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FIELD EVALUATION OF FIPRONIL AND CHLORFENAPYR FOR MANAGEMENT OF ODOROUS HOUSE ANTS (HYMENOPTERA: FORMICIDAE)

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Abstract Odorous house ant, *Tapinoma sessile* Say, is a pest ant with global distribution. The common name is derived from the emission of a substance with an odor similar to that of butyric acid. Polygynous colonies often associated with notably dynamic populations and multiple nesting sites make odorous house ants a formidable opponent upon gaining entry to a structure. This paper examines the use and performance of two non-detectable chemistries with distinctive use patterns governed by their respective Federal label registrations. Termidor® (fipronil) applications are applied perimeter only and to areas of entry and or egress of a structure; while Phantom® (chlorfenapyr) applications are limited to spot and crack and crevice sprays to indoor sites exclusively. Chlorfenapyr received registration for treatment of outdoor usage patterns of entry and or egress similar to that of fipronil. Such treatment regimes were not used during the course of these trials.

Single occupied dwellings of varying dimensions, each with robust exterior and interior infestations were selected for treatment with either fipronil 0.06% dilution sprays alone (exterior) or fipronil 0.06% + chlorfenapyr 0.50% interior spot crack and crevice sprays. Amount of fipronil applied was based upon the 1.5 gals per 1000 sq. ft. label language standard as a 1' vertical and 1' horizontal surface exterior perimeter spray. Easily accessible areas providing entry and or egress of ants were also subject to the prepared solutions. Static or increasing populations of odorous house ants after treatment with fipronil was the major parameter used to dictate the use of chlorfenapyr. Amount of chlorfenapyr delivered to subject sites was measured in milliliters and directed sprays were applied to run-off. One-way traffic counts taken prior to treatment served as baseline counts where trails entered into the test sites. Subsequent counts from these same sites were used to assess the performance of the treatments. Ant count data was taken at 1 day and 1, 2, 4 and up to 8 weeks or more post application. Total number of ants observed on all trails in a 10 minute inspection of the structures exterior and interior was recorded during these evaluation intervals.
Key Words Perimeter sprays, Termidor, Phantom, *Tapinoma sessile*

INTRODUCTION

Odorous house ants are small, of 1/8 inch long with dark brown workers. The name is derived from a disagreeable odor similar to the smell of rotten coconuts that is given off when the worker ants are crushed. Nests are commonly found outdoors in soil, under stones, logs, mulch, debris and other items. They will also nest indoors, commonly found in wall and floor voids particularly in moist or warm areas. High populations and the presence of alate winged swarmers are often used as an index to describe the relative location of the colony. A positive corollary can be drawn from ants found in high numbers inside between probable nesting sites within the structure. Odorous house ants regularly forage for food along well-traveled trails. Although honeydew produced by plant sap feeding insects such as aphids and mealybugs are a favored food source; it is their search for sweets and proteins that often brings them into contact with humans thereby constituting a nuisance pest.

Control of odorous house ants has been traditionally attained by physically sealing off entry points and/or by spraying a protective barrier of pyrethroid or organophosphate insecticides. Indoor control be with non-repellent baits and certain aerosol sprays with similar chemistries were employed. Fipronil and chlorfenapyr are registered for ant control. While the physical properties of these compounds are somewhat similar in their solubility, soil affinity, partition coefficients, toxicology and non-repellency; they are in two classes of chemistry and as such have different modes of action. The important aspect of non-repellency makes it implicit that to attain a high degree of control, the target species must travel over the treated area. Repellent chemistries would be presumed to be in conflict with this axiom and thereby considered non-complementary treatments with potentially antagonistic results.

The purpose of these tests was to determine the efficacy of Termidor SC applied to the exterior perimeter of structures and Phantom applied to the interior as spot treatments for control of *Tapinoma sessile*.

MATERIALS AND METHODS

Sites. The tests were conducted in Northwestern Oregon on residential structures. Twelve houses with infestations of *Tapinoma sessile* were selected for this study. Five structures were initially treated with fipronil (Termidor SC 0.06%) alone and a secondary application of chlorfenapyr (Phantom 0.5%). Seven additional sites were treated with fipronil (0.06%) only. Of the latter seven houses, four were treated later on the inside with chlorfenapyr 0.5%.

Locations of odorous house ant sites were facilitated through a local pest control operator. Perimeters of houses were inspected to determine odorous house ant trails and entry points into the structure. Data was collected on active trails by counting the number of ants crossing a specific point as one-way traffic during a 15 second interval. Homeowners were also educated on the research project and were actively involved in the inspection process as they could relay information regarding ant activity inside the structure and pinpoint activity sites.

Houses were treated with either a perimeter treatment only using fipronil 0.06% or with a perimeter treatment using fipronil 0.06% and a spot treatment on the interior with chlorfenapyr 0.5% where ants were actively trailing. Exteriors were sprayed using a compressed air hand sprayer with spray directed under the lower edge of the siding, on the foundation, and a 2' foot band (1' up and 1' out) along the edge of the foundation. Interiors were sprayed with a small 1-quart compressed air sprayer using a pin stream along the floor in a crack and crevice application. A small foam paint-brush assisted in providing an even layer of chemical where the edge of the floor meets the wall. If interior trails were found in cupboards, or following doorframes or other guidelines, these were also painted using the foam brush and the small pump sprayer.

After treatment, numbers of ants around structures were recorded on 1 day, 1, 2, 4, and 8 weeks or more. Total number of ants observed on all trails in a 10-minute inspection of the exterior was recorded. Numbers of ants observed by the homeowner were also recorded. This provided information regarding ant populations inside structures between the observation periods made on the exterior. If numbers were increasing inside the structure, Phantom was applied to achieve control

A total of twelve (12) occupied residences were evaluated during the course of the study. In all, seven (7) houses received fipronil 0.06% exterior only treatments were applied first. Conditionally, chlorfenapyr 0.5% was applied sequentially dependent upon 1) limited impact upon trailing infestations within the structure and 2) resurgence of populations inside structure over a course of time after the initial treatment. Doing so, allowed us the opportunity to evaluate the efficacy of fipronil 0.06% independent of the combinant, chlorfenapyr treatment. A separate set of treatment protocols mandated fipronil and chlorfenapyr treatments without regard to the effects of the initial fipronil only treatment.

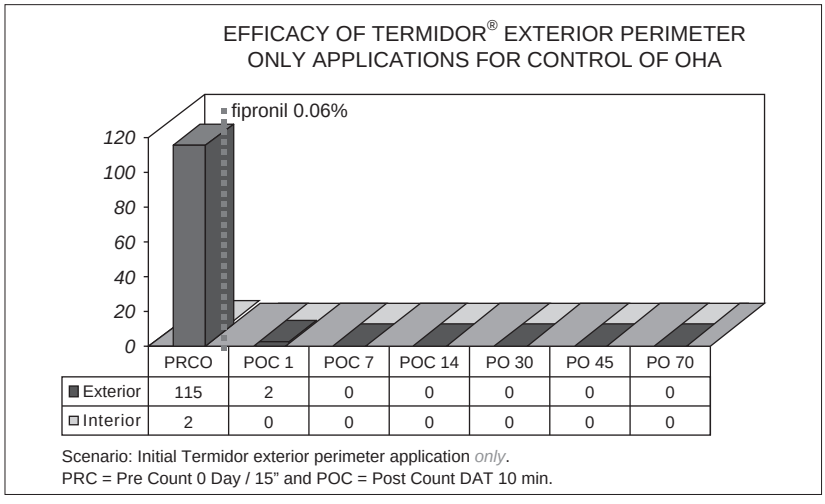
RESULTS

Dramatic differences between subject treated residences as denoted by type of home construction, ecological and environmental pressures and even sociological factors such as presence of pets or children make data summaries invalid. However, there are several scenarios that illustrate the effect of the treatments, and are considered normal treatment patterns under the test protocols.

Scenario 1. Fipronil was used only for exterior perimeter treatment; seven home sites treated. Foraging odorous house ants were eliminated from the perimeter treated areas for the entire course of the study in all sites. Three sites had no activity inside the structure as well after the initial fipronil only application (Table 1). The sharp decline in foraging populations both exterior and perimeter within 1 day of treatment indicated the singular treatment would be successful.

Scenario 2. A subset of the above seven treated homes. The fipronil-only exterior perimeter treatment was followed by a sequential chlorfenapyr interior spot treatment one day after. Interior populations of odorous house ants did not decline and some increased after initial fipronil treatment. Chlorfenapyr treatment within one day after treatment mitigated populations for the duration of the trial (Table 2-1). Some sites had complete control for up to 90 days post-treatment. At one site, there was renewed ant activity indoors after 30 days of treatment and did not decline significantly over the next 15 days (Table 2-2). After secondary application of chlorfenapyr, full control was achieved for up to 100 days after treatment.

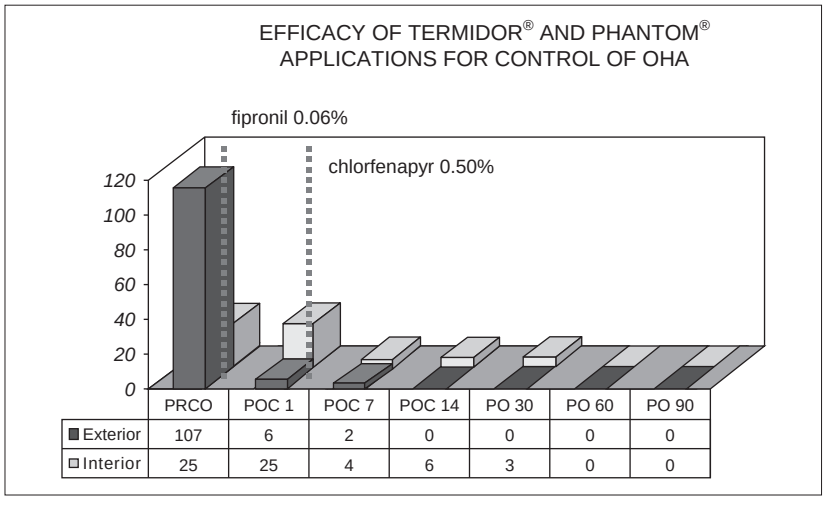
Table 1. Efficacy of fipronil (0.06%) - only application to exterior.



	PRCO	POC 1	POC 7	POC 14	PO 30	PO 45	PO 70
Exterior	115	2	0	0	0	0	0
Interior	2	0	0	0	0	0	0

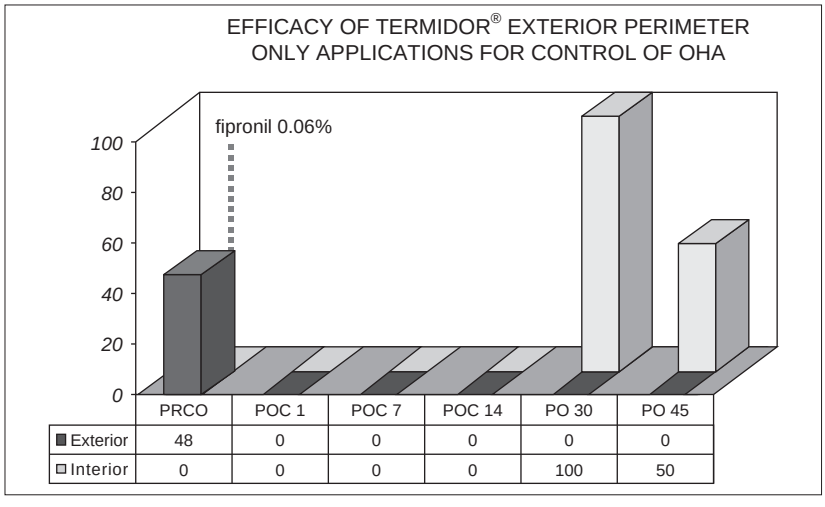
Scenario: Initial Termidor exterior perimeter application *only*.
PRC = Pre Count 0 Day / 15" and POC = Post Count DAT 10 min.

Table 2.1. Efficacy of fipronil 0.06% and chlorfenapyr 0.5% applications to exterior.



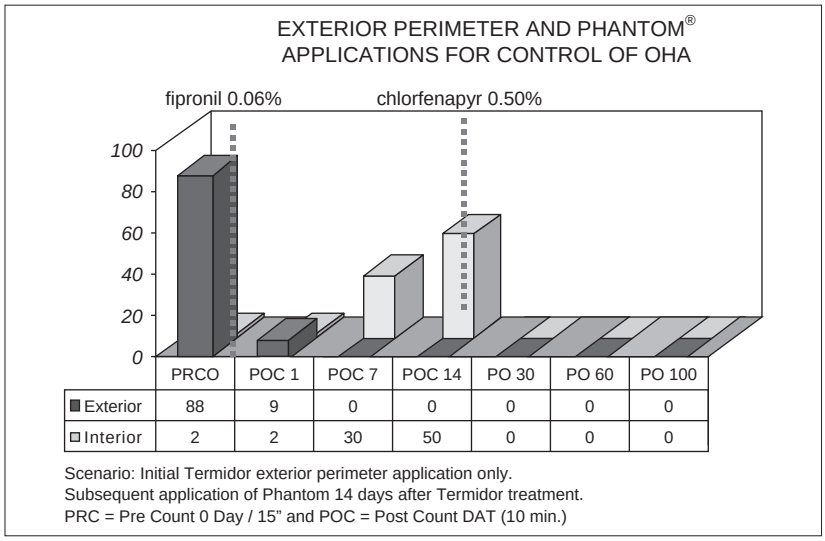
	PRCO	POC 1	POC 7	POC 14	PO 30	PO 60	PO 90
Exterior	107	6	2	0	0	0	0
Interior	25	25	4	6	3	0	0

Table 2.2. Efficacy of fipronil 0.06% to only exterior perimeter.



	PRCO	POC 1	POC 7	POC 14	PO 30	PO 45
Exterior	48	0	0	0	0	0
Interior	0	0	0	0	100	50

Table 3. Efficacy of fipronil 0.06% and chlorfenapyr 0.5% applications.



	PRCO	POC 1	POC 7	POC 14	PO 30	PO 60	PO 100
Exterior	88	9	0	0	0	0	0
Interior	2	2	30	50	0	0	0

Scenario: Initial Termidor exterior perimeter application only.
Subsequent application of Phantom 14 days after Termidor treatment.
PRC = Pre Count 0 Day / 15" and POC = Post Count DAT (10 min.)

Scenario 3. Five homes treated within 7 days, irrespective of the effect of the initial fipronil application also responded similarly to that shown in Table 2-1 (Table 3).

DISCUSSION

The three treatments presented here are representative of typical pest control problems faced by professionals. The treatment scenarios were: 1) single perimeter treatment with fipronil with full control inside and out of structure requiring no additional treatment; 2) single treatment with fipronil resulting in control of ants outside of structure, but unable to control ants indoors shortly after treatment, and necessitating treatment with chlorfenapyr; 3) single treatment with fipronil resulting in control of ants outside of structure, but compromised by a strong resurgence of activity within the structure after a 30 day period of time, necessitating treatment with chlorfenapyr and 4) the application of both products to their respective sites independent of the effect of fipronil exterior only applications. This type of application might be perfomed when there are significant populations inside at time of treatment.

Seven (7) houses treated originally with fipronil only, gave full control of foraging populations on the exterior of the structures. However; four (4) homes necessitated a chlorenapyr treatment to mitigate odorous house ants trailing in the interior of the homes. The application of chlorfenapyr under these circumstances gained full control of odorous house ants in all of these structures. The five houses treated with fipronil 0.06% and chlorfenapyr 0.5% had the highest level of control for odorous house ants. One of these five houses was treated with 0.5% Phantom on day 1 after an exterior Termidor treatment; one of these five houses was treated with chlorfenapyr 0.5% on day 7. After treatment with these two chemicals, ant populations were controlled for at least 60 days. Death of ants was observed in untreated areas well removed from the application site suggest lateral transfer mechanisms of fipronil as a probable cause and is worthy of future investigation. Treating the complete exterior and interior where ants are present provides the most consistent and effective level of control.