Termites in Hawaii

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Located in the middle of the Pacific Ocean, Hawaii is the most isolated group of islands in the world. However, Hawaii is also a natural stop for trans-Pacific commercial trade, a center of United States military activity in the Pacific, and a world-renowned tourist destination. Thus, approximately 15 new insects are introduced and become established in Hawaii each year.

There are about 3,000 different species of termites in the world, but less than 10% of these species are considered pests to man. In many parts of the world, termites perform the important functions of breaking down the cellulose in dead wood, and aerating (tunneling) the soil.

Eight termite species are currently found in Hawaii, and four of these species were discovered during the past 15 years:

Rottenwood Termites (Family Termopsidae):
- *Zootermopsis angusticollis* - found only at high, cool locations on Maui

Drywood Termites (Family Kalotermitidae):
- *Neotermes connexus* - found in trees and stumps in damp locations
- *Incisitermes immigrans* - found in trees in drier locations
- *Incisitermes minor* - found to date in four houses on Oahu
- *Cryptotermes brevis* - the major drywood termite pest in buildings in Hawaii
- *Cryptotermes cyanocephalus* - found in one location on Oahu

Subterranean Termites (Family Rhinotermitidae):
- *Coptotermes formosanus* - the most important termite pest in Hawaii
- *Coptotermes gestroi* - found in several locations on Oahu (formerly called *C. vastator*).

Drywood termites live directly inside wood; while subterranean termites usually live in large colonies in the soil. Often, the only evidence that drywood termites are present are the small fecal pellets that they push out of their galleries in the infested wood. With the help of bacteria and protozoa in their gut, termites digest almost all of the cellulose found in wood, and excrete the lignin in the form of small, hard pellets. Each drywood termite produces about one pellet each day. We can actually identify the species of termite by chemical analysis of the fecal pellets.

The drywood termites *Incisitermes minor* and *C. cyanocephalus* were only recently found in Hawaii, but will probably become more important pests in the islands. Currently, *Cryptotermes brevis*, the Indo-Malaysian drywood termite, is the most serious drywood termite pest, and is largely controlled by fumigation with sulfuryl flouride (Vikane). With small infestations, insecticides can be injected into the wood for termite control, but this is difficult since (1) it is difficult to determine the extent of the drywood termite infestation, and (2) there may be many termite galleries and multiple termite colonies within a single piece of wood. Research in our laboratory has also demonstrated that heat can be applied to control termites.

Coptotermes formosanus, the Formosan subterranean termite, is a very serious subterranean termite pest around the world, and is the most important economic pest in Hawaii. The recently discovered Asian subterranean termite, *Coptotermes gestroi* is only found in a few locations on

the island of Oahu, but is slowly expanding its range. Fortunately, similar methods appear to control both termite species. Soil treatment with an insecticide is commonly used to keep subterranean termites from tunneling into buildings. In new construction, two physical termite barriers are often installed: (1) the Basaltic Termite Barrier, a barrier of crushed gravel screened to a uniform size that was invented in the College of Tropical Agriculture and Human Resources, at the University of Hawaii at Manoa, or (2) Termimesh, a stainless steel wire mesh barrier. The Sentricon (Dow AgroSciences) baiting system is also commonly used around buildings in Hawaii to kill subterranean termite colonies.

Finally, the use of termite-resistant building materials in construction is important for preventing attack by both drywood and subterranean termites. These materials include wood treated with a preservative chemical, naturally durable wood species, and steel framing. With naturally durable woods, it is important to remember that only the heartwood (in the center of the tree stem) is resistant to termites and wood decay. The outer wood, called the sapwood, is not durable. The most commonly used wood preservative in Hawaii is Hi-bor (Disodium Octaborate Tetrahydrate).

Suggested Readings:

Grace, J.K., R.J. Woodrow and J.R. Yates. 2002. Distribution and management of termites in Hawaii. Sociobiology 40:87-93.

Woodrow, R.J., J.K. Grace & J.R. Yates III. 1999. Hawaii's termites - an identification guide. Household & Structural Pests No. 1. College of Tropical Agric. & Human Resources, Univ. of Hawaii at Manoa. 6 pp.
Free download from:
http://www.ctahr.hawaii.edu/ctahr2001/PIO/FreePubs/FreePubs06.asp#HouseholdAndStructuralPests

Yates, J.R. III, J.K. Grace & M. Tamashiro. 1999. New technology for managing the Formosan subterranean termite. Household & Structural Pests No. 3. College of Tropical Agric. & Human Resources, Univ. of Hawaii at Manoa. 4 pp.
Free download from:
http://www.ctahr.hawaii.edu/ctahr2001/PIO/FreePubs/FreePubs06.asp#HouseholdAndStructuralPests

University of Hawaii Termite Project: http://www2.hawaii.edu/~entomol/