

Coptotermes formosanus [简体中文](#) [正體中文](#)

System: Terrestrial

Kingdom	Phylum	Class	Order	Family
Animalia	Arthropoda	Insecta	Isoptera	Rhinotermitidae

Common name Formosa termite (German), Formosan subterranean termite (English)

Synonym *Coptotermes intrudens*

Similar species

Summary *Coptotermes formosanus* is a subterranean termite with an affinity for damp places. Wherever there is wood (cellulose) and moisture there is the possibility that this species can inhabit that location.



[view this species on IUCN Red List](#)

Species Description

It is difficult to identify Formosan termites with just the workers but the soldiers and alates look different from native subterranean species and are easy to identify. Cabrera *et al.* (2001) describes the soldiers as follows "Soldiers have orange-brown, oval-shaped heads that are quite different from the more rectangular, straight-sided head of native subterranean termite soldiers. There is a small pore, called the fontanelle, on the front of the head. The soldiers produce droplets of a white, glue-like fluid from this pore when they are attacked. This fluid gums up and disables attackers. Soldiers have black, sickle-shaped mandibles (jaws) that can be crossed to form an X. The bodies are yellowish-white and are about 6.4mm long. Formosan subterranean termite soldiers are very aggressive. They will even attack fingers or tools if provoked, although their bite and fluid is harmless to humans. Swarmers are yellowish-brown with golden brown heads, a pair of black eyes and 2 pairs of wings of equal length. They are about 12-15mm long from head to wingtip. The wings are clear with two heavily thickened veins on the leading edge and are covered with small hairs. These hairs are clearly visible under magnification."

Please see PaDIL (Pests and Diseases Image Library) Species Content Page [Termites: Formosan subterranean termite](#) for high quality diagnostic and overview images.

Notes

Raloff (2003) reports that, "It can take new colonies at least 7 years to reach a size that creates detectable damage. *C. formosanus* evaded detection for about 2 decades because they were mistaken for native termites of the *Reticulitermes* genus."

Lifecycle Stages

Su and Scheffrahn (2000) report that, "A single colony of *C. formosanus* may produce over 70,000 alates. After a brief flight, alates shed their wings. Females immediately search for nesting sites with males following closely behind. When the pair find a moist crevice with wooden materials, they form the royal chamber and lay approximately 15 to 30 eggs. Within two to four weeks, young termites hatched from the eggs. The reproductives nurse the first group of young termites until they reach third instar. One to two months later, the queen lay the second batch eggs which would be eventually nursed by termites from the first egg batch. It may take three to five years before a colony reach substantial number to cause severe damage and produce alates."

Habitat Description

C. formosanus are subterranean and generally live underground. They build nests out of a hard material called carton, workers make carton from soil, chewed wood or plant matter, and their own saliva and faecal matter. Carton nests constructed by hundreds of thousands are large and rock-like. Some Formosan termite colonies build above-ground nests that are not connected to the soil. Nests may be constructed on structures where the temperature does not get too hot or cold and where there is plenty of moisture (Cabrera *et al.* 2001). Boats and ships; porches, balconies, rooftops with plants; gutters and flat roofs are some of the places where termites find moisture. Cabrera *et al.* (2001) has found that *C. formosanus* can take up residence in boats and even high-rise condominiums.

Raloff (2003) reports that, "If *C. formosanus* find reliable food and drink, such as framing timber and rainwater, they will permanently nest within a building's walls." *C. formosanus* will also reside in live and dead trees along with homes and other man made structures (Raloff, 2003).

Reproduction

After swarming and landing on the ground, the alates break off their wings and search for a mate. Once a mate is found, the male and female search for a crevice in damp ground or wood, hollow out a small chamber, and crawl inside. The pair, now known as the king and queen, mate and within a few days the queen starts laying eggs. The young, known as larvae, hatch from the eggs and are fed by the king and queen. A mature colony contains distinct groups called castes. These castes look different from one another and each has a special duty within the colony. The king and queen *C. formosanus* are the primary reproductives and are responsible for reproduction. If the queen or king dies or the colony becomes large, secondary reproductives may form and begin reproduction. Soldiers defend the colony against predators and other natural enemies. Workers take care of and feed the larvae, reproductives and soldiers, tend the eggs, build and maintain the nest, and search for food. Alate nymphs become alates when they are fully grown. (Cabrera *et al.* 2001).

Nutrition

Cabrera *et al.* (2001) state that, "Like many other termites, the Formosan termite feeds on wood and other materials that contain cellulose, such as paper and cardboard. Bacteria and other single-celled organisms live in the termite digestive system and digest cellulose providing nutrition and energy for these termites. Although they feed mostly on wood, they will eat other cellulose-containing materials such as cardboard and paper. However, they are known to chew through foam insulation boards, thin lead and copper sheeting, plaster, asphalt, and some plastics."

Morales-Ramos and Rojas, (2003) found that, "Colonies of *C. formosanus* feeding on pecan, *Carya illinoensis* (Wangenh.), and red gum, *Liquidambar styraciflua* L., produced significantly more progeny than colonies feeding on other wood species tested. Progeny of colonies feeding on pecan and American ash, *Fraxinus americana* L., had significantly greater survival than progeny of colonies feeding on other wood species. Colonies feeding on nutritionally supplemented cellulose based matrix showed similar fitness characteristics as colonies feeding on the best wood treatments. These results indicate that differences observed in colony fitness can be partially explained by nutritional value of the food treatment, raising the possibility that wood from different tree species have different nutritional values to the Formosan subterranean termites. This suggests that feeding preference of *C. formosanus* is at least partially influenced by the nutritional value of the food source."



General Impacts

C. formosanus will hollow out live trees and not just dead ones. Some colonies will also nest in homes and other structures instead of just dining on them (Raloff, 2003). The presence of *C. formosanus* can easily go unnoticed for long periods of time. Infestations may not be noticed until floorboards become squishy or visible signs of the colony burrowing out through plaster walls become apparent (Raloff, 2003). Hu and Zhu (2003) found that in the wild *C. formosanus* cannot hybridise with other termite species. This species is very aggressive and will out compete native species of termites with ease.

C. formosanus has its greatest impact in North America. Lax and Osbrink (2003) state that, "*C. formosanus* is currently one of the most destructive pests in the USA. It is estimated to cost consumers over US \$1 billion annually for preventative and remedial treatment and to repair damage caused by this insect." Raloff (2003) states that in North America *C. formosanus*, "create significantly bigger colonies, and therefore more damage, than do their native U.S. cousins, which reside underground and enter buildings only to forage."

Management Info

Please see [Management Information *Coptotermes formosanus*](#) for management information.

Pathway

Jenkins *et al.* (2002) state that *Coptotermes formosanus* spread through commercial traffic in used railroad cross ties.

Principal source: Cabrera *et al.* 2001. Formosan Subterranean Termite
Su and Scheffrahn, 2000. Formosan Subterranean Termite, *Coptotermes formosanus* Shiraki (Insecta: Isoptera: Rhinotermitidae)

Compiler: National Biological Information Infrastructure (NBII) & IUCN/SSC Invasive Species Specialist Group (ISSG)

Review: Dr. Nan-Yao Su, Ft. Lauderdale Research and Education Center, University of Florida.

Publication date: 2006-10-11

ALIEN RANGE

[1] GUAM

[1] SOUTH AFRICA

[1] TAIWAN

[1] UNITED STATES MINOR OUTLYING ISLANDS

[3] JAPAN

[1] SRI LANKA

[61] UNITED STATES

BIBLIOGRAPHY

46 references found for *Coptotermes formosanus*

Management information

Boue, S. M., and A. Raina. 2003. Effects of plant flavonoids on fecundity, survival, and feeding of the Formosan subterranean termite. *Journal of Chemical Ecology*. 29(11):2575-2584.

Brooks, S. E., F. M. Oi, and P. G. Koehler. 2003. Ability of canine termite detectors to locate live termites and discriminate them from non-termite material. *Journal of Economic Entomology*. 96(4):1259-1266.

Chang, S., and S. Cheng. 2002. Antitermitic activity of leaf essential oils and components from *Cinnamomum osmophleum*. *Journal of Agricultural & Food Chemistry*. 50(6):1389-1392.

Chang, S., S. Cheng, and S. Wang. 2001. Antitermitic activity of essential oils and components from Taiwania (*Taiwania cryptomerioides*). *Journal of Chemical Ecology*. 27(4):717-724.

Ibrahim, A. S., G. Henderson, and H. Fei. 2003. Toxicity, repellency, and horizontal transmission of fipronil in the formosan subterranean termite (Isoptera: Rhinotermitidae). *Journal of Economic Entomology*. 96(2):461-467.

Ibrahim, S. A., G. Henderson, B. C. R. Zhu, H Fei, and R. A. Laine. 2004. Toxicity and behavioral effects of nootkatone, 1,10-dihydronootkatone, and tetrahydronootkatone to the formosan subterranean termite (Isoptera: Rhinotermitidae). *Journal of Economic Entomology*. 97(1):102-111.

- Jenkins, T. M., R. E. Dean, and B. T., Forschler. 2002. DNA technology, interstate commerce, and the likely origin of Formosan subterranean termite (Isoptera: Rhinotermitidae) infestation in Atlanta, Georgia. *Journal of Economic Entomology*. 95(2):381-389.
- Kartal, S. N., T. Yoshimura, and Y. Imamura. 2004. Decay and termite resistance of boron-treated and chemically modified wood by *in situ* co-polymerization of allyl glycidyl ether (AGE) with methyl methacrylate (MMA). *International Biodeterioration & Biodegradation*. 53(2): 111-117.
- Lax, A. R., and W. L. A. Osbrink. 2003. United States Department of Agriculture-Agriculture Research Service research on targeted management of the Formosan subterranean termite *Coptotermes formosanus* Shiraki (Isoptera: Rhinotermitidae). *Pest Management Science*. 59(6-7):788-800.
- Maistrello, L., G. Henderson, and R. A. Laine. 2001. Effects of nootkatone and a borate compound on formosan subterranean termite (Isoptera: Rhinotermitidae) and its symbiont protozoa. *Journal of Entomological Science*. 36(3):229-236.
- Maistrello, L., G. Henderson, and R. A. Laine. 2003. Comparative effects of vetiver oil, nootkatone and disodium octaborate tetrahydrate on *Coptotermes formosanus* and its symbiotic fauna. *Pest Management Science*. 59(1):58-68.
- Mankin, R. W., W. L. Osbrink, F. M. Oi, and J. B. Anderson. 2002. Acoustic detection of termite infestations in urban trees. *Journal of Economic Entomology*. 95(5): 981-988.
- Maruyama, M., and R. Iwata. 2002. Two new termitophiles of the tribe Termitohospitini (Coleoptera: Staphylinidae: Aleocharinae) associated with *Coptotermes formosanus* (Isoptera: Rhinotermitidae). *Canadian Entomologist*. 134(4):419-432.
- Mortia, Y., E. Matsumura, T. Okabe, M. Shibata, M. Sugiura, T. Ohe, H. Tsujibo, N. Ishida, and Y. Inamoria. 2003. Biological activity of tropolone. *Biological & Pharmaceutical Bulletin*. 26(10):1487-1490
- Osbrink, W. L. A., and A. R. Lax. 2003. Effect of imidacloprid tree treatments on the occurrence of Formosan subterranean termites, *Coptotermes formosanus* Shiraki (Isoptera: Rhinotermitidae), in independent monitors. *Journal of Economic Entomology*. 96(1):117-125.
- Quicheng, F. 1980. Some current study and research approaches relating to the use of plants in the traditional Chinese medicine. *Journal of Ethnopharmacology* 2(2): 57-63.
- Summary:** Kudzu uses
- Shelton, T. G., and J. K. Grace. 2003. Effects of exposure duration on transfer of nonrepellent termiticides among workers of *Coptotermes formosanus* Shiraki (Isoptera: Rhinotermitidae). *Journal of Economic Entomology*. 96(2):456-460.
- Su, N., P. Ban, and R. H. Scheffrahn. 2003. Resistance of insecticide-treated foam board insulation against the eastern subterranean termite and the formosan subterranean termite (Isoptera: Rhinotermitidae). *Journal of Economic Entomology*. 96(5):1526-1529.
- Su, N., P. Ban, and R. H. Scheffrahn. 2004. Polyethylene barrier impregnated with lambda-cyhalothrin for exclusion of subterranean termites (Isoptera: Rhinotermitidae) from structures. *Journal of Economic Entomology*. 97(2):570-574.
- Su, N.-Y. and Scheffrahn, R. H. 1996. A method for elimination of subterranean termite colonies. Ft. Lauderdale REC Research Report 96-1.
- Summary:** A monitoring-baiting technique using hexaflumuron was described to eliminate colonies of the Formosan subterranean termites.
- Su, N.-Y. and Scheffrahn, R. H. 2000. Formosan Subterranean Termite, *Coptotermes formosanus* Shiraki. *Featured Creatures*, Univ. Florida Dept. Entomol./Nematol. Website. EENY-121.
- Summary:** US and Florida distribution of the Formosan subterranean termite, biology and control.
- Su, N.-Y. and Tamashiro, M. 1987. An overview of the Formosan subterranean termite in the world. In Tamashiro, M. and Su, N.-Y. (eds.) *Biology and control of the Formosan subterranean termite*. College of Trop. Agr. Human Resources, Univ. of Hawaii, Honolulu, HI: 3-15.
- Summary:** The world wide distribution of this termite pest and their control measures are discussed.
- [Walker, K. 2006. Formosan subterranean termite \(*Coptotermes formosanus*\) Pest and Diseases Image Library. Updated on 6/10/2006 10:00:55 AM.](#)
- Summary:** PaDIL (Pests and Diseases Image Library) is a Commonwealth Government initiative, developed and built by Museum Victoria's Online Publishing Team, with support provided by DAFF (Department of Agriculture, Fisheries and Forestry) and PHA (Plant Health Australia), a non-profit public company. Project partners also include Museum Victoria, the Western Australian Department of Agriculture and the Queensland University of Technology. The aim of the project is: 1) Production of high quality images showing primarily exotic targeted organisms of plant health concern to Australia. 2) Assist with plant health diagnostics in all areas, from initial to high level. 3) Capacity building for diagnostics in plant health, including linkage developments between training and research organisations. 4) Create and use educational tools for training undergraduates/postgraduates. 5) Engender public awareness about plant health concerns in Australia. PaDIL is available from : <http://www.padil.gov.au/aboutOverview.aspx>, this page is available from: <http://www.padil.gov.au/viewPestDiagnosticImages.aspx?id=295> [Accessed 6 October 2006]
- Wang, C., and J. E. Powell. 2004. Cellulose bait improves the effectiveness of *Metarhizium anisopliae* as a microbial control of termites (Isoptera: Rhinotermitidae). *Biological Control* 30(2):523-529.
- Wang, C., J. E. Powell, B. M. O Connor. 2002. Mites and nematodes associated with three subterranean termite species (Isoptera: Rhinotermitidae). *Florida Entomologist*. 85(3):499-506.
- Wright, M. S., W. L. A. Osbrink, and A. R. Lax. 2002. Transfer of entomopathogenic fungi among Formosan subterranean termites and subsequent mortality. *Journal of Applied Entomology*. 126 (1):20-23.
- Zhu, B. C. R., G. Henderson, A. M. Sauer, Y. Yu, W. Crowe, and R. A. Laine. 2003. Structure-activity of valencenoid derivatives and their repellence to the Formosan subterranean termite. *Journal of Chemical Ecology*. 29(12):2695-2701.
- Zhu, B. C. R., G. Henderson, H. Fei, X. Ying, and R. A. Laine. 2003. Terpene-induced morphological changes to exoskeleton of Formosan subterranean termites (Isoptera: Rhinotermitidae): Toxic effects of cis-nerol. *Journal of Entomological Science*. 38(2):225-233.
- Zhu, B. C. R., G. Henderson, Y. Yu, and R. A. Laine. 2003. Toxicity and repellency of patchouli oil and patchouli alcohol against Formosan subterranean termites *Coptotermes formosanus* Shiraki (Isoptera: Rhinotermitidae). *Journal of Agricultural & Food Chemistry*. 51(16):4585-4588.

General information

- Bishop Museum. 2002. *Coptotermes formosanus*. The State Museum of Natural and Cultural History, Arthropod Checklist Query Results.
- Cabrera, B. J., N. Su, R. H. Scheffrahn, F. M. Oi., and P. G. Koehler. 2001. Formosan Subterranean Termite. University of Florida: Extension (Institute of Food and Agricultural Sciences) ENY-216.



GLOBAL INVASIVE SPECIES DATABASE

FULL ACCOUNT FOR: *Coptotermes formosanus*

[City of New Orleans Mosquito & Termite Control Board. 2003. National Termite Survey: *Coptotermes formosanus* \(Formosan subterranean termite\).](#)

Summary: Available from: http://www.termitesurvey.com/distribution/coptotermes_formosanus.shtml [Accessed 15 November 2004]
Cornelius, M. L., and L. A. W. Osbrink. 2003. Agonistic interactions between colonies of the Formosan subterranean termite (Isoptera: Rhinotermitidae) in New Orleans, Louisiana. *Environmental Entomology*. 32(5): 1002-1009.

Fei, H. X., and G. Henderson. 2003. Comparative study of incipient colony development in the Formosan subterranean termite, *Coptotermes formosanus* Shiraki (Isoptera, Rhinotermitidae). *Insectes Sociaux-Social Insects*. 50(3):226-233.

Hathorne, K. T., P. A. Zungoli, E. P. Benson, W. C. Bridges. 2000. The termite (Isoptera) fauna of South Carolina. *Journal of Agricultural & Urban Entomology*. 17(4): 219-229.

Husseneder, C., and J. K. Grace. 2001. Similarity is relative: Hierarchy of genetic similarities in the formosan subterranean termite (Isoptera: Rhinotermitidae) in Hawaii. *Environmental Entomology*. 30(2): 262-266.

Hu, X. and F. Zhu. 2003. Aggressive relationship between two subterranean termites (Isoptera: Rhinotermitidae). *Acta Zoologica Sinica*. 49(3):295-302.

[Hu, X. P., F. M. Oi, and T. G. Shelton. 2001. Formosan Subterranean Termites. Alabama Cooperative Extension System: PubID: ANR-1035.](#)

Summary: Available from: <http://www.aces.edu/pubs/docs/A/ANR-1035/> [Accessed 15 November 2004]

[ITIS \(Integrated Taxonomic Information System\), 2004. Online Database *Coptotermes formosanus*](#)

Summary: An online database that provides taxonomic information, common names, synonyms and geographical jurisdiction of a species. In addition links are provided to retrieve biological records and collection information from the Global Biodiversity Information Facility (GBIF) Data Portal and bioscience articles from BioOne journals.

Available from: http://www.itis.gov/servlet/SingleRpt/SingleRpt?search_topic=TSN&search_value=650469 [Accessed December 31 2004]

Morale-Ramos, J. A., and M. G. Rojas. 2001. Nutritional ecology of the Formosan subterranean termite (Isoptera: Rhinotermitidae): Feeding response to commercial wood species. *Journal of Economic Entomology*. 94(2):516-523.

Morales-Ramos, J. A., R. M. Guadalupe. 2003. Nutritional ecology of the Formosan subterranean termite (Isoptera: Rhinotermitidae): Growth and survival of incipient colonies feeding on preferred wood species. *Journal of Economic Entomology*. 96(1):106-116.

Raloff, J. 2003. Munching Along - Warning: Aggressive alien termites could be headed your way. *Science News* 164(22):344

Scheffrahn, R. H., N. Su., J. A. Chase, J. R. Mangold, J. K. Grace, and J. R. Yates. 2000. First record of *Cryptotermes cynocephalus* light (Isoptera: Kalotermitidae) and natural woodland infestations of *C. brevis* (Walker) on Oahu, Hawaiian Islands. *Proceedings of the Hawaiian Entomological Society*. 34:141-145.

Su, N., and R. H. Scheffrahn. 2000. Formosan Subterranean Termite, *Coptotermes formosanus* Shiraki (Insecta: Isoptera: Rhinotermitidae). University of Florida: Extension (Institute of Food and Agricultural Sciences) EENY-121.

Su, N.-Y. and Scheffrahn, R. H. 1988. Foraging population and territory of the Formosan subterranean termite (Isoptera: Rhinotermitidae) in an urban environment. *Sociobiology* 14: 353-359.

Summary: The foraging population and territory sizes and the Formosan subterranean termite colonies in urban SE Florida were determined using triple mark-recapture methods.

Vargo, E. L., C. Husseneder, and K. Grace. 2003. Colony and population genetic structure of the Formosan subterranean termite, *Coptotermes formosanus*, in Japan. *Molecular Ecology*. 12(10): 2599-2608.