

Bio-diversity of Termites in Bhadrachalam Forest Region, Khammam District, Andhra Pradesh

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ABSTRACT Termites are an integral part of the extensive subterranean fauna of tropical forests. They play a very important role in forestry and fall into two distinct divisions such as termites that play a beneficial role and termites that cause injury to forestry termites diversity and that cause injury to forestry are discussed in this paper. The study was conducted with an objective of investigating the termite species diversity in Bhadrachalam region of Dhadakarnyam forest in Khammam district, Andhra Pradesh. Termites were sampled with a standardized 100x2 m straight belt transect at three undisturbed forest sites. A total of 13 species were collected from different parts of the plants, on dead wood litter, dead tree stumps and leaf litter, logs and living trees

INTRODUCTION

The Asian tropical forests are known for their rich fauna particularly the termites due to the role they play in the recovery of forest ecosystems (Davies et al. 1999). They provide a range of ecosystem services: decomposition, carbon and nitrogen cycling, soil structuring and the stimulation of microbial activity (Wood and Sands 1978; Donovan et al. 2002; Sugimoto et al. 2000). The termite assemblages in forests are very sensitive to habitat disturbances like fire, forest clearance (Davies et al. 2003; Eggleton et al. 1995, 1996). Indian sub-region comprising as whole India, Pakistan, Nepal, Bhutan, Bangladesh, Burma and Sri Lanka, 337 species of termites in 59 genera have been listed and comprehensively described by Roonwal and Chhotani (1989) and Chhotani (1997), Bose (1984) and reported 95 species of termites in five families and their distribution in Southern India. Termite diversity generally declines with increased elevation like temperature, is an important factor for termites. Various termites functional groups respond differently to temperature, due to their different feeding habits (Davies et al. 2003; Inoue et al. 2006). Although temperature is often considered the key factor influencing termites diversity, rainfall can have negative effect on termites species richness and abundance in tropical rain forest systems (Bignell and Eggleton 2000). Termite damage to living trees in forest ecosystem is relatively poorly described. The aim of this study is to investigate diversity of

termite and their damage to living trees of forest region of Bhadrachalam in Dandakarnyam forest.

MATERIAL AND METHODS

Study Area

Bhadrachalam is situated in an area which once formed part of the Dandakarnyam forest. The forest is the area comprising about 144603 ha either side of the Godavari River located between latitudes 17.67 N 80.53 E and elevations ranging from 50m (160ft). The area is characterized by hot humid and temperature climate with a mean annual rainfall 1361.22 mm the max. Temperature 50^o C for the period of 2008 – 2010.

Sampling of Termites

Standardized transect method of Jones and Eggleton (2000) was used for sampling termites. A belt transect (2x100m) was laid in each forest zone. Each transect was divided into 20 (2x5m) sections and each section thoroughly searched for termites. Within each section the following microhabitats were searched, surface soil, leaf litter and humus on the forest floor, inside dead logs, tree stumps, branches, twigs subterranean nests, mounds, earthen sheetings and runways on trees up to height of 2m above ground. Mainly soldier and worker castes were collected from the different microhabitats. In addition to sampling, random collections of termites were col-

lected in several areas within the forest for species determination. Termite specimens collected for identification were stored in 80% isopropyle alcohol.

RESULTS

A total of thirteen termite species were collected in different habitats of the study area. They are belonging to six genera and two families viz., Termitidae and Rhinotermitidae (Table 1).

Out of 13 species, 11 species of were identified as pest of the plants. Among pest species *O. obesus* ranks top and had 24% percent followed by *O. brunneus* (16%) *O. redemanni* (13%) *O. wallonensis* (12%) *Heterotermis indicola* (6%) *Microcerotermes bee soni* (6%) *O. guptai* (5%) *Coptotermes hemi* (4%), *Microtermes obesi* (3%) *O. feae* (2%) *O. indicus* (1%) (Fig. 1).

O. obesus is the predominant species in Bhadrachalam forest region severely damaging

Table 1: Diversity of termite species recorded in the Bhadrachalam forest region.

Family	Sub family	Name of the species
Termitidae		<i>Odontotermes brunneus</i> (Hagen)*
		<i>Odontotermes feae</i> (Wasmann)*
		<i>Odontotermes guptai</i> (Roonwal and Bose)*
	Macrotermitinae	<i>Odontotermes indicus</i> (Thakur)*
		<i>Odontotermes obesus</i> (Rambur)*
		<i>Odontotermes redemanni</i> (Wasmann)*
		<i>Odontotermes wallonensis</i> (Wasmann)*
		<i>Macrotermes convulsionaries</i> (Konig)
		<i>Microtermes obesi</i> (Holmgren)*
		<i>Microcerotermes beelsoni</i> (Snyder)*
Rhinotermitidae	Termitinae	<i>Coptotermes hemi</i> (Wasmann)*
	Coptotermatinae	<i>Heterotermes indicola</i> (Wasmann)*
	Heterotermitinae	

*Termites causing damage to trees

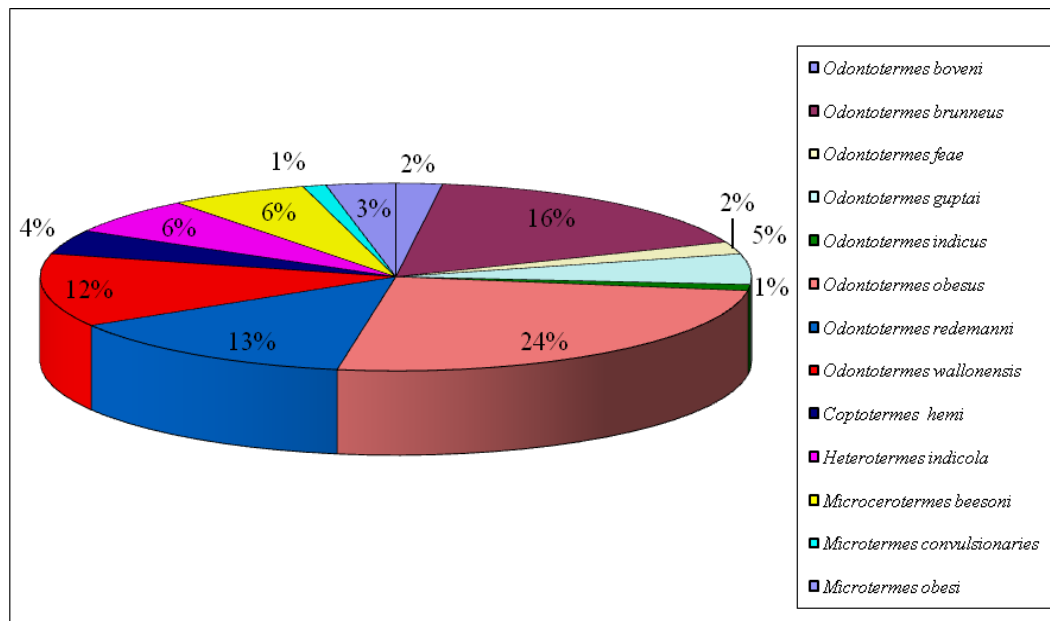


Fig. 1. Species identified as pest of the plants

Table 2: Termites were damaging tress in Bhadrachalam forest region of Dhandakarnyam forest

<i>Termite species</i>	<i>Plant species</i>	<i>Intensity of damage</i>	<i>Damage of plant parts</i>	
<i>Odontotermes brunneus</i> (Hagen)	<i>Tectona grandis</i>	+++++	Stem (live)	
	<i>Polyalthia longifolia</i>	++++	Dead stem	
	<i>Terminalia arjuna</i>	++++	Dry log	
	<i>Albizia amara</i>	+++	Dry wood	
	<i>Miliusa tomentosa</i>	++++	Stem (live)	
	<i>Dalbergia paniculata</i>	+++	Dry wood	
	<i>Hardwickia binata</i>	+++	Stem (live)	
	<i>Buchanania lanzan</i>	++++	Stem (live)	
	<i>Madhuca indica</i>	+++	Dead wood	
	<i>Acacia chundra</i>	+++	Dry part of tree	
	<i>Lagerstroemia parviflora</i>	+++++	Dry part of branches	
	<i>Odontotermes obesus</i> (Rambur)	<i>Ixora pavetta</i>	++++	Live bark
		<i>Bridelia retusa</i>	+++++	Dead wood
		<i>Chloroxylon swietenia</i>	++++	Stem (dry)
<i>Madhuca indica</i>		+++++	Dry branches of tree	
<i>Senna auriculata</i>		+++	Dry wood	
<i>Albizia odoratissima</i>		++++	Stem (dry tree)	
<i>Lannea coromandelica</i>		++++	Dead wood	
<i>Azadirachta indica</i>		+++	Stem (live)	
<i>Alangium salvifolium</i>		+++	Dead wood	
<i>Grewia tilaefolia</i>		++++	Fallen leaves	
<i>Schleichera oleosa</i>		+++	Dead stem	
<i>Morinda pubescens</i>		+++	Stem (live)	
<i>Anacardium occidentale</i>		+++++	Stem (live)	
<i>Anogeissus latifolia</i>		++++	Dry bark	
<i>Miliusa tomentosa</i>		++++	Stem (dead)	
<i>Senna auriculata</i>		++++	Stem (live)	
<i>Odonotermes indicus</i> (Thakur)		<i>Tectona grandis</i>	+++++	Dry stem
	<i>Miliusa tomentosa</i>	+++	Dead wood	
	<i>Albizia odoratissima</i>	+++	Dead wood	
	<i>Lagerstroemia parviflora</i>	+++++	Dry wood	
	<i>Anogeissus latifolia</i>	++++	Stem (dead)	
<i>O. feae</i> (Wasmann)	<i>Syzygium cumini</i>	++++	Stem (live)	
	<i>Schleichera oleosa</i>	+++++	Stem (live)	
	<i>Lagerstroemia parviflora</i>	+++++	Dead wood	
	<i>Senna auriculata</i>	+++	Bark (live)	
	<i>Acorus calamus</i>	++++	Stem (live)	
	<i>Terminalia alata</i>	++++	Dead wood	
	<i>Buchanania lanzan</i>	++++	Stem (live)	
	<i>Anogeissus latifolia</i>	++++	Stem (live)	
	<i>Boswellia serrata</i>	++	Stem (live)	
	<i>Tectona gradis</i>	+++	Stem (live)	
	<i>Chloroxylon swietenia</i>	++	Stem (live)	
<i>O. wallonensis</i> (Wasmann)	<i>Madhuca indica</i>	+++	Stem (live)	
	<i>Miliusa tomentosa</i>	+++	Bark (live)	
	<i>Syzygium cumini</i>	+++	Dead (stem)	
	<i>Premna tomentosa</i>	+++	Dead (wood)	
	<i>Anogeissus latifolia</i>	++++	Stem (live)	
	<i>Buchanania lanzan</i>	+++	Dead stem	
	<i>Cleistanthus collinus</i>	+++	Dead wood	
<i>O. redmanni</i> (Wasmann)	<i>Tectona grandis</i>	+++	Stem (live)	
	<i>Polyalthia longifolia</i>	++++	Dead wood	
	<i>Terminalia alata</i>	+++++	Stem(live)	
	<i>Senna auriculata</i>	+++++	Stem (live)	
	<i>Wrightia tinctoria</i>	+++	Stem (dead)	
	<i>Terminalia arjuna</i>	+++	Bark (live)	
	<i>Tectona grandis</i>	+++	Stem (dead)	
<i>O. guptai</i> (Roonwal and Bose)	<i>Limonia acidissima</i>	+++	Dead (stem)	
	<i>Manilkara hexandra</i>	+++	Dead (wood)	

Table 2: Contd...

Termite species	Plant species	Intensity of damage	Damage of plant parts
	<i>Cassia fistula</i>	+++	Stem (dead)
	<i>Premna tomentosa</i>	++	Dry bark
	<i>Terminalia bellerica</i>	+++	Dead stem
<i>Microcerotermes beelsoni</i> (Snyder)	<i>Calycapteris floribunda</i>	+++++	Dead wood
	<i>Terminalia alata</i>	+++	Live stem
<i>Heterotermes indicola</i> (Wasmann)	<i>Anogeissus latifolia</i>	+++	Dead wood
	<i>Dalbergia sissoo</i>	+++	Dead wood
<i>Coptotermes hemi</i> (Wasmann)	<i>Tectona grandis</i>	++++	Root and stem (live)
	<i>Lagerstroemia parviflora</i>	++++	Stem (dead)
	<i>Cleistanthus collinus</i>	++	Stem (live)
	<i>Lannea coromandelica</i>	++	Stem (live and dead)

many trees plants and they ordinarily attack at the ground level. Generally all forest plants are severely attacked on the bark externally thus contributing to the gradual death of the standing trees, as also observed by Roonwal (1955). In the case of teak trees in Uttar Pradesh the damage by termites species *C. hemi* and *H. indicola* were observed in the dead stumps and logs and dry part of the standing trees. The attack often penetrates into sound wood adjoining the rotten wood.

The damage caused by subterranean termites to trees can be recorded by partly removing the bark of roots, and above the ground by removing the dead bark of the trunk under the steller of narrow run ways or broad earthen sheets. The extending natural cracks, other wounds in the bark can be seen by exposing the living cambium and after desiccation and partial decay is further destroyed.

DISCUSSION

Termites fauna of the world is estimated to be around 2,761 species distributed over 11 families and 288 genera (Miles 1998). Indian termites fauna share a very small portion of the global fauna that is 240 species.

Termites play an important role in the ecosystem and some species certainly improve the fertility of soil (Pearce 1997). At the same time some species cause extensive damage to wood work in buildings, agricultural crops and forest trees in India and many other countries of the world (Sensarma et al. 1975; Akhtar 1983; Akhtar and Shahid 1988, 1990)

Termite fauna in India is fairly well known and 80 species of termites have been recorded so far (Roonwal 1970). Detailed studies about the abundance of different species of termites in

different habitats have not been carried out. The termites of the genus *Macrotermes* were found actively feed on only a twig litter or forage inside dead trees, trunks and were found to forage on live trees consuming only dead tissues. However, *C. hemi* and *H. indicola* were observed foraging on dead parts of the living trees and dead tree trunks. Thus termites play a very important beneficial role in forestry and also cause injury to forestry.

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