Toxicity and Residual Evaluations of Selected Surface Treatment Compounds

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The red imported fire ant, Solenopsis invicta, Buren, occasionally infests structures such as wall voids, water meter casings and electrical equipment. Magnetic fields have been documented to cause ants to stop near the source. Occasionally, enough ants accumulate between the breaker points to cause electrical equipment to short circuit. Failure of this type of equipment, such as traffic signals, can lead to serious problems. The ants will also use casings and housings as nesting sites, moving soil into these areas and chewing on the insulation of wiring. Attempts to repair infested units becomes potentially dangerous to personnel.

Several specialty products have been developed to prevent or eliminate fire ant activity within structures. Most utilize common pesticides in a carrier that offers enhanced effectiveness, ease of application, increased safety, or extended residual effects. This trial was conducted to evaluate the residual activity of three products.

Materials and Methods

Three products tested included: 1) Stutton JS 685 Powder®: an aerosol spray of 4.00 % silica gel, 1.00 % piperonyl butoxide, and 0.10 % pyrethrins. The spray leaves a thick, white, powdery residue with little residual odor. 2) Insecta Latex Paint®: a latex paint containing 0.86 % chlorpyrifos. The paint is white, but dries clear and has a noticeable odor. 3) Suscon® granules: chlorpyrifos-containing plastic granules. The granules are the size of salt grains, have a translucent white color, and a powerful odor. This last product is not currently registered for use within structures.

To evaluate the products, a container was designed to isolate a food source (bait) and force foraging ants to cross a treated surface to reach it. Containers were removable and bait replaceable. Thereby, the success of a treatment in preventing ants from reaching the bait could be tested over time.

Containers were constructed from two tall, plastic Petri dishes glued together, bottom to bottom, with plastic model cement. The inner surface of one container was treated with Fluon® to prevent anst from crawling up the sides and around the treated area. A piece of aluminum foil approximately one inch wide was glued to the side of the dish so that it contacted both the bottom and lid of the Fluon®-treated Petri dish. A 0.5 cm. hole was melted in the bottoms of the two containers approximately an inch above the end of foil strip. Another hole was melted along the edge of the lid covering the treatment chamber to allow ant entrance. During testing a bait, such as artificial diet (1.0 cm cube) or a frozen cricket was placed in the non-Fluon-coated Petri dish and sealed with a lid to prevent ant entrance except across the treated surfaces and through the

hole melted in the dish bottoms.

The treatments were applied to the foil as follows: 1) The Stutton JS 685 Powder was applied by fitting a paper shield around the inside of the treatment chamber so that the spray would contact only the foil. The spray was applied to an even thickness; 2) The Insecta Latex Paint was brushed on until complete coverage was obtained, and ; 3) The Suscon granules were spread an even layer so that the entire surface of the foil was covered. A fourth chamber was prepared and the foil left untreated as a control.

The four treatment containers were placed in random order within Fluon-treated plastic boxes similar to the colony boxes. A cardboard bridge approximately one inch wide and fourteen inches long was placed between the test boxes and laboratory fire ant colony boxes to allow ants to forage freely. During each trial, the ants were allowed access to the bait for 24 hours. After the bridge was removed, the percent bait removed and presence of dead ants was documented using the rating scale as follows:

Bait Removal:	Ant Mortality
0 = bait untouched	0 = <10 dead ants in container
1 = bait < 10% removed	1 = 10-50 dead ants in container
2 = bait 10-75% removed	2 = 50-100 dead ants in container
3 = bait entirely removed	3 = > 100 dead ants in container

Evaluations were made on 3 October 1990, shortly after applying treatments and 14 months later on 11 December, 1991.

Results and Discussion

Initially, all products gave very good protection of the bait, even under extreme feeding pressure. Ant mortality was not particularly great, probably due to the repellent properties of the insecticides. Death of ants in the check chambers is most likely due to ants being poisoned in an adjacent container and actually dying on the untreated surface. It must be noted that, in the first test, the colony box of Colony 6 was contaminated by the great number of ants that crossed into the treatment box. This colony was essentially dead two days after the bridge was removed.

After 14 months, it was apparent that the Insecta Latex Paint had lost some of its effectiveness, an average of 50 percent of the bait was removed as compared to none in the initial test. However, the increased number of dead ants in the container indicates that the product was still toxic to ants. The Stutton JS 685 Powder and the Suscon granules were still quite effective as both protectants and toxicants at that time.

Table 1. Removal of bait* and ant mortality** ratings resulting from ant exposure to

insecticide-treated surfaces.

----------Treatment----------

Colony	**Untreated Check**	**Stutton JS 685 Powder®**	**Insecta® Latex Paint**	**Suscon® Granules**
Date: 3 Oct. 1990				
1	2* / 0**	0* / 0**	0* / 0**	0* / 0**
2	0 / 0	0 / 0	0 / 0	0 / 0
3	1 / 0	0 / 0	0 / 0	0 / 0
4	3 / 1	0 / 1	0 / 1	0 / 1
5	3 / 1	0 / 1	1 / 2	0 / 1
6	3 / 3	1 / 2	1 / 2	1 / 3
Averages:	2.0/0.8	0.2/0.7	0.3/0.7	0.2/0.8
Date: 11 Dec. 1991				
1	3 / 0	0 / 0	2 / 3	0 / 0
2	1 / 0	0 / 1	0 / 1	0 / 1
3	3 / 0	0 / 0	2 / 3	0 / 3
4	3 / 0	0 / 1	2 / 3	0 / 1
Averages:	2.5/0.0	0.0/0.5	1.5/2.5	0.0/1.25

Ratings:
* Bait Removal:

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Ant Mortality
0 = <10 dead ants in container
1 = 10-50 dead ants in container
2 = 50-100 dead ants in container
3 = > 100 dead ants in container