Residential Perimeter Treatment Trials in Hawaii with Thiamethoxam, Termidor, and Premise

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Abstract. Pre-1988 strategies for termiticide treatment of soil to prevent subterranean termite infestation in residential structures included application of organochlorine insecticides beneath concrete slabs through drilled holes at more than 2-foot intervals along the interior of perimeter and dividing walls. Post-1988 soil termiticides included organophosphates and pyrethroids. These less forgiving insecticides forced the pest control industry to change their treatment methods because of numerous call-backs that required re-treatments. Drill hole spacing through concrete slabs decreased to 1-foot intervals and exterior perimeter treatments were added to the management regime. With the advent of new non-repellent soil treatment termiticides, chemical manufacturers of these insecticides have devised a less intrusive treatment protocol that includes the remedial treatment of all known live infestations within the structure and a perimeter-only treatment of soil. For post-on-pier construction the perimeter of all piers is included in the treatment strategy. Results of field trials with three non-repellent termiticides (Thiamethoxam, Termidor, and Premise) are described.

Key words: Isoptera, Rhinotermitidae, *Coptotermes formosanus*, termiticide, non-repellent, perimeter treatment

Introduction

The Formosan subterranean termite, *Coptotermes formosanus* Shiraki, is the most economically important insect pest in the State of Hawaii. Costs to residents of the State to control and repair termite damages have been estimated to exceed $100 million annually (Tamashiro, et al. 1990). In addition, the serious termite pest *Coptotermes vastator* Light, the most damaging subterranean termite in Guam and other Pacific regions, was also recently discovered on Oahu, Hawaii (Woodrow et al. 2001). Together, these termites represent an extremely serious threat to Hawaii's residential, commercial and government structures, as well as to utility poles, water lines, agriculture (including sugar cane), and forest and urban trees.

In spite of this insect threat to structures there is a concerted effort to preserve our environment from contamination by pesticides for the betterment of Hawaii's people. In this regard, protecting our drinking water supply is of paramount concern. The organochlorine termiticides chlordane and dieldrin have been found at trace levels in water wells located in several areas on Oahu (State of Hawaii Department of Health 2003). An adjunct to this preservation effort is a Department of Health program to remove organochlorine treated soils from properties when homes are demolished (John Peard, personal communication). Therefore, minimizing the future application of soil termiticides by using perimeter-only treatments, rather than also treating within and beneath the structure, can complement this effort to preserve our environment.

Materials and Methods

With the aid of pest control operators, candidate trial homes were identified in different areas on the island of Oahu. Candidate homes were chosen if there was live infestation(s) by subterranean termites on the inside and/or outside of the structure. Thiamethoxam and Premise (imidacloprid) termiticides were applied using localized remedial treatments and exterior perimeter applications. Termidor (fipronil) treated homes received only perimeter treatments. Chemical manufacturers of these termiticides also had preferences for the type of structural foundations included in the study. Thiamethoxam and Termidor treatments were applied to either slab-on-grade or post-on-pier residential structures, whereas Premise applications were limited to slab-on-grade homes. Direct application to perimeter soil was done by trenching. Sidewalks that abutted the structure were drilled and insecticide injected at one-foot intervals. Treatments were performed with industry-standard application equipment with tank agitators. Pump pressure was set for 25 psi. Formulations of the candidate termiticides and application rates were: Thiamethoxam 25WG (Syngenta), 0.10%; Termidor 80WG (Rhone-Poulenc), 0.06%; Termidor SC (Aventis/BASF), 0.03%, 0.0625%, 0.09% and 0.125%; and Premise WSP (Bayer Environmental Sciences), 0.05% and 0.10%. Linear footage rates were prescribed by the manufacturers as described in Table 1.

Treated homes were/will be inspected for re-infestation at various time schedules: Thiamethoxam 25WG, 0.25, 0.5, 1, 2, 3, 4 and 5 years post-treatment; Termidor 80WG (Rhone-Poulenc), 3, 9, 15 and 21 months post-treatment to once per year until the trial is terminated; Termidor SC (Aventis/BASF), bi-monthly to once every 4-months until the trial is terminated; and Premise WSP, 7 and 14 days, and 1, 2, 3, 6, 12, 18 and 24 months post-treatment. The last post-treatment inspection is noted in Table 1.

Results and Discussion

Residential structures that were treated with Thiamethoxam WG, Termidor WG and Premise WSP remained free of re-infestation for the post-treatment periods as listed in Table 1. However, three homes that received Termidor SC treatments were retreated at the periods listed. The owner for the structure located on Mariner's Ridge reported subterranean termite damage to a window frame that was approximately two feet above the treated perimeter. Repair to the window was done prior to my notification and, therefore, there was no evidence to indicate whether the damage was subsequent to the treatment or if the damage was actually due to subterranean termites. The residence in Salt Lake experienced subterranean termite infestation in a 4x4-inch post and the supported 4x12-inch beam that was part of an elevated porch. The support post sat on a concrete block approximately 6 feet from the perimeter of the structure, so the soil around the block was not included in the treatment protocol. Moreover, a gutter downspout attached to the post and a nearby sprinkler head deposited water at the concrete block, making the surrounding area conducive for termite infestation. The structure in Waipahu had an enclosed garage with asphalt flooring used as a living area. When the perimeter treatment was made, the cold joint formed at the juncture for the asphalt flooring and structural concrete slab was not included. Subterranean termites came through the cold joint beneath a false floor within the bathroom. This entry point was difficult to treat because of the hidden area beneath the false floor, which resulted in three termiticide reapplications. Because many of Hawaii's homes have room additions, it is recommended that the original perimeter of the structure be included in the treatment protocol, as well as all other entry points that could result in termite infestation.

Table 1. Re-infestation record for residential structures on Oahu treated with four termiticides.

Location	Rate (%)	Years since last post-treatment inspection	Years since retreatment
Thiamethoxam 25WG termiticide at 1 gal/10 ft² (three structures)			
Palolo	0.10	3	0
Makaha	0.10	3	0
Manoa	0.10	3	0
Termidor 80WG at 1 gal/10 linear ft/ ft of depth (three structures)			
Waikele	0.06	6.8	0
Kailua	0.06	6.8	0
Kaneohe	0.06	6.8	0
Termidor SC at [a]2 gal/ 10 linear ft, and [b]1 gal/10 ft² (nine structures)			
Manoa[a]	0.03	4.8	0
Ewa[b]	0.0625	3.4	0
Hawaii Kai[b]	0.0625	3.1	0
Manoa[b]	0.0625	3.4	0
Ainakoa[b]	0.09	3.4	0
Mariner's Ridge[b]	0.09	3.1	2.0
Mililani[b]	0.125	3.1	0
Salt Lake[b]	0.125	3.4	2.3
Waipahu[b]	0.125	3.4	2.3, 2.8, 3.0
Premise WSP at 4 gal/10 linear ft (ten structures)			
Ainahaina	0.05	0.79	0
Kailua	0.05	0.79	0
Kalihi	0.05	1.7	0
Maunalani Hts.	0.05	0.79	0
Mililani	0.05	0.9	0
Newtown	0.05	0.79	0
Kalihi	0.10	1.8	0
Kaneohe	0.10	1.2	0
Pacific Palisades	0.10	0.79	0
Wahiawa	0.10	1.2	0

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