, WO Ree. 1991. Impact of Chlorpyrifos Treatments of Pecan Tree Trunks and the Orchard Floor. Result Demo. Handbook 1990-1991. Tex. Ag. Extension Serv. Bryan, TX. Also <http://fireant.tamu.edu>