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A Study on Termite Attack on Some Woods of Economic Trees in Maiduguri, Borno State

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Abstract

Different wood species namely A. indica, E. camabulensis and T. indica were tested for their resistibility to termites by placing them in termite mould for four (4) weeks at the University of Maiduguri. The result show that among the three woods types, Tamarindus indica was the most resistant with weight loss ranging from 10.3g at the second week of storage in the termite mound to 24.1g after 4 weeks of storage. Tamarindus indica was followed by Azadirachta indica with a range of 36.6 to 48.8g loss and Eucalyptus camadulensis was next and the least resistant losing 25.5g of its weight in two weeks to 38.4g after 4 weeks. The difference in their resistibility were significant at (<0.001) , This research have intensified some woods that are resistant to termite attack and future research can dwell more in the same or alternative line.

Keywords: *Termite, Economic trees, Wood, Maiduguri, Macrotermes*

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Background to the Study

Termite belongs to the order *isopteran* and distributed in the tropical and sub-tropical regions. Termites have become important to man because of their feeding behavior and the fact that they cause great losses or have been considered as the main agents of mass destruction of most trees of economic importance. They are neither conspicuous as individual nor do they attract attention by any fluctuation in numbers. They cause a lot of damages to plants especially the wood tissues or the woodland, pasture, agricultural crops and the bark tissues, and any organic material they come into contact with. However, since their food is mainly wood and woody tissues of plants, they do in fact come into competition with man causing a steady loss of property and amenities (Harris, 1971). Termite particularly, are winged and come out in swarms during the early period of the raining season which provide a food source for insect eating birds, reptiles, mammals or even man himself.

Termites have also attracted man's attention because of their large mounds above the ground and their ability to disturb the land around their mounds (Francis, 1957). Macrotermes. This species of termites (*Macrotermes Subhyalinus*) have attracted man's attention because of their large mounds above the ground and their ability to disturb the land around their mounds. Also all termites including this species are known to be herbivorous and scavengers, although some of them are cannibalistic (Mungomery, 1984) within their geographical boundaries. They are a threat to most trees of economic importance, wood, paper and cloths for reasons not yet fully understood and also a number of growing crops (Collins, 1982). *Macrotermes subhyalinus* are the termites spp in which the pronotum without spines mandible are present. Mandible symmetrical labrum visible above labrum not forloed labrum tongue without anterios lobe both mandible without teeth and also termite have belling mouth part, the mouth part of the reproductive workers and the soldiers are similar. The antennae are filli form and comprises of 10-32 segment depending on the species.

In some generae there are large compound eyes, one each side of the head and also two part of similar wings which are membranous and possess a humeral sutun near the base which permits the breaking and shedding of wings. The abdomen consists of ten (10) segments with terys of chitinised plates (Brownman, 1935). At present, there are about 2000 species of termites belonging to different families known for their distribution and social behavior and also for their feeding behaviours and for the fact that they cause great losses in both tropical and sub-tropical region. The family *Termitidae* has sub-family *Macrotermitnae* and a genus *Macroterme subhyalinus*. In this family, its members show quite wide divergence in structure (Noirot, 1969). The hind wings do not bear an anal lodes, tarsi, are four segmented. The ocelli and fountenella are present, the protonum of the workers and the soldiers is narrow with raised anteriot lodes among this are the *Macrotermes*, *Aneptoctermes* and *Macrotermes* species. Like other social insects, individual members or there are four group of termites within a colony called castes. The castes have specific function and roles to play within the colony or each castes carrying out specific responsibility.

The reproductive castes are winged and swam during the raining season. When pair male and female shed their wings in a secure place and lay eggs and start a new colony and also the workers caste are generally smaller in size and bear no wings or with small reduce wing and they form a large group of individuals within a colony. The workers caste maintains cohesiveness in their nest, clean the nest, care for the youth and feed the queen. The reproductive potentials are depressed by the queen substance which they lick from the body

while cleaning the queen. The queen substances are transferred among the workers by the process of regurgitation. When the queen dies however some of the workers produce eggs. The forages are also workers which go out of the nest to find and collect food. The forages again recruit other workers, to source for food by scant trail from their colony to the food source (Wilson, 1965) and also the workers build and repair broken nest (Mamaham, 1970).

The soldier castes are specialized in structure and behavior for the defense of the colony particularly against attacks by other insects. In several generate the soldier's castes has a big head and a powerful mandible and defend the colony by snapping action (Kaiser, 1954) and also some soldiers attack some insect intruders with adhesive secretions of the salivary or frontal gland (Ernst, 1959). The queen in the colony produce all the eggs and initially produce 15-50 eggs which the few production increase the mature queen of the *termitidea* lay several thousand eggs per day. While in some of the primitive family e.g. *Kalotermo flavicolis* female reaches their full egg laying. Initially all eggs produced give rise to sterile workers but after a period of four years. In *Zootamopsis alate* reproductive are produced (Heath, 1927) 4 – 6 eggs produced because their colony range from 40 – 450 individuals, the sterile workers were produce so that they should build and extend the nests. Emerson, (1938) giving a general account of the nest structure in which the structure of the termietria and mode of construction are described, all this specific responsibilities includes the primary reproductively, and secondary reproductively, the sterile soldiers as well as the workers (Sands, 1960).

Also the adult winged reproductive (alates) after shedding their wings and mating may succeed in finding a new colony where the pair will become a king and queen (Harris, 1971). The king appearance remain similar to the alates but the queen will gradually develop a large abdomen over a period of years as capacity to produce eggs increase and also the workers are similar to adult but possess more highly chitinised heads. Their main function is to provide food for the colony and build the nests while the soldiers are most like the workers except that the head has greatly developed mandibles. Soldiers are usually rush to any damage portions of the termite mound to defend it against intruders and lastly soldiers of many species are capable of inflicting serious bites on human (Wagner, 1991). Termites are importance because of the damages they cause trees and plants, especially those of economic importance, timbers, agricultural products, and forestry building organic materials such as paper, fabrics, leather, and rubber and in fact anything produced from trees (Macgregor, 1950).

Assessment of losses of timber due to termites is not easy particularly in natural forest where selective filling is practiced. Macgregor (1950) stated that there is no literature either published literature or unpublished reports to suggest that termites constitute a serious forest pest except in the case of Eucalyptus plantation or forest nurseries where young saplings were killed by termites. The amount of damage that termites do to growing crops depends on the general level of agricultural practices. Delays in harvesting of crops such as groundnut, sorghum and maize may cause lodging and make them susceptible to termite attack while subterranean termites penetrate the roots and stems near ground level and hollow them out causing the plant to wilt (Wgniger, 1962). Building are not exempted from attacks as any unprotected timber used in construction work or as fitting unless unpalatable or it is naturally resistant to termite infestation are destroyed (Macgrego, 1950). Agricultural crops losses of up to 10% have been recorded in northern Nigeria more particularly in standing crops (Sands, 1960). Amitermes evanciter and microtermes species have been recorded from Nigeria (Harris, 1971). The amount of damage that termites do to growing crops depends on the general level of

agrocutural practice. Delays in harvesting crops such as groundnuts and maize may eventually cause them to lodge and make them susceptible to termite attacks (Harris, 1971). Destruction of trees of economic importance within a short time has been reported (Calwell, 1958). The influence of termite on tropical forestry according to Harris (1971) is of three folds:-

i. A reduction of seedling and saplings required for afforestation.
ii. The reduction in yield of timber from forest where termites are active in mature trees.
iii. The effect of termites on natural regeneration of woodlands.

Foresters in general appear to agree with the view expressed by Macgregor (1950) that there is nothing in published literature or unpublished reports to suggest that termites cause a serious forest pest except in eucalyptus plantation or in forest nurseries. He also related the fact that the economic consequences may however be serious. Termites are important in the restoration of the fertility of the soil. This is because in the process of mud building, soil materials are brought to the surface from the depth of 4 meters. Nutrient and soil particles are transferred to the surface (Francis, 1957) (Nye, 1955) estimated that in Ibadan at least 500kg of earth per acre mainly from creep horizon is deposited on soil by termite each year. (Holdaway, 1933) and (Cohen, 1933) reported that the mounds of *Entermes exitosus* contained 8 – 25% organic carbon in the outer wall and 44-53% organic carbon on the nest, these soil are beneficial to plant growth. The role of termite as decomposers of leaves and woods in southern Guinea Savanna of Nigeria, was investigated by (Collins, 1982) as part of a study on little dynamic of the area. He found that termite were able to remove about 60% of animals woodfall and 3% of animal leaf falls.

Termites have been found to feed exclusively on grasses of various kinds while others include dried grasses in their leaf of the appropriate season. For example, in Africa *Holotermes nossabicus* have been reported to cause complete denudation of grass cover at the end of the winter and in early spring coast on 1947. *Anacanthotermes alonerranus* is considered a pest of pasture with dense grass cover and loses of up to 20% (Glicoros, 1962). Dead wood for example, timber constitute a stable food for a large number of common termite such as *Crytotermis haviland* and *C. brevis* which destroy timber in West Africa (Williams, 1973). Dry wood termites are easily moved around the world in wooden furniture and shipping crates and therefore can easily be distributed to new areas. Wood is largely a mixture of cellulose and lignum in various stages of decomposition the ratio of lignum/cellulose varies plant species to plant species. Richard (1977) reported that various species of termites can use various material for example *Scalateru flavicollis* can digest 70-90% of cellulose whereas *Nasupitermes ephratae* may use over 90% of lignum. timber is important to building and fitting furniture, boat construction, create several other structures, some of these timbers have varying level of resistance to termite attacks based on natural occurring organic substance in the plant or hardness of time. Thus, the present study aimed to evaluate the effects of termites on woods of some economic trees.

Materials and Methods

The study was conducted in January 2017 at University of Maiduguri (11˚54 N, 13˚5 E). 30cm fresh Neem (*Azadirachta indica*) branch weighting 138.4g was obtained at the University of Maiduguri Campus and allowed to dry for a week until the weight was constant. 27cm fresh branch of Tamarind **(***Tamarindus indica*) weighting 133.9g was obtained at Government Day Secondary School premises, Maiduguri and allowed to dry for a week until the weight was constant. 30cm fresh branch of Eucalyptus (*eucalyptus camadulensis*) 75.1g in weight was

obtained at the University of Maiduguri Science Complex and was also allowed to dry for a week until the weights was constant. A termite mould was identified at the Works Department, University of Maiduguri and the dried weighted woods were placed carefully into the mond which was collected and weighted weekly for four (4) weeks using a weighting scale. The mean value of all data determined was compared using Turkey-Kramer multiple comparison at P>0.001 and all statistical analyses was performed using computer software STATISTIX 8.0.

Result and Discussions

Table 1: Weight loss of *Azadirchta indica, Tamarind indica* and *Eucalyptus camadulensis* exposed to termite infestation

Plant materials	Mean (x) initial length	Mean (x) weight loss			
		1st Week	2nd Week	3rd week	4th week
Azadirchta indica	28.83[a]	140.33[a]	107.69[a]	101.90[a]	09.57[a]
Tamarindus indica	26.67[b]	139.03[a]	125.87[b]	121.03[b]	111.47[b]
Eucalyptus camadulensis	30.67[a]	71.03[b]	54.07[c]	46.4[c]	37.73[c]

All figures are mean value of 3 different plant treatment in each column. Figure with the same letter are not significantly different at (P>0.001) using Turkey-Kramer multiple comparison.

The result of this study is given in table 1. This table shows that by the first week of keeping the wood in the termite mound, the termite had already started attacking the wood. By the end of the second week of the study, there was a significant decrease on weight of the test wood with *A. indica* 36.6g, in *T. indica* 10.3g and in *E. camadulensis* 25.5g. After this initial massive attack by the termite, the weight loss reduced significantly. For example in *A. indicate* the weight loss of 1 week of storage in the termite mounds shows that there are no significant differences between *A. indica* and *T. indicate* but there is significant difference between *A. indica* to *E. camadulensis* and to *T. indica* in table 1 while the second week of storage, show that there is significant differences at (P<0.001) between all the 3 samples ach of the plant treatments and also the third and the fourth week of the storage of wood in the termite mound show that there is significant different between the plant treatment. The result show that *E. amadulensis* is the most susceptible of the test wood to termite infestation followed by *A. indicate* and then *T. indica* was the most resistant of the test woods to termite among the three different samples of the test wood. Trees are the primary source of timber for various purposes, observations have shown that infested timbers are eventually destroyed by termite unless they are treated or have natural resistance to termites due to the chemicals they contain or the hardness of the wood. In the present study, *Azadirchata indica, Eucalyptus camadulensis* and *Tamarindus indica* were investigated according to their resistibility to termite attack. The result show that among the three woods types, *Tamarindus indica* was the most resistant with weight loss ranging from 10.3g at the second week of storage in the termite mound to 24.1g after 4 weeks of storage. *Tamarindus indica* was followed by *Azadirachta indica* with a range of 36.6 to 48.8g loss and Eucalyptus camadulensis was next and the least resistant losing 25.5g of its weight in two weeks to 38.4g after 4 weeks. The difference in their resistibility were significant at (<0.001).

Ocloo and Isher (1980) found eucalyptus to be resistant to termite. The presence of alleopogenic compunds such as monotapenoid lineole in *E. camadulensis* is toxic. Ocloo and Usher (1980), Musa (1996) also found *E. camadulensis* as the most resistant of the wood species infested. He also attributed this resistance to the toxic nature of the compound contained in *E.*

camadulensis. This is not the first report of its resistibility to termite attack. Ocloo and Usher (1980) and Musa (1996) reported resistance to termites. They attributed this resistance to the alkaloid substance contained in it. *A. indica* was found to be resistant contained in it. *A. indica* was found to be more resistant than *E. camadulensis* and *T. indica* the most resistant in the study. The resistibility may be due to some chemicals that contains e.g. Terpenoids. *T. indica* was the most resistant of the woods tested. Wolcott (1956) reported that the properties of the chemicals contained in these woods have great influence on their susceptibility to termites. For all the woods, all first 14 days witnessed the greatest loss in weight, after which the rate of weight loss decreased. This may not be unconnected with the fact that the first part of the wood to be exposed to the termite in the present study was the bark as the storage period increased, the hard wood was exposed, there was less eight loss Wolcott (1958) reported that there is higher concentration of chemicals in the hard wood than in the bark and that extracts of resistance hard wood have been used to impregnate palatable soft woods and so render the termite attack for long periods.

Conclusion

Base on the conclusion the paper foregoing discussion is an indication that some woods are resistant to termites. The wood will eventually succumb to termite infestation. This research have intensified some woods that are resistant to termite attack and future research can dwell more in the same or alternative line.

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