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FORAGING ACTIVITY AND DEGREE OF DAMAGE CAUSED BY SUBTERRANEAN TERMITES IN PAKHAL WILDLIFE SANCTUARY

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Seasonal foraging activity of subterranean termites on leaf litter and forest plants were observed in Pakhal Wildlife Sanctuary, Warangal (A.P.). Two distinct foraging patterns are identified in the species of termites. *Microtemes* sp and *Coptotermes* sp have strong foraging peak in the wet season. Whereas *Odontotermes* sp and *Macrotermes* sp have distinct foraging peak in dry season. The foraging activity depends upon Environmental factors were discussed.

Key words : Foraging, degree of damage, termites, Pakhal wildlife sancturary.

INTRODUCTION

A diverse species of termites are belonging to the order Isoptera.. They play a prominent part in the recycling of plant nutrients through the disintegration and decomposition of dead wood and plant debris. Seasonal changes in the abundance and species composition of tropical forest termites are poorly, studied despite the importance of termites in forest ecosystems (Matsumoto, 1976; Matsumoto & Abe, 1979; Lepage, 1982; Collins, 1989). Eggleton & Bignell (1995) discussed the importance of seasonal changes in termite abundance in tropical forest briefly. Key environmental factors affecting on seasonal foraging activity of termites was discussed (Haverty *et al.*, 1974; Lapage *et at.*, 1976). However, very little and scattered information is available on the seasonal diversity of termite foraging activity on trees grown in the forest ecosystem, and leaf litter on forest floor.

The present study, therefore, deals with the foraging of termites on forest floor, forest plantation was estimated by visual and photometric methods has been described by Health *et al.* (1964), but without using the litter bags.

Study area : The present work was carried out in the Pakhal Wildlife Sanctuary (located between altitude 17.42.5 and 18.10 North, between longitude 79.55 and 80.10 East) of the annual mean temperature 25°c and annual precipitation is 990mm. Soil are typically acidic (pH 4.0-7.5) the soil are low in organic matter.

MATERIALS AND METHODS

Intensive observations were made closely and carefully inspected for sign of termite foraging activity such as earthensheet covering, runways and galleries on tree trunks, fallen trees, pieces of logs, twigs of more than 2cm in diameter (woody debris) on forest floor. Termites were collected and preserved in 80% alcohol for identification.

The foraging activity of termites were recorded based on the penetration in wood and covering of earthen sheet following slightly modified method of Esenther & Beal (1974) and Beal *et al.* (1979) which is as follows:

0 = No damage
\+ = Plastering of earthen-sheet of about 5% of the stem of the tree
++ = Plastering of earthen-sheet of about 25% of the stem of the tree
+++ = Plastering of earthen-sheet of about 35% of the stem of the tree
++++ = Plastering of earthen-sheet of about 65% of the stem of the tree
+++++ = 90% portion of the tree was covered with earthen sheet

RESULTS AND DISCUSSION

(i) *Qualitative Composition* : Seven species of termites were recorded in three-year study period. (Table I) which belonging to two families *viz.* Termitidae and Rhinotermitidae. In *Termitidae Odontotermes feae* (Wasmann), *Odontotermes wallonensis* (Wasmann), *Odontotermes obesus* (Rambur), *Odontotermes brunneus* (Hagen), *Macrotermes* spp., *Microtermes obesi* (Hagen), in Rhinotermitidae *Coptotermes heimi* (Wasmann) were recorded. Of the termites *O. wallonensis* and *O. brunneus* were found as the most foraging species attacking trees and woody debris.

Table I : Foraging activity and degree of damage caused by subterranean termites in Pakhal wildlife sanctuary.

Termite species	Foraging activity at forest floor	Degree of damage in different plants
Odontotermes feae	+++	+++
O. wallonensis	++	+
O.brunneus	+++	+
O. obesus		
Macrotermes sp		
Microtermes obesi		
Coptotermes heimi	+++	+++

\+ : 5% above; ++ : 25% above; +++ : 35% above.

(ii) *Foraging patterns of termite species* : From the point of view of damage to plants three types of foraging behavior observed in natural forest area.

- The termites climb up standing living trees, which is cut down into small pieces of bark and carried back to the nest. *O.feae., O.wallonensis, O.obesus, O.brunneus* feed largely in this way and *M. obesi* partly so. The termites construct runways and earthen sheets of soil over the trunks and consume the dead wood under the protective cover of soil. This type of foraging is characteristic of *Odontotermes sp.*

- Dead leaf litter, woody litter lying on the forest floor is carried back to the nest. *Odontotermes* sp traveling from their nests via subterranean galleries to the soil surface where the emerge from holes and travel on soil surface to source of food. They either consume the dead litter under the protective cover of soil or emerge for short distance to carry pieces of grass back to the nest. *Macrotermes* sp forage on the leaf litter without constructing a protective cover of soil. This type of feeding behavior removes leaf litter and woody litter on forest floor.

- The foraging patterns of *C. heimi* made their nests in and around fallen trees, tree stumps and dead part of living tree trunks. Its foraging was mainly confined to the inside sap and heartwood that have been hollowed out and filled with the carton material. *C. heimi* being a xylophagous species attacked both living trees and dead wood of several species of trees lying on the forest floor.

Table II : Diversity of termites and their pattern of damage during foraging activity in natural forest area of Pakhal Wildlife Sanctuary.

Termite species	Species of plants damaged	Intensities of damage	Plant parts damaged
Family I : Termitidae	*Garuga pinnata* Roxb.	+++++	Root and Stem (Live & dead)
Odontotermes feae (Wasmann)	*Semecarpus anacardium* Lf.	+++	Stem (Live)
	Terminalia arjuna	++	Stem (Live)
	Dichrostachys cinera (L)	+++	Stem (Live)
	Tectona grandis	+++	Stem (Live)
Odontotermes wallonensis (Wasmann)	*Anogeissus latifolia* (Roxb. Ex DC)	++++	Stem (Live)
	Boswellia serrata	++	Stem (Live)
	Tectona grandies	+++	Stem (Live)
	Tectona grandis	+++	Stem and branches (Live & dead)
	Chloroxylon swientenia DC	++	Stem (Live)
	Madhuca indica	+++	Stem (Live)
Odontotermes brunneus (Hagen)	*Xylia xylocarpa*	++++	Stem and branches (Live)
	Madhuca indica	+++	Stem (Live)
	Tectona grandis	+++	Stem and branches (Live)
	Casia fistula L.	++++	Stem (Dead)
	Gmelina arborea	+++	Stem and branches (Dead)
	Albizzia odorattisima	++++	Stem (Dead)
	Haldinia cardifolia (Roxb.)	++	Stem and branches (Live)
	Zizipus xylopyus	+++	Stem (Live)
	Ixora arborea Roxb.	++	Stem (Live)
Family II : Rhinotermitidae *Coptotermes heimi* (Wasmann)	*Tectona grandis*	++++	Root and stem (Live)
	Lagerstroemia parviflora Roxb.	++++	Stem (dead)
	Cleistanthus collinus	++	Stem (Live)
	Lannea coromandelia	++	Stem (Live and dead)
	Phyllanthus emblica L.	+++	Stem and branches (Live & dead)
	Diospyros melanoxylan	+++	Stem (Live & dead)

The foraging activity of *O. brunneus* was recorded on *Tectona grandis* and *Xylia xylocarpa* earthernsheet being plastered upto 5-6 m in the stem and branches. The foraging of *O. wallonensis* on *T grandis* and *Anogeissus latifolia* was found under the earthen sheet extended upto 6-7m on the stem The damage of *0. feae* recorded on the stem of *Garuga pinnata*. It damaged upto the sapwood in both the living and dead trees and filled the damaged part with mud. Besides a number of irregular chambers of varied size were recorded under the earthern sheet on the surface of the stem.

Both observed termite abundance and species richness was generally higher during the dry-season and lower during the wet season. Seasonal variation in wood litter accumulation was considerable, with a maximum in March/April leaf litter accumulation was also seasonally variable with major peak in March/April/ May (dry season) the wood leaf litter consumption reflect seasonal foraging patterns on the type of food.

Results indicated that the foraging activities of subterranean termites in rainy season was the highest and slightly decreased at the end of rainy season in cool-dry season the activity further decreased, while the lowest activities were observed in hot dry season.

Odontotermes species will feed on tree bark in the dry season, and are mainly active in the dry season when leaf litter and woody litter is abundant Termite other than *Macrotermitinae* were of minor importance as consumers of fallen wood and leaf litter on the forest floor. *Coptotermes heimi* showed highest activity followed by *Microtermes obesi.*

Climate factors especially rainfall that declined soil temperature and increase soil moisture and relative humidity might influenced the foraging patterns and increasing foraging activity of subterranean termites (Collin *et al* 1973, La Fage *et al.,* 1976 and Block & Wood, 1989).

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