



## **Infestation of Termites on *Azadirachta indica* (Neem) in Forest Plantation of Wamakko Local Government in Sokoto, Nigeria**

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### **ABSTRACT**

Research was carried out to identify the occurrence and level of termite infestation in the study area. Simple cluster sampling technique was used to select the sample areas (A, B, C, D and E). Descriptive statistic was used to analyze the data obtained. A total number of ninety six trees were enumerated from the selected clusters, out of which 53% were infested while 46% trees were not infested with termites. In cluster A 40% of trees were infested with termites while 60% were not infested. In cluster B, 61.1% of trees were infested with termites while 38.9% were not infested. In cluster C, 40.9% were infested with termites while 59.1% were not infested. In cluster D, 52.6% were infested with termites while 47.4% were not infested and in cluster E, 70.6% were infested while 29.4% were not infested. The infestation was attributed to large debris of litters around the tree plants, damaged vegetative parts and closeness of tree stands which favor growth, development and spread of the insect pests. Control measures need to be developed through adjustment in silvicultural practices and/ or chemical method.

**Keywords:** Forest, Termites, Infestation, Cluster and Trees

### **INTRODUCTION**

The termites are group of social insects usually classified at the taxonomic rank of order Isoptera. As truly social insects, they are termed eusocial along with the ants and some bees and wasps which are all placed in the order Hymenoptera (Piper, 2007). Termites mostly feed on dead plant materials, generally in the form of wood, leaf litter, soil or animal dung, and about 10% of the estimated 4,000 species are economically significant as pest, that can cause serious structural damage to buildings, particularly in the subtropical regions and their recycling of wood and other plant matter is of considerable ecological importance (Robert, 1997).

As eusocial insects, termites live in colony that, at maturity, numbered from several hundred to several million individuals. They are prime example of self-organized system using swarm intelligence and use this cooperation to exploit food sources and environment that could not available to any insect acting alone (Van, 1997).

A typical colony contains nymphs (semi mature young), workers, soldiers and reproductive individuals of both genders, sometime containing several egg-laying queens (Calaby, 1970). Due to their wood eating habits, termites can do great damage to unprotected buildings and other wooden structures. Their habit of remaining concealed often results in their presence being undetected until the timber are severely damaged and exhibit surface changes. Once termites have entered a building, they do not limit themselves to wood, they also damage paper, cloth, carpets, and other cellulosic materials (Lobeck, 1989). A female termite that flown, mated, and remains in proximity to queen is called a king. At

maturity, a primary queen has a great capacity to lay eggs. The king grows only slightly larger after initial mating and continues to mate with the queen for life. This is very different from ants' colonies, in which a queen mate once with the male store the eggs for life, and the male ant die shortly after mating (Tilyard, 1937).

Termites' workers build and maintain the nest to house their colony. These elaborate structures are made using a combination of soil, mud, chewed wood, saliva and faeces. A nest has functions such as to provide a protected living space and to collect water through condensation (Ware, 2008)

The Neem tree is easily identifiable tree with a straight stem, usually evergreen which may exceptionally reach a height of 20m tall. *A. indica* tree may start flowering and fruiting at the age of 4-5 years, but economical quantities of seed are produced only after 10-12 years. Pollination is by insects such as honey bees. The flowering and fruiting season largely depend on location and habitat. Neem is widely distributed in several part of the world. The species adapted to hot and dry climates made it one of the most commonly planted species in arid and semi arid region. It is highly efficient in restoring soil productivity and improving the ecology of the area.

Termites are common pests of forest tree species; they attack various parts of trees such as roots, stems and resulting in serious damage, decline in trees vigour and subsequent death of trees. Trees that are seriously infested may die off especially if they are over stressed by the diseases caused by termites. This study was carried out to identify and examine the rate and level of infestation as well as damage on the infested Neem tree.

## **MATERIALS AND METHOD**

### **Study Area**

The study was conducted at the Sabon Gari Forest Plantation, located in Wamakko Government area of Sokoto state. The area is located on the latitude  $11^{\circ} 13' 13^{\circ}$  and longitude  $3^{\circ} 5' 7^{\circ}$ . The climate is semi-arid and characterized by alternating wet and dry season with a short cool and dry period, which starts in November and end in late February (Hassan and Bode, 1990).

The mean annual rainfall is about 700mm, ambient temperature ranges from  $14^{\circ}\text{c}$  during harmattan period to  $36^{\circ}\text{c}$  during the hot season (SERC, 2004). The natural vegetation of Sokoto is dominated by grasses with sparse trees of about 5 – 9m tall. Due to a combination of natural and human activities and continuous cultivation, little of natural vegetation remains in the area (Shinkafi, 2000).

### **Sampling Procedure**

The sampling procedure used in the study area was cluster sampling technique. Five clusters were selected, and each size of the selected clusters 10m x 10m in size. In each selected cluster, number of trees were counted, also number of tree infested and number of non infested trees were counted and recorded.

### **Data Analysis**

The data obtained was subjected to analysis using descriptive statistic tools such as percentage and frequency distribution to achieve the prescribed objective.

## **RESULT**

The result in Table 1 indicates that 40% of trees found in cluster A were infested while 60% of trees found in this cluster were free from the termite infestation. Table 2 indicates that 61.1% of trees found in cluster B were infested where 38.9% of trees found in this cluster were free from the termites' infestation. Table 3 indicates that 40.9% of trees found in cluster C were infested while 59.1% of trees found were free from the termite's infestation. Table 4 indicates that 52.62% of tree found in cluster D. were infested while 47.4% of tree found were free from termites infestation. Table 5 indicates that 70.6% of trees found in cluster E were infected while 29.4% of tree found were free from the termites infestation.

**Table 1: Result of Termites Infestation in Cluster A**

Level of infestation	Frequency	Percentage (%)
Infested Trees	8	40
Non infested	12	60
Total	20	100

**Table 2: Result of Termites infestation in cluster B**

Level of infestation	Frequency	Percentage (%)
Infested Trees	11	61.1
Non infested	7	38.9
Total	18	100

**Table 3: Result of termite's infestation in Cluster C**

Level of infestation	Frequency	Percentage (%)
Infested Trees	9	40.1
Non infested	13	51.1
Total	22	100

**Table 4: Result of Termites Infestation in Cluster D**

Level of infestation	Frequency	Percentage (%)
Infested Trees	10	52.6
Non infested	9	4.74
Total	19	100

**Table 5: Result of Termites Infestation in cluster E**

Level of infestation	Frequency	Percentage (%)
Infested Trees	12	70.6
Non infested	5	29.4
Total	17	100

**Table 6: Summary of Termites Infestation in the Cluster**

Cluster	No. of Trees Enumerated	No. of Trees infested	No. of non infested trees
A	20	8	12
B	18	11	7
C	22	9	13
D	19	10	9
E	17	12	5
Total	96	50	46

## DISCUSSION

Termites infestation has been found to be widely spread in the study area, they are pest of standing trees and damage timber structure in most tropical regions, this goes in line with finding made by Melanson (2003), that termites infestation is the infiltration of a termites' colony which typically result in damage to the infested structures, be it a tree, building, garden or crops.

The result from the study revealed that, termites have been found to infest eight trees species of Neem in cluster A. The result also shows that, termites seriously damaged the outer and inner part of the stem. This

goes in line with findings made by Ketende (1995) that bark – eating termites attack Neem seedling and saplings; they cover the tree trunk or stem with tunnels built of soil, plant fragments and saliva and gnaw away the bark underneath these tunnels. Termites infestation can occur once a food source is located where the colony can gather, this could be as a result of dead plants material within the area, this agrees with observation made by Creffield (1991) that accumulated dead wood or waste wood like stumps, tree tops or branches on or in the soil offers additional food for termites.

Result in cluster B revealed that, eleven tree species of Neem have been found to be infested by termites. They damaged the middle and lower portion of the stems of Neem. The result shows that, the middle and lower portion of the stems are tunneled and hollowed out by termites, which goes in line with finding made by Kayatha (1985) that termites eat into the stem and taproot of young saplings immediately below the soil surface, destroying the central roots portion and fill the resulting cavity with soil. Termite's infestation in this cluster is more severe than in cluster A, and this is as a result of trees of cluster A are spread, while trees in cluster B are closer to each than that of cluster A.

The result in cluster C shows that, nine tree species of Neem have found to be infested by termites, they covered the main Neem stems and do not cause serious damage. This agrees with the finding made by Messica (2003) that, tunneling damage may kill seedlings and saplings or ring-back trees when large cavities are eaten out of the trees. However, they do not cause damage when feeding on the established tree. Termite's infestation in this cluster is brought about by the presence of tree leaf litters and dead grasses within the area.

In cluster D termites have been found to infest ten trees species of Neem. They are found to damage the main stems of the Neem which may result to wilt or death of the Neem. This goes in line with observation made by Melansson (2003) that, termites may travel up through the roots in to trunk and branches. They eventually disrupt the movement of nutrients and water through the vascular system which result in death of the tree plant. Infestation of termites in this cluster is more severe than in cluster C as a result of some Neem barks are damaged and some branches are pruned. This is in consonance with finding made by Creffield (1991) that damaged bark of the residual tress, caused during tending, thinning and pruning invites termites.

The result revealed that, in cluster C twelve species of Neem were found to be infested by termites. They covered need trunks with tunnels build of soil and little damage this goes in line with finding made by Kayatha (1985) that, stem –eating termites attack a tree plant and cover the tree trunk with soil runways or soil sheeting, under which termites may be found. This cluster in the study area has much of death branches leaf litter and plants materials than other cluster; therefore, infestation is more severe within this cluster in the study area.

## CONCLUSION

In conclusion it has been found that termites' infestation on forest tree species is a worldwide problem in a forestry sector, particularly in the developing countries. As a result of inadequate and irregular inspection, occurrences of infestation are not noticed until a considerable damage might have taken place. This study revealed that termite infestation on Neem trees in Wamakko forest plantation is generally fair and tend to be more severe on the stems. Therefore possible management practices should be ensured so as to enhance the productivity of this forest plantation.

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