SUBTERRANEAN TERMITE (ISOPTERA: RHINOTERMITIDAE) ATTACK ON GROUND MONITORS AROUND AN APARTMENT COMPLEX IN FIXED PATTERN PLACEMENTS VERSUS CONDUCIVE PLACEMENTS

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One of the newest tools for the management of subterranean termites (*Reticulitermes* spp., *Coptotermes formosanus* Shiraki, and *Heterotermes* spp.) is termite baiting. Limitations to the effective use of baits include difficulty in getting the termites to accept baits and the need for baits to remain in place for an extended period of time to allow slow-acting toxicants to work. One factor that may have importance to bait acceptance is bait placement. Su et al. (1984) found that foraging by subterranean termites is a random process of investigation and suggested that termites do not discriminate among similar food sources within a colony's foraging range. This suggests that toxic baits placed randomly or uniformly within a foraging range of a colony will have equal chance of discovery. Therefore, the best strategy for bait placement would be to employ them in a manner that is most convenient to the pest control operator or acceptable to state regulators. A preset patterned placement of baits around all structures in a similar manner makes baiting procedures easy to follow, location of baits during follow-up inspections simple, and requires little to no background information on termite activity in the area before implementation of the process. However, Delaplane and La Fage (1987, 1989) and Oi et al. (1996) found clear preferences were made by subterranean termites, even when food sources were identical, and argued that termites do not feed randomly. The most important variable for increased preference was relative proximity to termite activity. Thus, baits clustered close to termite activity or areas conducive to termite habitation might increase the probability of termite feeding. The objective of this study was to determine which placement type is the more effective method of using wood monitor stations to locate subterranean termites (both native species, *Reticulitermes spp.,* and Formosan, *Coptotermes formosanus)* around buildings in an urban habitat.

The study site consisted of 11 apartment buildings (Georgetown Apartments, New Orleans, LA), similar in size and construction and located in a known area of Formosan subterranean termite infestation. For each apartment, diagrams were drawn detailing exterior areas that were prone to moisture problems or had readily available termite food, such as exterior water faucets, air conditioners, downspouts, landscaping timbers, mulch beds, wooden fencing, and tree stumps. These areas were considered more likely to harbor populations of subterranean termites nearby (areas conducive to termite infestation). Pine stakes (2.5cm × 5cm × 30cm) purchased from a local hardware store were placed around each of the 11 similar apartment buildings. Approximately 20 stakes were placed in a fixed (uniform) pattern around each structure, and another 20 were put in a conducive placement pattern, for a total of 428 stakes. For the uniform placement, stakes were driven into the ground 3.3m away from the building and 5m away from each other. For conducive placements, stakes were positioned at least 30cm away from the building in conducive condition areas (i.e. near water and food sources where termites were likely to concentrate their ac-

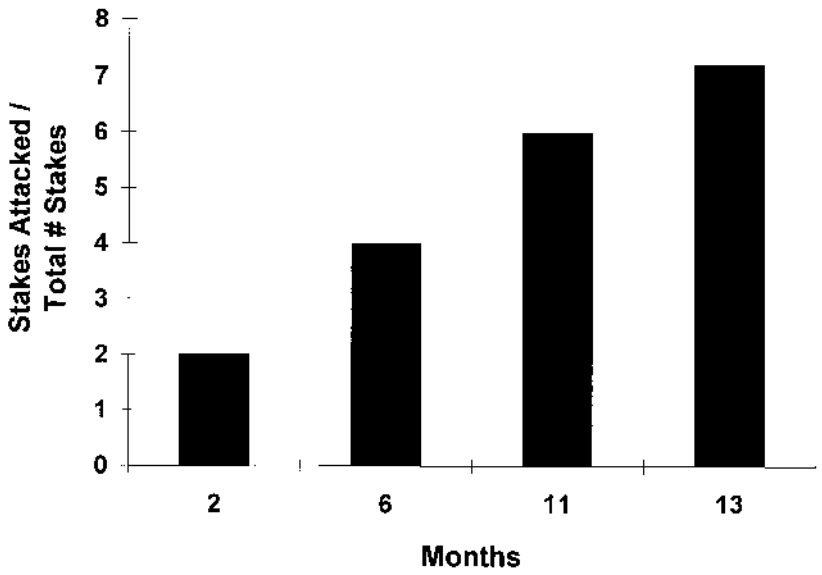

Fig. 1. The percentage of stakes attacked at each inspection period.

tivities, as described above). Each side of the buildings received approximately the same number of conducive and uniformly placed stakes. Stakes were inserted all the way into the ground so as to be inconspicuous and not interfere with normal landscaping activities. Stakes were placed in the ground in July, 1995, and all were inspected for termite activity after two, six, 11, and 13 months. Both Formosan subterranean termites, *Coptotermes formosanus,* and native subterranean termites, *Reticulitermes* spp., occupied this area.

The incidence of stake attack was low throughout the study, with only about 7% of the pine stakes showing signs of attack after 13 months (Figs. 1 and 2). On average, 73% of stakes attacked were found to harbor termites on the next inspection. Of the wooden stakes that were attacked, stakes in conducive placements were attacked twice as often as fixed patterned stakes. The stakes around one building amounted to over one-half (16) of the total number of attacks on all stakes (fixed and conducive) at month 13. Conducive placement stakes were seven times more likely to be attacked at this building compared with stakes in a uniform pattern. We tested for the statistical significance of stake placement and termite attack using generalized linear modeling and analysis of deviance (SAS Institute, Cary, NC) where the indicator variable was stake type and the class was building effect. Wald statistics generated an odds ratio association with stake type. There was no significant difference in stake placement for termite attack.

Our findings suggest that a sound knowledge of termite biology and foraging behavior will increase the success rate in locating termites with ground monitors. We know that termites show preferences when certain amino acids are added to foods (Chen and Henderson, 1996). Thus, both bait placement and bait quality are important variables that can improve bait acceptance.

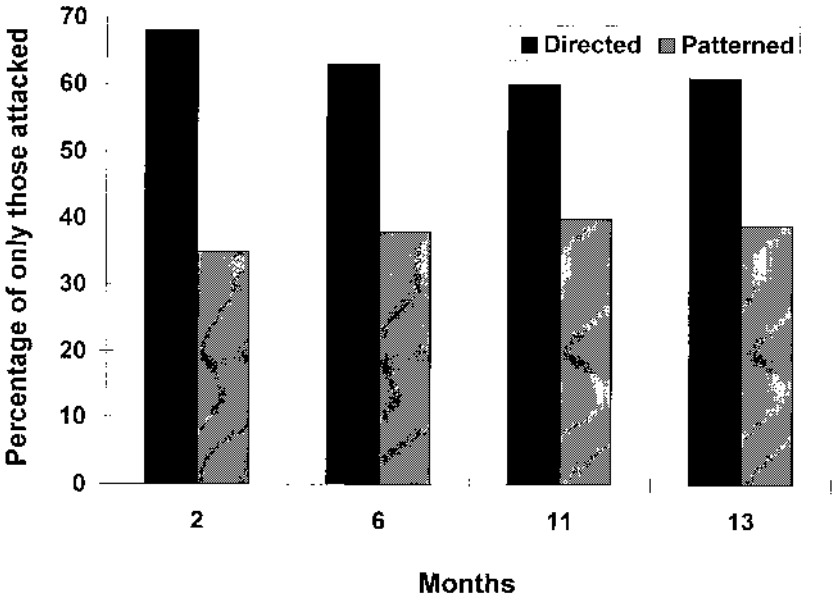

Fig. 2. Of the stakes that were attacked, the percentage that were attacked in directed vs. patterned placements at each inspection period.

Our study was unable to determine how many stakes were contacted by termites but not fed upon. So, although foraging may be nonrandom, the strategy in search for food may not. Oi et al. (1996) stated that search behavior is random in subterranean termites, although no data to support this conclusion are provided. Robson et al. (1995) found search to be a nonrandom process in *Reticulitermes flavipes* (Kollar). Research on search behavior will help our understanding of subterranean termite foraging behavior and its applications toward successful termite control.

SUMMARY

Four hundred and twenty-eight wooden stakes were placed in the ground around eleven similar buildings using conducive and uniform placements to evaluate placement success relative to termite attack. Stakes were monitored for termite attack at two, six, 11, and 13 months. Overall, monitors placed in conducive locations were twice as likely to be attacked by subterranean termites compared with patterned placements; however, the difference was not statistically significant.

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