Large-scale Suppression of a Subterranean Termite Community Using the Sentricon® Termite Colony Elimination System: A Case Study in Chatsworth, California, USA

by

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ABSTRACT

Prior to 2001, a condominium complex in Chatsworth, California, USA, had a long history of subterranean termite activity and termite-related homeowner complaints. Sentricon® stations were installed along the perimeters of 134 buildings, and inspected monthly thereafter. Sentricon® stations with actively foraging termites were immediately baited following label instructions. Two species of *Reticulitermes* were found at this site: *R. hesperus* Banks and an undescribed species of *Reticulitermes* (known as cuticular hydrocarbon phenotype SCA-B). When feasible, auxiliary, or additional, stations were installed adjacent to the active stations to increase the rate of station discovery and to enhance bait consumption. Within two months of installation, 41% of the buildings had Sentricon® stations with signs of subterranean termite activity. This percentage rose to 90% after 6 months and 95% after one year. Of the 7,327 Sentricon® stations initially installed, 12% had subterranean termite activity; 13% of the auxiliary stations had subterranean termite activity. Between 2002 and 2003, 70% fewer Sentricon® stations developed new termite activity, likely the result of baiting. After March 2004, very few Sentricon® stations became active. These results strongly suggest that the baiting program utilizing the Sentricon® Termite Colony Elimination System had a significant impact on both species of *Reticulitermes* in the subterranean termite community at this site.

Keywords: baiting, hexaflumuron, noviflumuron, Recruit™ II, Recruit™ III, *Reticulitermes.*

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INTRODUCTION

Baits, using various active ingredients, are becoming increasingly available for the control of subterranean termites. Our baiting research has involved field and laboratory studies in northern and southern California. We have been investigating the performance of the Sentricon® Termite Colony Elimination System since 1992, giving us long-term data on: termite activity rates in independent monitoring stations (Lewis *et al.* 1998); foraging patterns (Haverty *et al.* 1999a); alate flight phenology (Haverty *et al.* 2003); behavior (Delphia *et al.* 2003; Getty and Haverty 1998; Getty *et al.* 2000a; Haverty *et al.* 1999b); demographics (Haverty *et al.* 2000); and chemical taxonomy (Haverty and Nelson, 1997, Page *et al.* 2002, Copren *et al.* 2005). This information gives us a unique regional perspective into the use and performance of baits for the control of subterranean termites.

The objective of this study was to gain insight into the performance of termite baiting, and specifically the Sentricon® Termite Colony Elimination System, under operational conditions, over a large, contiguous area with a history of termite activity and termite-related issues. The process of termites locating a bait station can vary from property to property based on factors such as termite foraging intensity, time of year, moisture, and food availability. Because the site is large and variations in all of these factors and conditions are prevalent at the site, the condominium complex was especially conducive to this type of study.

It is generally agreed that long-term, follow-up monitoring of a site is usually necessary to ensure that a baiting program was successful (Thorne & Forschler 2000). Therefore, another important objective of our study was to monitor termite activity at the site as it was serviced on a monthly basis by a local pest management professional.

METHODS & MATERIALS

The condominium complex, known as the RockPointe Condominium Complex, is located in the city of Chatsworth, in Los Angeles County in southern California. The RockPointe Homeowners Association was incorporated in February 1969 with the construction of the condominium complex in seven development phases, the last of which was completed in 1979.

Twenty-two of the 36.4 ha consist of common areas and greenbelts. There are a total of 139 buildings with 139,350 m^2 of property under roof (Figure 1). One hundred and thirty-two buildings are residential structures, containing 739 units that are home to over 2,600 people. The average linear perimeter of a building is 133.8 m, with a total perimeter of 18.2 km for all of the buildings.

A pest management firm installed Sentricon® stations around 134 of the 139 buildings from October through December 2001. Initially, 7,327 Sentricon® stations were installed, with an average of ca. 54 stations per building. All Sentricon® stations were inspected monthly throughout the study. This monthly monitoring was the responsibility of one technician.

Fig.1. Aerial view of the RockPointe Condominium Complex, Chatsworth, CA. The condominium complex is outlined with a solid line.

At each monthly inspection, all Sentricon® stations were manually opened and serviced following label instructions. When a Sentricon® station contained live termites, the wood monitoring devices were removed, the live termites were placed into the recruitment chamber of a moistened bait tube, and the bait tube was inserted into the station. We did not identify every group of termites collected to species during the monitoring stage. Occasional samples were mailed to M. Haverty at the Chemical Ecology of Forest Insects Laboratory for species determination. Chemical phenotypes (or species) of *Reticulitermes* were determined using the techniques outlined in Haverty and Nelson (1997) and the species/phenotype designations reported in Copren *et al.* (2005) and Haverty *et al.* (2003).

From the initiation of the study through March 2003, 0.5% hexaflumuron (Recruit™ II) was used as the active ingredient. From April 2003 until December 2004, 0.5% noviflumuron (Recruit™ III), registered by the U.S. Environmental Protection Agency in May 2003, was used. Noviflumuron is similar in chemical composition to hexaflumuron and has been demonstrated to be 50% more effective than hexaflumuron in achieving colony elimination (Karr *et al.* 2004).

When feasible, auxilary or additional stations were installed adjacent to any Sentricon® station found with termites during an inspection. The protocol required that two additional Sentricon® stations be placed around a Sentricon® station containing termites with the intent of enhancing the rate of station discovery and bait consumption. A total of 423 auxilary stations was installed over the course of this program.

Because this was not a research experiment, our intension was to report the results of a large-scale, operational deployment of the Sentricon® Termite Colony Elimination System. After each inspection period, monthly service tickets for each structure and all Sentricon® stations were copied, then forwarded to, and summarized by, University of California, Berkeley personnel. The primary response variables of interest were the number of buildings with termite activity in Sentricon® stations along their perimeters and the number of Sentricon® stations that became active each month.

RESULTS & DISCUSSION

Termite activity at the RockPointe Condominium Complex was substantial. Within 2 mo of initial installation, 41% of the buildings had Sentricon® stations with termite activity and were subsequently baited; after 6 months, this percentage rose to 90% (Figure 2). Within one year of installation of the Sentricon® stations at this site, 95% of the buildings had some measure of termite activity within Sentricon® stations (Figure 2). Two species were found: *R. hesperus* (cuticular hydrocarbon phenotype SCA-A) and a new, undescribed species of *Reticulitermes* (cuticular hydrocarbon phenotype SCA-B) (Copren *et al.* 2005, Nelson *et al.* 2007). It is not uncommon to find these two species or cuticular hydrocarbon phenotypes of *Reticulitermes* on the same residential property in southern California (Nelson *et al.* 2007).

Within the first year after installation, 12% (878 of 7327) of the Sentricon® stations became occupied by termites, and were subsequently baited. This level of activity is comparable to that of our research sites in northern California (Getty *et al.* 2000b, Haverty *et al.* 1999a, 2000). The mean/me-

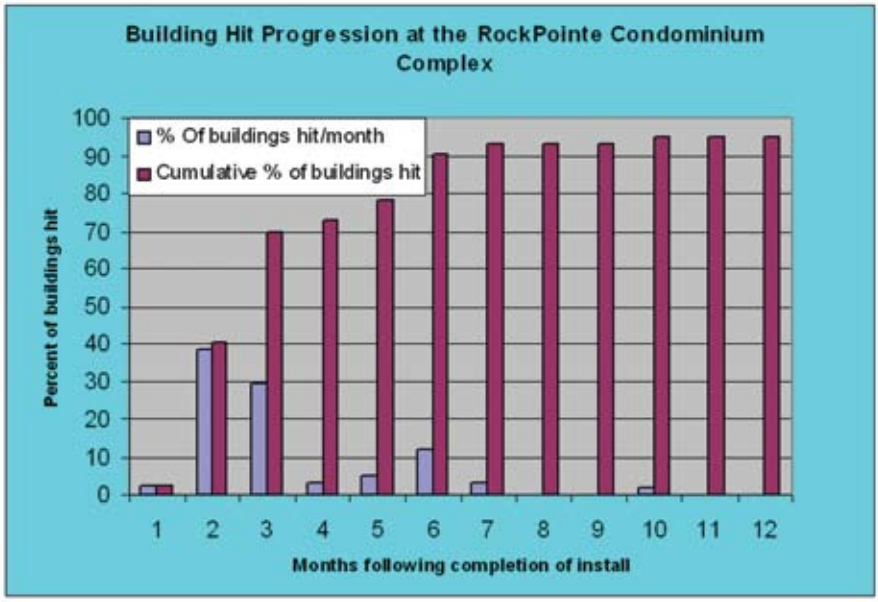

Fig. 2. Progression of termite activity detected with the first year of monitoring; percentage of buildings with newly active Sentricon® stations each month and cumulative percentage of buildings with active Sentricon® stations.

dian number of days to termite activity being detected in a Sentricon® station was 153/105, respectively. Eighty three percent (727 of 878) of the active stations were successfully baited within the first year following installation. Successful baiting was defined as a newly active station that sustained actively foraging termites with a minimum of 5% bait matrix consumption at the first 30-day, post-baiting inspection. If there was less than 5% consumption and no termites were present at the 30-day inspection, the station was considered abandoned.

In March 2002 a high-sugar-content sports drink (Gatorade™, Gatorade Corp., Chicago, IL) was added to both the bait station and the bait matrix prior to inserting the bait tube (Cabrera & Thoms 2006). Based on our experience using high-sugar content sports drinks at other research sites in southern and northern California, bait tube abandonment can be reduced with addition of these liquids (Neese *et al.* 2004), although we do not have empirical evidence that addition of a sports drink attracts termites to a station (Cornelius 2005). At the RockPointe site, overall station abandonment by termites was reduced from 54% to 6% with the addition of the sports drink.

Frequently, Sentricon® stations continued to show evidence of continuous feeding on the matrix subsequent to baiting. In these cases, colony elimination for a Sentricon® station was defined as three consecutive monthly inspections after which neither termites nor new bait consumption were observed. At this point the bait tube was replaced with wooden monitoring devices for further monitoring (Thorne & Forschler 2000). Some stations became active with termites after they were declared successfully baited and the colony eliminated. This occurred in 120 (14%) of the Sentricon® stations within the first year after installation. These stations were re-baited with active ingredient. It should be noted that neither colony size and dispersion (Haverty *et al.* 2000) nor affiliations (Haverty & Nelson 1997; Delphia *et al.* 2003; Getty *et al.* 2000a) were determined in this study. Getty *et al.* (2000b) showed that a Sentricon® station or other monitoring station can become re-invaded by a new colony as early as 12 days after a previous colony vacates or is eliminated from a station. Therefore, one must be cautious in implying that the same termite colony has returned to a station after multiple, successful baitings of that station.

One of the most practical measures of the effectiveness of a baiting system in providing control and long-term protection of a site from termites is to follow the progression of activity in the number of monitoring stations over time (Su 1994, 2003). In addition to the 7,327 Sentricon® stations originally installed, an additional 423 Sentricon® stations were added between February 2001 thru August 2004, 54 (13%) of which became active and were subsequently baited during the course of the study. The number of newly infested stations declined substantially in 2003, apparently due to a successful baiting program, with a 70% reduction in new activity between 2002 and 2003 and a negligible number of newly active Sentricon® stations after August 2003 (Figure 3).

Termite activity over the course of this study, as measured by newly active Sentricon® stations (Figure 3), was similar to the foraging patterns observed in northern California (Haverty *et al.* 1999a) and in southern California (Haagsma & Rust 1995). Foraging activity typically increases rapidly during the late winter/spring months and declines in the late fall/early winter. This

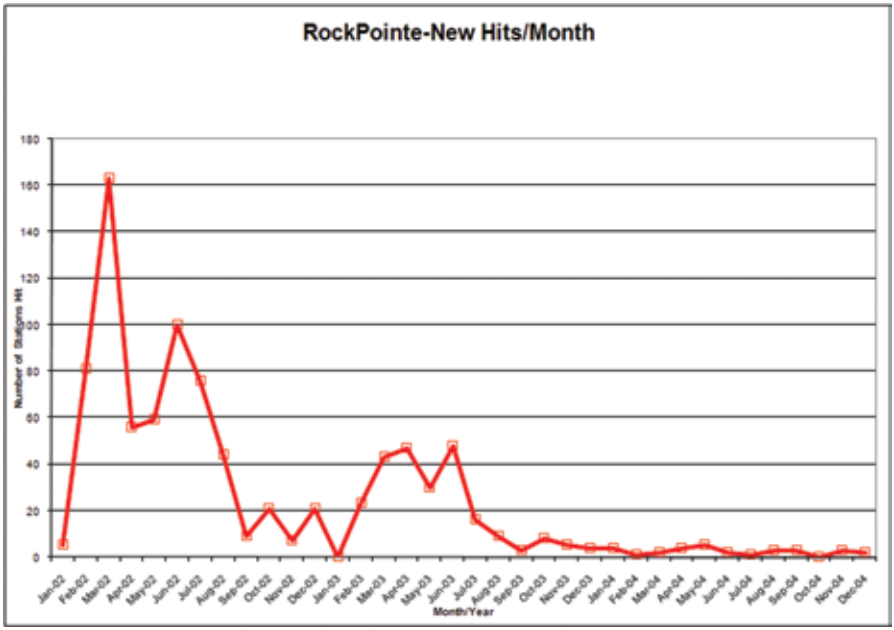

Fig. 3. Monthly summary of the number of Sentricon® stations with new termite activity at the RockPoint Condominium Complex. These data include initially deployed, as well as auxiliary stations.

pattern was observed at the RockPointe Condominium Complex during 2002 and 2003. However, the total number of newly active stations was severely reduced in 2004, and the expected increase in newly active stations never occurred. These results strongly suggest that the continuous baiting program, utilizing the Sentricon® Termite Colony Elimination System, had a significant impact on both species of *Reticulitermes* occurring in the termite community at this site.

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