

**Effect of Adding Amdro® (Hydramethylnon) to
Fertilizer Formulations on Acceptance
by the Red Imported Fire Ant**

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Amdro® (0.73 % hydramethylnon bait) has been shown to be an effective and popular material for the control of the red imported fire ant (*Solenopsis invicta*, Buren). American Cyanamid Corporation supplied four fertilizer formulations to which Amdro had been added. These tests were undertaken to determine if the attractiveness of Amdro bait to foraging worker ants was reduced when added to fertilizer formulations.

Previous studies have shown that the soybean oil component of the Amdro product is subject to oxidation which reduces the attractiveness of the bait to fire ant foragers. Rancidity of the oil can occur within a few days of bait exposure to air. The hypothesis tested here is that the fertilizer, being both an oxidizer and hygroscopic, causes a rapid degradation of the soybean oil into an unacceptable state.

Materials and Methods

Four samples of Amdro plus different formulations of granular fertilizer were tested using laboratory colonies of red imported fire ants. Colonies were large, averaging approximately 25,000 workers each, with very active foraging. They were kept at approximately 80 degrees Fahrenheit and 60% relative humidity and provided a feeding regime of frozen crickets, dilute honeywater and distilled water on a daily basis.

Preference Test 1. Fifty granules of Amdro bait were removed from each of the fertilizer formulations and placed in small, plastic scintillation vials. An additional 50 granules were obtained from a freshly purchased, unopened jug of Amdro and placed in similar vials. One vial of each of the five treatments was placed in each of six ant colonies. The mouths of the vials were rested on a test tube containing the ants' water supply. All of the vials was emptied. The vials were then frozen to kill any ants before the remaining of granules in each vial was counted and recorded.

Preference Test 2. To determine if the fertilizer was repellent to ants, ten grams of each formulation was placed in a Petri dish lid. The lids were randomly placed in a Fluon®-coated colony box. These boxes were placed adjacent to four ant-colony boxes with a cardboard bridge inserted between them. A honey-water cup was placed in the boxes containing the fertilizer formulations to stimulate ant foraging. Ants were observed for 24 hours.

Preference Test 3. To determine if ants were repelled by the fertilizer, a small area was cleared in the middle of each Petri dish lid from Test 2. Fifteen to twenty granules of fresh Amdro were

placed in the center of the ring of fertilizer. Ant activity was noted for one hour.

Preference Test 4. To determine the time interval in which the fertilizer reduced the attractiveness of Amdro, two teaspoons of fresh Amdro were placed in a glass jar containing one-half cup of the fertilizer formula, RLC-101, and another containing one-half cup of SCU-101. Two teaspoons of Amdro were also placed in an empty jar. All three jars were tightly sealed and shaken vigorously to mix the contents thoroughly. After 24 hours, 50 grains of Amdro from each jar were removed and placed in plastic weighing containers. Additionally, 50 grains from a fresh, sealed, and refrigerated bottle of Amdro were added to a fourth weighing container. One each of the four containers were placed in six laboratory colonies of fire ants. All four containers were removed from a colony when most, or all, of the grains of one treatment were removed by the ants. Containers were frozen to kill any ants before the remaining granules were counted.

Results and Discussion

Preference Test 1. Tables 1 and 2 demonstrate clearly that Amdro bait had become unattractive to red imported fire ant foragers after being pre-mixed with fertilizer formulations. In each colony tested, ants removed all 50 particles of fresh Amdro bait within three hours. It was unclear whether this lack of attractiveness was due to repellency of the fertilizer or loss of attractiveness of the bait.

Preference Test 2. Ants established an active foraging trail across the bridge in each box within 30 minutes and crawled freely across the fertilizer particle in the dishes. A few ants were seen to apparently feed or lick on some of the granules. After three hours, no bait granules had been removed to the colony box, although a dozen or so bait particles and spherical, yellow fertilizer granules had been removed from the Petri dish lids. This test included the fertilizer as well as the bait. The ants showed no reluctance to cross the fertilizer granules themselves, but were still quite unattracted to the bait.

Preference Test 3. Foraging ants found fresh bait particles and were attempting removal within one minute of bait placement. Most of the fresh bait was removed to the colony box within half an hour. Despite the initial lack of attractiveness, it was noted, after two days, that most of the fertilizer-mixed bait granules had been removed from the lids. During this time, the ants had not been fed the standard dietary regime.

This test was performed to determine if the ants would accept fresh Amdro and if they would cross fertilizer granules to retrieve it. The extremely rapid location and removal of the bait suggested that the ants were both strongly attracted to fresh Amdro and not repelled by the fertilizer. It was concluded that the fertilizer had a definite effect on reducing the attractiveness of Amdro while demonstrating no repellent properties itself. Though the fresh Amdro was overwhelmingly preferred, the bait that had been in the fertilizer formulation was removed eventually, indicating that it was still somewhat attractive to the ants, at least under food stress condition.

Preference Test 4. This test was conducted to determine how fast the fertilizer caused a loss of

attractiveness of Amdro bait to foraging fire ants. Tables 3 and 4 indicate that even over a relatively short period (24 hours), the attractiveness of Amdro was significantly reduced, though not eliminated. A surprising result of this last experiment was the significantly higher degree of attractiveness of the bait that had been shaken in a container and aged 24 hours. This treatment obviously removed some of the soybean oil from the bait particles onto the walls of the container and exposed the bait to air, both of which normally reduce a bait's attractiveness.

Although a theoretically convenient method of controlling fire ants, mixing Amdro with fertilizer appears to significantly reduce the bait's attractiveness to foraging fire ants in a very short time. Further studies will need to be undertaken to confirm this finding under field conditions. Furthermore, tests should be conducted to determine if the fertilizer also reduces toxic effects of Amdro and, thereby, reduces ant mortality, under both laboratory and field conditions.

Table 1. Number of Amdro[®] granules from four pre-mixed fertilizer formulations and fresh product remaining following exposure to laboratory colonies of red imported fire ants (Preference Test 1).

Number of granules remaining out of 50

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<u>Colony</u>	<u>Exposure Time</u>	<u>RLC-101</u>	<u>RLC-102</u>	<u>SCU-101</u>	<u>SCU-102</u>	<u>Amdro</u>
1	2:55	50	50	50	42	0
2	1:55	47	43	50	50	0
3	1:55	45	46	43	50	0
4	3:00	47	35	48	50	0
5	1:25	49	48	50	50	0

Table 2. Analytical results from Preference Test 1. Average number of grains of bait remaining out of 50.

<u>Treatment</u>	<u>Average number of grains remaining*</u>
SCU-102	48.4 a...
SCU-101	48.2 ab..
RLC-101	47.6 abc.
RLC-102	44.4 abc.
Fresh Amdro [®]	0.0 ...d

* Means followed by the same letter are not significantly different according to Analysis of Variance (ANOVA) at P # 0.05 and the Least Significant Difference (LSD) Test. The LSD value was 4.794.

Table 3. Number of Amdro[®] bait particles prepared and “aged” with fertilizer formulations remaining after 24 hours exposure to laboratory colonies of red imported fire ants (Preference Test 4).

Grains remaining of 50

<u>Colony</u>	<u>Exposure Time</u>	<u>Aged</u>	<u>Fresh</u>	<u>RLC-101</u>	<u>SCU-101</u>
1	2:15	1	0	12	9
2	1:15	0	6	30	19
3	0:53	3	4	20	28
4	2:45	0	14	45	42
5	2:12	0	8	13	22
6	3:20	0	37	35	37

Table 4. Analytical results of Preference Test 4. Average number of grains remaining out of 50.

<u>Treatment</u>	<u>Number of grains</u>
SCU-101	26.1667 a..
RLC-101	25.8333 a..
Fresh Amdro® (hydramethylnon)	11.5000 .b.
Aged Amdro (24 hrs)	0.6667 ..c

* Means followed by the same letter are not significantly different according to Analysis of Variance (ANOVA) at P # 0.05 and the Least Significant Difference (LSD) Test. The LSD value was 10.228.
