

Crushed Neem Seed for the Control of Individual Red Imported Fire Ant Colonies

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Seeds from the neem tree (*Azadirachta indica*) have been used for centuries in their native region for a wide range of medicinal and other purposes. The primary active ingredient, azadirachtin, is known to act as a growth regulator in some insect species and is formulated in insecticides. Nuvis LLC prepared an unextracted formulation of crushed neem seed to preserve all the other naturally-occurring components that may increase its effectiveness. This trial was initiated as the first step in evaluating this product for the control of individual mounds of red imported fire ants (*Solenopsis invicta* Buren).

Objective: Test the effectiveness of crushed, unextracted neem seed as individual mound treatments for the control of fire ants.

Materials and Methods

A field trial of the crushed neem seed product was initiated on 27 September 2001 with the marking of active fire ant colonies in a non-bearing section of a pecan orchard in Robertson County, Texas. Soil was dry and fire ant mounds tended to be very small, most less than 6 inches in diameter and somewhat difficult to locate. However it was one of the few sites in the region with enough mounds to conduct a test at all due to drought conditions through the summer.

Trees were used as a center point and 10 active mounds were flagged radiating out from the central tree. The distance of the outermost mound from the center was measured, recorded and used as the radius of a circular plot. Plot perimeters were kept a minimum of 20 feet apart to minimize the chances of bait products being picked up by ants from adjacent plots. Flagged mounds in adjacent plots were considerably farther apart than 20 feet. Radii of all plots were then arrayed from lowest to highest, divided into four equal groups (replications) and treatments assigned within replications so that the total areas of all treatments were as equal as possible. This was done to equalize the area in which new and/or satellite mound formation could occur.

Treatments were as follows:

- 1) untreated
- 2) one gallon water drench per mound
- 3) crushed neem seed, 50g applied dry per mound
- 4) crushed neem seed, 50g mixed in one gallon water, applied as a drench per mound
- 5) Amdro[®] bait (0.73% hydramethylnon), applied at 4 Tablespoons per mound
- 6) Distance[®] bait (0.5% pyriproxyfen), applied at 4 Tablespoons per mound

Treatments were applied 28 September. Weather at the time of treatment was partly cloudy, with temperatures in the 70's and 80's. Treated mounds in this test were evaluated on 5, 12 and 26 October, 6 and 21 December (1, 2, 4, 10 and 12 weeks post-treatment, respectively). The scheduled evaluation at 8 weeks was postponed due to cool, wet weather and resulting poor mound formation. The plot areas were surveyed for new/satellite mound formation 12 and 26

October and 21 December by counting all active, unmarked mounds within the original plot boundaries. Data were analyzed using SAS analysis of variance ($P \leq 0.05$) and Tukey's studentized range (HSD) test for mean separations.

Results and Discussion

Results are presented in **Table 1**. At no point did either neem treatment produce a significant ($P \leq 0.05$) reduction in active or total (marked + new) mound numbers compared to the untreated control over the course of the test. Amdro treatments resulted in significantly ($P \leq 0.05$) fewer active marked mounds than other treatments through two weeks post-treatment as well as significantly fewer total mounds per plot than some of the other treatments (exact ones varied by evaluation date). The most striking aspect of the test was the number of "new" mounds that appeared at the two week evaluation after several days of rain. Only Amdro appeared to suppress the formation of these new mounds.

The crushed neem seed was difficult to apply consistently. Applied "dry," its oiliness made it hard to scatter on a mound and the ants did not seem to be attracted to it. In water, the seed had to be constantly agitated to stay suspended. Results from this test indicated little or no mortality of fire ants or suppression of colony populations by the crushed neem seed when applied as described. It is possible that other formulations may perform better.

Table 1. Mean number of active fire ant mounds for four replications, evaluated as indicated. Mumford, Texas, treated Sept. 20, 2001.

Treatment	Week 1 marked	Week 2 marked	Week 2 New	Week 2 Total	Week 4 marked	Week 4 New	Week 4 Total	Week 10 marked	Week 12 marked	Week 12 new	Week 12 total
untreated	9.75 a	7.75 a	23.50 ab	29.75 ab	6.75 a	16.75 a	23.50 ab	4.00 a	4.75 a	4.25 a	9.00 a
water only	8.50 a	7.75 a	14.25 ab	22.00 ab	7.00 a	12.00 a	19.00 ab	5.25 a	4.25 a	4.75 a	9.00 a
neem dry	9.50 a	8.50 a	20.25 ab	31.25 a	6.50 ab	14.00 a	20.50 ab	5.25 a	4.75 a	4.50 a	9.25 a
neem drench	9.00 a	8.25 a	19.25 ab	27.50 ab	7.75 a	16.25 a	24.00 ab	5.75 a	5.50 a	6.00 a	11.50 a
IGR bait	8.25 a	7.75 a	29.50 a	35.75 a	5.75 ab	19.25 a	25.00 a	2.50 a	1.50 a	5.50 a	7.00 a
hydrameth.	4.50 b	3.50 b	11.25 b	14.75 b	3.50 b	7.25 a	10.75 b	3.75 a	2.50 a	3.00 a	5.50 a
F	6.82	5.66	4.23	5.09	3.79	3.72	5.38	1.49	1.75	2.64 a	1.85 a
P	0.0008	0.0020	0.0079	0.0034	0.0126	0.0136	0.0026	0.2408	0.1663	0.0502	0.1453
R ²	0.7844	0.7513	0.6929	0.7307	0.6692	0.6651	0.7416	0.4427	0.4830	0.5845	0.4964
MSD	2.7611	2.9361	16.701	15.78	3.0125	14.205	13.281	4.1025	4.4041	5.2332	8.0526

Means in the same column followed by different letters are significantly different ($P \leq 0.05$) using Tukey's studentized range (HSD) test for mean separation. df = 15.

