

SUPPRESSION OF A SUBTERRANEAN TERMITE COMMUNITY (ISOPTERA: RHINOTERMITIDAE, *RETICULITERMES*) USING A BAITING SYSTEM: A CASE STUDY IN CHATSWORTH, CALIFORNIA, USA

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Abstract The RockPointe Condominium Complex in Chatsworth, California, USA, has had a long history of subterranean termite activity and termite-related homeowner complaints. A total of 7,327 Sentricon[®] stations were installed between October and December of 2001 along the perimeter of 134 buildings, and inspected monthly thereafter. Sentricon[®] stations with actively foraging termites present were immediately baited with hexaflumuron following label instructions. The active ingredient was changed to noviflumuron in April 2003. When feasible, auxillary stations were installed adjacent to the active stations to increase the rate of station discovery and enhance bait consumption. Within two months of installation, 41% of the buildings had stations that revealed visual signs of subterranean termite activity. These stations were then baited. This percentage rose to 90% after 6 months and 95% after one year. A total of 423 auxillary stations were installed between February 2001 and October 2003. Of the 7,327 stations initially installed, 12% had subterranean termite activity; 13% of the auxiliary stations became active. Comparing newly active stations between 2002 and 2003 resulted in 70% fewer stations with new activity, likely the result of baiting. Since March 2004, a few stations have become active. A reduction in resident's complaints of termites at the complex paralleled the reduction of termites in stations at the site. These results strongly suggest that the ongoing baiting program utilizing the Sentricon[®] Termite Colony Elimination System has had a significant impact on the subterranean termite population at this site.

Key Words Termite baiting, hexaflumuron, noviflumuron

INTRODUCTION

Baits, using various active ingredients, are becoming increasingly available for the control of subterranean termites. In prior and current studies, 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 stations (Lewis et al., 1998), foraging patterns (Haverty et al., 1999b); alate flight phenology (Haverty et al., 2003), and colony characteristics (Delphia et al., 2003; Getty and Haverty, 1998; Getty et al., 2000a; Haverty et al., 1999a, 2000; Haverty and Nelson, 1997). This information has given 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[®] System, over a large, contiguous area with a history of termite activity and termite-related complaints by homeowners. Because 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, a project site as large as the RockPointe townhouse complex was especially conducive to this type of study. Variations in all of these factors/conditions are prevalent at this site.

It is generally agreed that long-term, follow-up monitoring of a site is usually necessary to ensure that a baiting program was successful. Therefore, another important objective of our study was to observe the site over an extended period as it continued to be serviced on a daily basis by a local pest management professional.

We were further interested in determining how baiting multiple structures over an extended length of time affected homeowner complaints with respect to termite activity in and around residences.

MATERIALS AND METHODS

The RockPointe Townhouse Community is located in southern California in the city of Chatsworth, in Los Angeles County. The RockPointe Homeowners Association was incorporated in February 1969 with the construction in seven development phases the last of which was completed in 1979. Fifty-four of the RockPointe property's 90 acres consist of common areas and greenbelts. There are a total of 139 buildings with 1.5 million square feet of property under roof. One hundred thirty two buildings are residential structures, containing 739 units, which are home to over 2,600 people. The average linear perimeter of a building is 439 feet, with the total perimeter linear footage of the buildings estimated to be 59,714 feet or the equivalent of 18.2 km (11.3 mi).

Station installation occurred from October through December 2001. Terminix International (21113 Superior Street, Chatsworth, CA 91311) installed stations around 134 of the 139 buildings. Three additional buildings had previously been treated by installation of stations in May 1999. These three buildings are included in this report. Initially, 7,327 stations were installed, with a mean number of 54 stations installed per building. All stations were inspected monthly throughout the study. This monthly monitoring was the responsibility of one Terminix technician. Halfway through the project the original technician left the company and was replaced by another who has serviced the property to date.

At each monthly inspection, all stations are manually opened and serviced following label instructions. When a station contained active termites, wood monitoring devices inside the station were removed, the live termites were placed into a moistened bait tube (containing either hexaflumuron or noviflumuron), and the bait tube was inserted into the station. From the initiation of the study through March 2003, 0.5% hexaflumuron (Recruit™ II) was used as the active bait ingredient. From April 2003 to date, 0.5% noviflumuron (Recruit™ III), has been the active bait ingredient. Noviflumuron, a new active ingredient developed by researchers at Dow AgroSciences LLC, has been under field investigation since 1998 and was registered by the U.S. Environmental Protection Agency in May 2003. It 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, auxiliary stations were installed per label instructions around any station found with termites during an inspection. The protocol required that two additional stations be placed around an active station with the intent of enhancing the rate of station discovery and bait consumption by termites. After each inspection period, monthly service tickets for each structure and all stations were copied and forwarded to researchers at the University of California, Berkeley. All pest problems experienced by the RockPointe residents were reported to the Homeowner Association office, which generated a complaint record that was passed on to the Terminix office. Terminix would then send/dispatch a technician to the property in question to determine the nature and extent of the problem. The original complaint and the technician's feedback were supplied to the University of California, Berkeley and allowed us to follow the trends in homeowner complaints.

RESULTS AND DISCUSSION

Termite activity at the RockPointe Complex was substantial. Within two months of the initial station installation, 41% of the buildings had stations with termite activity that were subsequently baited with active ingredient; after 6 months, this number rose to 90% (Figure 1). Within one year of site installation, 95% of the buildings had some measure of termite activity within their respective stations (Figures 2 and 3). This activity rate rose to 97% by August 2003 when stations around three additional buildings became active with termites.

When analyzing overall activity rates of all stations installed, 878 of 7327 (12%) became active with termites, and were subsequently baited, within the first year of installation (Figure 3). This level of activity is typical of our California research sites over the last ten years. The mean/median number of days to termite activity was detected in a station was 153/105, respectively. Eighty three percent (727 of 878) of the active stations were successfully baited within the first year of installation. Successful baiting was defined as a newly active station that continued to contain actively foraging termites and at least 5% bait matrix consumption at the first 30-d, post-baiting inspection. If there was less than 5% consumption and no termites were present at the 30-d inspection, the station was considered abandoned.

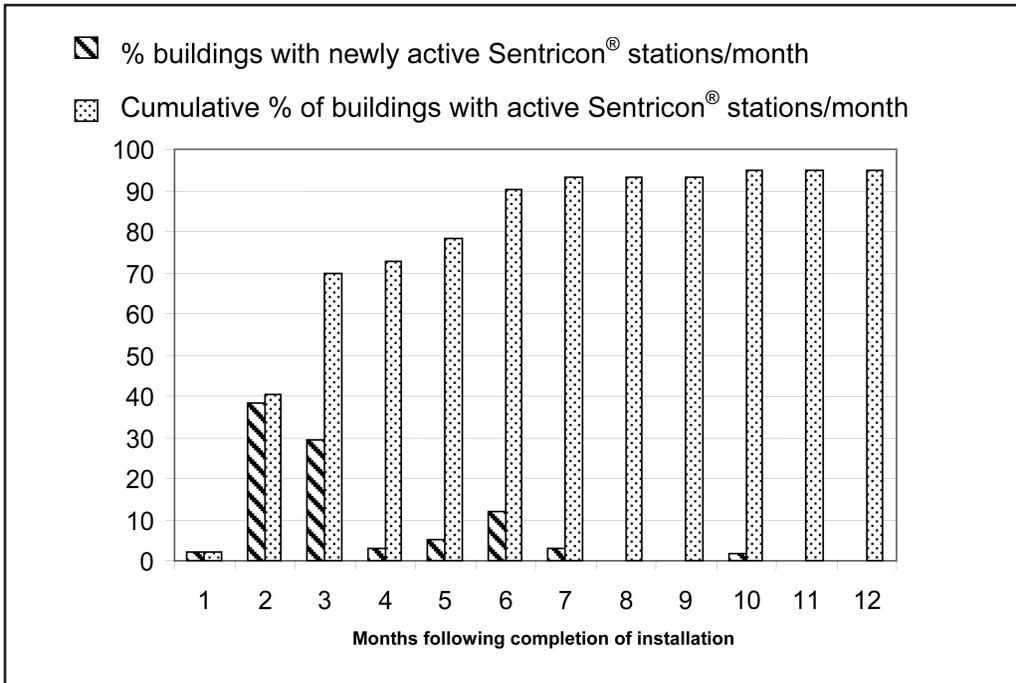


Figure 1. The progression of termite activity detected within the first year of monitoring; percentage of buildings with newly active Sentricon® stations each month and cumulative percentage of buildings with active Sentricon® stations

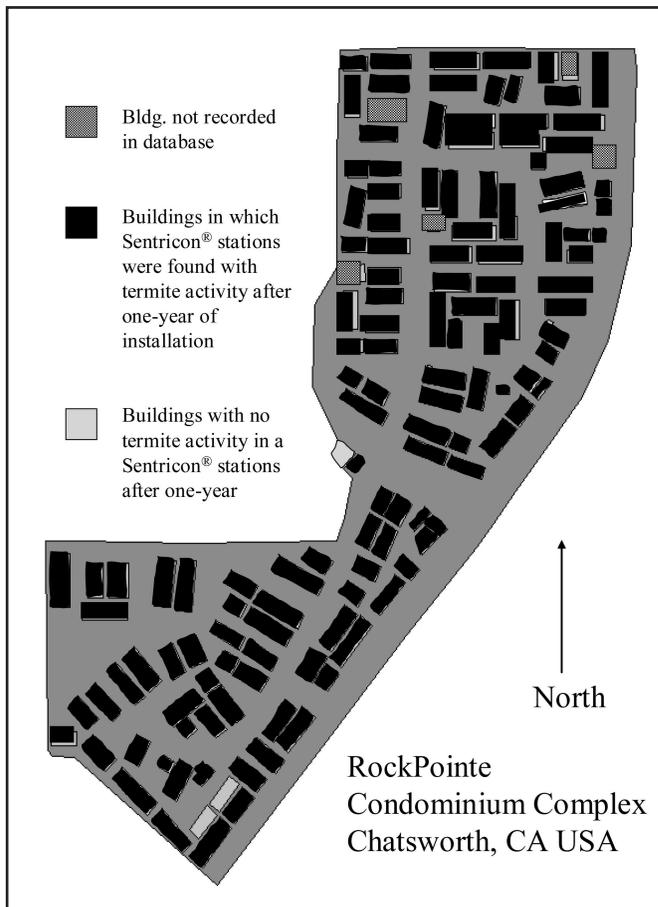


Figure 2. Buildings with active Sentricon® stations at one-year inspection

In March 2002 it was discovered that the addition of a high-sugar-content sports drink to a bait station (prior to inserting the bait tube), and to the bait matrix itself, reduced the overall station abandonment rate by termites from 54% to 6% at this site. Similar results have also been recorded at our other research sites, in both northern and southern California (Neese et al., 2004). We do not have any direct evidence that the addition of a sports drink attracts termites to a station. However, their tendency to abandon a bait tube once they discover it was significantly reduced with the addition of sports drink.

Several stations continued to contain termites or showed evidence of continuous feeding on the matrix subsequent to being baited with active ingredient. In these cases, colony elimination for a station was defined as three consecutive monthly inspections after which no termites or new bait consumption was observed (i.e. the station was considered successfully baited). Some stations became active with termites after a station was declared successfully baited and the colony eliminated. This occurred in 120 (14%) of the 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 and Nelson, 1997; Delphia et al., 2003; Getty et al., 2000a) were determined in this study. Getty et al. (2000b) showed that a 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.

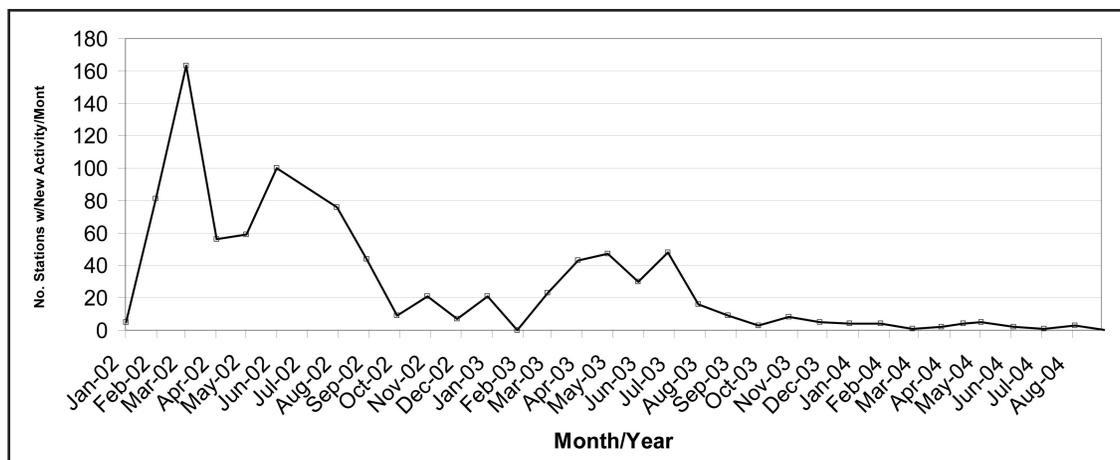


Figure 3. Monthly summary of the number of Sentricon® stations with new termite activity at the RockPointe Condominium Complex. These data include initially deployed as well as auxillary stations.

The most accurate measure of a baiting system's effectiveness 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) (Figure 3). In addition to the 7,327 stations originally installed, an additional 423 auxillary 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 stations by August 2003 (Figure 3). Paralleling this trend in the reduced numbers stations at the site with termite activity was a reduction in complaints of termite-related issues from residents at the complex.

Fifteen to 20 complaints about subterranean termite problems were received prior to the installation of the Sentricon® Termite Colony Elimination System at RockPointe. By June 2003 this number dropped to 5-7 calls per month, and as of August 2004 there have been fewer than one complaint per month. In addition, alate flights, which typically have regularly occurred twice a year have significantly declined at this site (Haverty et al., 2003).

The effects of baiting on termite activity over the course of this study have been similar to the foraging patterns observed in both northern (Haverty et al., 1999b) and southern California (Haagsma and Rust, 1995). Foraging activity typically increases rapidly during the late winter/spring months and declines in the late fall/early winter. This pattern was observed during 2002 and 2003; however, the total numbers of newly active stations were severely reduced in 2003, so this pattern was less evident. In 2004, the expected increase never occurred because few newly active stations were recorded. These results suggest that the continuous baiting program, utilizing the Sentricon® System, has had a significant impact on the termite community at this site.

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