A Rapid Method for Collecting Large Numbers of Subterranean Termites From Wood[1,2]

by

J. P. La Fage,[3] N-Y. Su,[3] M. J. Jones,[3] and G. R. Esenther[4]

ABSTRACT

A technique which uses a corrugated fiberboard trap to collect subterranean termites from infested logs is described. Single-trap collections in excess of 63 grams (wet wt.) for *Reticulitermes virginicus* (Banks) and 43 grams for *Coptoterms formosanus* Shiraki were taken one to three days following discovery by termites. If traps, shortly after being attacked, are removed from the source, termites are collected relatively free from extraneous soil and cellulosic debris.

INTRODUCTION

The need for large numbers of termites for research led to development of a labor-saving technique to remove *Coptotermes formosanus* Shiraki, *Reticulitermes flavipes* (Kollar), and *R. virginicus* (Banks) from infested wood. All three species are collected in sound or decayed logs in southern Louisiana *Coptotermes formosanus* colonies nest in hollowed-out heartwood ofstanding dead cypress (*Taxodium distichum* [L.] Rich) snags, *R. flavipes* and *R. virginicus* nest in dead, standing, and fallen southern yellow pine (*Pinus* sp. L.) logs. Although their colonies are diffuse with indistinct boundaries, large numbers of *Reticulitermes* ssp. foragers can be collected from above-ground feeding sites, primarily infested logs.

Gathering colonies of *C. formosanus* and logs containing large populations of *Reticulitermes* species is a simple task. The difficult and time consuming activity is to extract the termites from the infested logs. Collecting termites from the established laboratory colonies includes two steps: 1) removal of termites from the galleries; and 2) separation of termites from debris. Initial removal is easy if logs are decayed so that they split along growth rings but is difficult when the wood is sound. In intact logs, termites remain hidden and eventually die when moisture levels drop. When logs are sufficiently decayed or if small-dimension lumber is used in traps (Tamashiro et al., 1973), the

---

[1]Isoptera (Rhinotermitidae).

[2]This work on which this paper is based was supported. in part, by a cooperative agreement between the Louisiana State University and U.S. Department of Agriculture, Forest Service, Forest Products Laboratory, P. O. Box 5130, Madison, Wisconsin.

[3]Dept. of Entomology, Louisiana State University Agricultural Center, Louisiana State University, Baton Rouge, LA 70803.

[4]Forest Service, U.S. Department of Agriculture, Forest Products Laboratory, P.O. Box 5130, Madison, Wisconsin 53705.

termitecontaining wood can be split and the termites gently tapped into collecting trays. This method works well where termite density is high but is less satisfactory when large quantities of sound wood must be split to obtain the desired number of individuals. There is also a high probability of damaging the termites unless great care is exercised.

Becker (1969) proposed that foragers could be collected individually with forceps, but this method is practical only when very few specimens are required; the number required for screening experiments makes the method far too time consuming and increases the danger of damaging the termites. Becker also cited the popular practice of placing wetted paper towels over the nest material, wooden debris, or soil to concentrate termites. Originally proposed by Gay et al. (1955), this method is in widespread use today with *Reticulitermes* species (Becker 1969).

More recently, French and Robinson (1981) adapted a method originally suggested by La Fage et al. (1973) to aggregate large numbers of subterranean termites. They packed toilet paper rolls moistened with water into 54-L perforated steel drums partially buried in soil near pre-determined foraging sites of *C. acinaciformis* (Froggatt). After five months, the toilet paper baits were heavily infested and could be used as a source of foragers for laboratory investigations. Esenther (1980) used a corrugated fiberboard sandwich bait to accomplish the same purpose with *R. flavipes.* The units were buried a few cm below the soil surface within a m of termiteinfested logs. Within a few weeks seven of ten units were attacked. Howard et al. (in Press) have also used corrugated fiberboard to monitor the field activity of *Reticulitermes* species.

Until now the use of corrugated fiberboard has been restricted to field applications. In this context the fiberboard has the advantage over toilet paper of allowing easier retrieval of termites from the infested bait Our experience with toilet paper(La Fage et al. 1973) has shown that the uniform, crevice free roll is filled with large amounts of soil soon after discovery. Thus, although they accumulate large numbers of termites, much effort must go into the separation of termites from soil contamination.

Because corrugated fiberboard is constructed with spaces between the two face layers, termites are able to move quickly into artificial galleries. Although soil and woody debris are deposited in the usual manner after termites work the material for extended periods, little is taken in during the initial stages of attack The 10-cm square sandwiches described by Esenther (1 980) have proved useful for the collection of termites in the field but are limited by size and a tendency to degrade quickly. We have adapated the use of corrugated fiberboard for the collection of large numbers of termites from laboratory colonies of *Reliculitermes* spp. and *C. formosanus.*

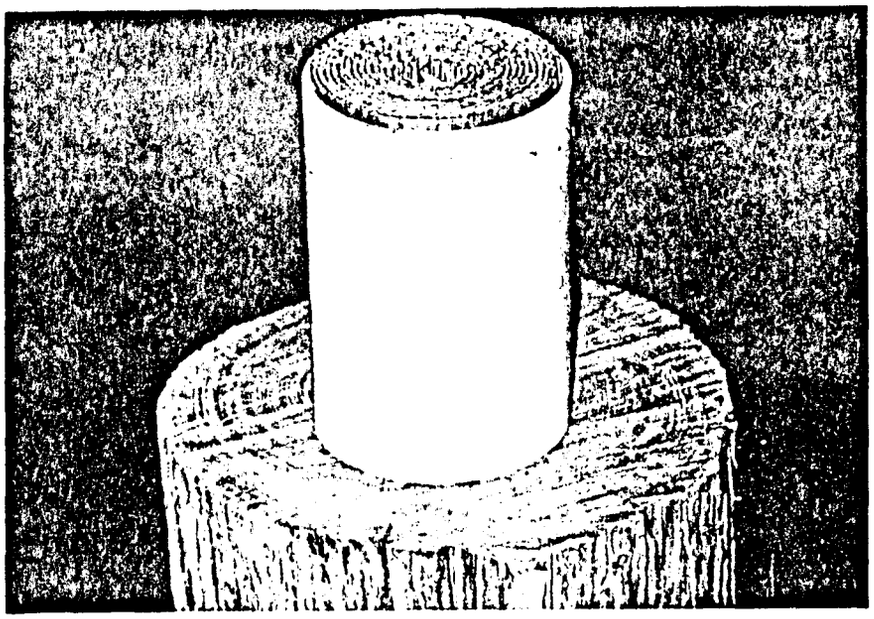

Fig. 1. Corrugated fiberboard trap placed on a log infested with *Coptotermes formosanus* Shiraki.

CORRUGATED-FIBERBOARD TRAP

Single backed corrugated fiberboard strips (one flat surface glued to one corrugated surface) are cut from larger rolls (General Paper Co., Inc, Baton Rouge, LA). Strips are cut (ca. 1 m) so that when rolled (corrugation facing in) they fit snugly into a 10-cm diameter polyvinyl chloride sleeve (open both ends). We selected a unit length of ca. 15 cm (Fig. 1) for convenience of handling and because it accommodates large numbers of termites (Table 1). The dimensions of the corrugations apparently affect the number of termites collected, the optimum size is approximately equal to the cross- sectional diameter of the forager's body. The units are most attractive when wetted prior to placement on the termite-infested logs. If left on the termite source for more than a few days, the open end should be covered with a plastic petri dish to retain moisture.

If placed directly on exposed galleries, traps are discovered and invaded within hours or a few days. Recruitment is rapid, and a trap removed and disassembled after only 24 to 72 hours may contain grams of termites. After trap removal, a second one can be put in its exact position and will be occupied almost immediately. We have used a succession of units to determine the total population of several *C. formosanus* colonies(La Fage et al., in Preparation).

However, in our program the greatest value of the units has been their ability to concentrate large numbers of termites relatively free of contamina-

Table 1. termite yields from corrugated fiberboard traps.

Trap[a] #	Termites collected (g wet)	
	Coptotermes formosanus	*Reticulitermes virginicus*
1	43.99	44.16
2	15.42	63.31
3	4.89	17.68
4	10.16	9.62
5	10.24	36.10
6	11.67	8.16
7	12.29	17.66
8	8.91	28.81
9	7.13	8.27
10	7.95	3.45
11	8.32	8.08
12	14.68	15.86
13	20.36	25.51
14	11.81	40.81
15	10.42	5.95
16	12.96	4.48
	$\bar{X}$ = 13.19	$\bar{X}$ = 21.12

[a] Separate traps used for each species.

tion with little expenditure of labor. If removed from the logs within 72 hours, the fiberboard insert can be unravelled and the exposed termites gently tapped into collection trays. Little debris is carried into the units during the initial stages of attack, and the termites can be collected directly, Should debris-free termites be necessary, the use of wooden bridges from the contaminated termites to undamaged wooden boards (Tamashiro et al. 1973) is suggested for *C. formosanus* and moistened paper towels for *Reticulitermes* species.

YIELDS FROM TRAPS

The quantity of termites collected depends on density of individuals in the source colonies and time baits remain on the logs. Trap yields for *C. formosanus* and *R. virginicus* are given in Table 1. Experience is required to

achieve highest trap density with little contamination. 'Colonies' of *R. virginicus* containing ca. 250,000 individuals have yielded single-trap catches in excess of 63 grams (wet wt.). This is equivalent to more than 33,000 foragers. The largest capture from a *C. formosanus* colony to date has been ca. 44 grams.

REFERENCES

Becker, G. 1969. Rearing of termites and testing methods used in the laboratory. *In* Biology of Termites (K. Krishna and F. M. Weesner, eds.), Vol. 1, pp. 351-385. Academic Press, New York.

Esenther, G. 1980. Estimating the size of subterranean termite colonies by a release-recapture technique. The Intl. Res. Group on Wood Pres. Document No.: IRG/WP/1112.

French, J. R. J., and Robinson, P. J. 1981. Baits for aggregating large numbers of subterranean termites. J. Aust. Ent. Soc. 20:75:76.

Gay, F. J., Greaves, T., Holdaway, F. G., and Wetherly, A. H. 1955. Standard laboratory colonies of termites for evaluating the resistance of timber, timber preservatives, and other materials to termite attack. Australian, Commonwealth Sci. Ind. Res. Organ. Bull. 277, 60 pp.

Howard, R. W., Jones, S. C., Mauldin, J. K., and Beal, R. H. Abundance, distribution, and colony size estimates for *Reticulitermes* spp. in southern Mississippi. Envir. Entomol. (in Press).

La Fage, J. P., Nutting, W. L., and Haverty, M. I. 1973. Desert subterranean termites: A method for studying foraging behavior. Environ. Entomol. 2:954-956.

La Fage, J. P., Su, N-Y., and Surman, M. Total colony population estimates for the Formosan subterranean termites, *Coptotermes formosanus* Shiraki (in Preparation).

Tamashiro, M., Fujii, J., and Lai, P-Y. 1973. A simple method to observe, trap, and prepare large numbers of subterranean termites for laboratory and field experiments. Envir. Entomol. 2:721-722.