



Landscape Mulches: Will Subterranean Termites Consume Them?¹

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Subterranean termites occur throughout the temperate and tropical regions of the world and cause the majority of damage to wood in use (Moore 1979; Anonymous 1997). They live in the soil in colonies which can number up to 1 million workers and soldiers. In nature, their role as decomposers of dead and fallen trees is a valuable one. However, termites also consume wood in service, and so there is great interest and concern over their threat to wooden buildings and structures.

The dark southern subterranean termite, *Reticulitermes virginicus* (Banks), and eastern subterranean termite, *Reticulitermes flavipes* (Kollar), are two of the five principal subterranean termite species in the U.S., causing 95% of the termite damage to wooden structures (Forschler and Lewis 1997). They do not build distinct nests but instead have dispersed colonies underground with a collection of feeding sites (Ballard 1997). Subterranean termites forage for food as far as 250 feet from their colony. To lessen the effect of air currents and reduce attack from ants, these termites build mud tubes between the soil and food sources.

Landscape mulches are commonly used in today's urban forest to provide many benefits including water and soil conservation, weed control, soil temperature buffering, and soil organic matter improvement. These benefits and the increasing interest in utilizing yard waste have resulted in a wide array of mulches being used for weed and water management and for decorative purposes around houses. Recently, questions have been raised about organic mulches being possible attractants to termites. This article is one of a series of fact sheets reporting the results of two studies comparing six common Florida landscape mulches (Duryea et al. 1999; Duryea et al. 1999). This fact sheet reports some results of a study which determined if termites would consume various commercially available landscape mulches currently used in Florida.

The Study

After collecting colonies of subterranean termites (*R. virginicus* and *R. flavipes*) from forests and backyards in Gainesville, Florida, we conducted two experiments to determine if these insects would eat mulches. We also wanted to see if they would eat

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certain kinds of woods, so we also fed them heartwood and sapwood of cypress and melaleuca and pine sapwood.

The six tested mulches were:

- Cypress (bark and wood from *Taxodium distichum* and *Taxodium distichum* var. *nutans*)
- Eucalyptus (bark and wood from *Eucalyptus grandis*)
- Melaleuca (bark and wood from *Melaleuca quinquenervia*)
- Pine-bark (mostly bark from *Pinus elliotii* and *P. taeda*)
- Pine-straw (needles from *P. elliotii*)
- Gainesville Regional Utility (GRU) mulch.

The GRU mulch contained utility-prunings (leaves, bark and wood) from oaks (*Quercus laurifolia* Michx., *Q. rubra* [L.], and *Q. virginiana* Mill.) and cherry (*Prunus serotina* Ehrh.), with a small amount of cedar (*Juniperus silicicola* [Small] Bailey), camphor (*Cinnamomum camphora* [L.] J. Presl), and southern pines (*Pinus* spp.) chopped with a Woodchuck[®] Disk Chopper. The other mulches were purchased from commercial gardening stores.

Wood samples from three tree species were also tested. The five samples were:

- Southern pine sapwood (used as a standard, because termites are known to feed on pine)
- Cypress sapwood
- Cypress heartwood
- Melaleuca sapwood
- Melaleuca heartwood

The mulches and woods were air-dried and then placed in plastic petri dishes with 55 worker termites.

The petri dishes were placed in a humidity chamber and each week for 3 weeks we observed the termites and noted the number of active, inactive and dead individuals. At the end of the experiments (3

weeks) we counted the number of live termites and dried and weighed the samples to see how much of the mulch or wood had been consumed.

What Did the Termites Consume?

Woods

Termites survived better and consumed pine and cypress sapwoods while not surviving or consuming either cypress heartwood or melaleuca. In other studies, termite survival on cypress was 22% compared to 81% for slash pine (Smythe and Carter 1969) and 1% and 72% for melaleuca and slash pine (Carter and Huffman 1982).

Heartwoods are known to be repellent or sometimes toxic to termites (Johnston et al. 1972; Moore 1979). Termite resistant woods listed by Johnston et al. (1972) are heartwoods of California redwood (*Sequoia sempervirens* [D. Don] Endl.), southern tidewater red cypress (*Taxodium distichum* var. *nutans* [Ait.] Sweet), very pitchy southern pine (called lighterwood) (*Pinus* [L.]) and heartwood of red cedar (*Juniperus virginiana* [L.]). In his index of termite-resistant woods, Wolcott (1950) rated cypress heartwood to be very resistant and cypress sapwood to be very susceptible. In another termite study, redwood and cypress were the least favored species and slash and loblolly pine the most (Smythe and Carter 1969). Another study using extracts from cypress heartwood showed that the termites were repelled by the cypress extract and died from starvation (Scheffrahn et al. 1988).

- Termites consumed the pine sapwood standard and cypress sapwood much more than the cypress heartwood and melaleuca woods (Figure 1).
- In Experiment 2 the pine and cypress sapwoods had 64% and 77% surviving termites while melaleuca and cypress heartwood had less than 15% survival.

Mulches

In Experiment 1 termites ate utility (GRU) mulch more than any other mulch and more than pine sapwood. Another study which compared 90 U.S. hardwoods showed that red oak and black cherry

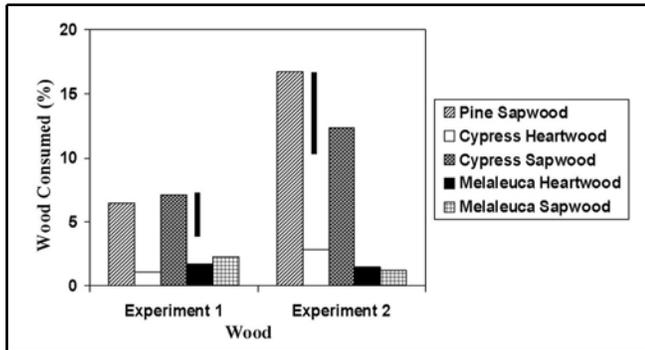


Figure 1. Termites consumption of five woods showing that termites liked pine and cypress sapwood but did not eat cypress heartwood or melaleuca. (Bars show significant differences.)

sapwood, two of the woods in the utility mulch, were susceptible and moderately susceptible to termites (Carter and Dell 1981). In another study with eleven woods, black cherry sapwood was placed at the top of the favorable list along with loblolly and slash pines while cypress and redwood were unfavorable foods (Smythe and Carter 1969).

Both melaleuca wood and mulch were not eaten by the termites. Another study of termite feeding on melaleuca heartwood resulted in 1% survival and 2% wood weight loss compared to slash pine sapwood with 72% survival and 28% weight loss (Carter and Huffman 1982). Other studies have identified some tree species which repel termites or are not eaten as much by termites (Carter and Dell 1981; Grace 1991; Carter and Smythe 1972). Our results indicate that termites were consuming all the mulches but preferred melaleuca less. The resistance of certain woods to termites could be due to their chemical make-up which could make them distasteful, repellent or toxic.

Other authors have noted susceptibility and resistance of different woods. When discussing wood preservation, Tamblin (1984) noted that untreated eucalyptus sapwood is susceptible to decay and termite attack. Cypress heartwood, also known as tidewater red cypress, though scarce today, has long been known for its termite and decay resistance (Johnston et al. 1972; Moore 1979). Today's cypress mulch is harvested from young trees with little or no heartwood, and we found that termites ate the same amount of mulch as they did the cypress sapwood.

- In Experiment 1, termites ate GRU mulch more than any other mulch and more than the pine sapwood and in Experiment 2 termites ate all mulches (Figure 2).
- Survival in the various mulches was not different.
- Over both experiments, melaleuca was the least preferred mulch.

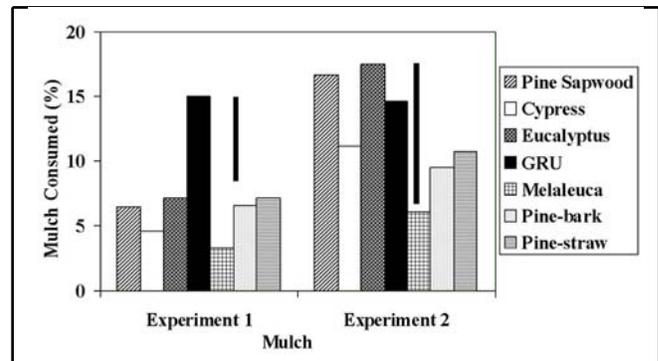


Figure 2. Termites consumption of six landscape mulches showing that termites ate all mulches but liked melaleuca the least. (Bars show significant differences.)

Conclusions and Recommendations

Subterranean termites consumed mulches in this study. Therefore it seems reasonable that termites can feed on mulches used in landscaping. If mulches do attract and support termite colonies in the landscape, the next question is whether this is a concern. Do mulches provide needed food while termites are foraging for other wood materials around or in a house? Do chemical barriers (pesticides) and other preventatives such as building design provide enough protection for houses so that termite colonies in mulch are unimportant?

Little is known or mentioned in the literature about mulches and termites. Warnings about not leaving pieces of wood or stakes as termite attractants after house construction are common though. One publication noted that when construction is complete on a new house, every "piece of wood that can be picked up between the tines of a common garden rake should be removed" (Moore 1979). Another publication notes that moist warm soil containing an abundant supply of cellulose material is a termites

optimal environment (Johnston et al. 1972). They define "cellulose material" as scraps of lumber, stakes, stumps, and roots left in the soil. One of the prerequisites for subterranean termites and wood-decaying fungi is for the wood to be in reasonably close proximity to the soil surface (Moore 1979) as mulch is. Yet, most houses in Florida with many trees and other landscape plants may already have plenty of food available for termites, and mulch may just be one more additional food source.

Further research on mulches and termites is warranted to determine if we should be concerned about using mulch around houses. Also, research is needed on possible repellent mulches such as melaleuca which might serve as an additional barrier for household protection against termites. At this time the benefits of mulches such as water conservation, reduced use of herbicides, and reduced soil erosion are very apparent while the risks to termite infestations due to mulches are unknown. Homeowners will continue to use mulches in landscaping around their houses and buildings. Our current recommendation is to be vigilant and up-to-date with termite inspection and treatment.

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