

## DIVERSITY AND MICROHABITATS OF TERMITES (INSECTA: ISOPTERA) AT THE *UDAWATTAKELE* FOREST SANCTUARY, KANDY

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### Introduction

The termite fauna of Sri Lanka is represented by 58 species in 28 genera (Sands, 1975). Termites play an important role in tropical forests as major decomposers of plant matter and plant litter and thereby play a central role in nutrient recycling. Termites exhibit a wide range of foraging and nesting habits. Furthermore, among insects termites are considered as bioindicators in forest ecosystems. *Udawattakele* forest was a part of the castle premises during the Kandyan kingdom. During the British era it was used for military and aesthetic purposes. It was declared a Forest Sanctuary in 1938. The Forest Sanctuary is 105 ha in extent and located at 500-600 m elevation. Within it are located ancient and recent Buddhist temples and hermitages. The forest being a secondary rain forest harbours dense vegetation comprising mostly of about 30 forest tree species that form two canopy layers. The ground vegetation is sparse consisting mostly of seedlings and the ground is covered by a thick layer of leaf litter in different stages of decomposition. Very little sunlight reaches the ground surface inside the forest. Foot paths and roads meander through the forest reserve. The objective of this preliminary study was to document the diversity and microhabitats of

termites inhabiting the different areas of the *Udawattakele* Forest Sanctuary.

### Materials and Methods

#### *Study methods: Random collections*

In representative areas within the forest, termites were randomly collected by carefully searching all likely microhabitats including live trees up to 2 m height. Termites collected were preserved and identified using taxonomic keys and descriptions of Roonwal & Chhotani (1989) and Chhotani (1997).

#### *Sampling*

Termite diversity was determined by sampling two belt transects (2 x 100 m each). Each transect was divided into 20 (2 x 5 m) sections and each section was sampled by 2 persons for 30 min. where all known microhabitats of termites were examined. The number of encounters with termites (hits) within a transect was taken as the relative abundance of species within that transect. An encounter is the presence of a species in one section (5 x 2 m) of the transect. Diversity was compared using Shannon Diversity Index. The adequacy of transect sampling was estimated using species accumulation curve.

## Results

The collected termites were identified to 23 species in 5 genera belonging to 2 families and 2 subfamilies (Table 1). Five morphospecies collected could be identified only up to family (F.Termitidae) as the sample contained only workers. Of the termites, 12 spp. were collected from both methods, while 14 spp. were recorded only from sampling and 2 spp. only from random collections. Majority (16 spp.) belonged to the genus *Odontotermes*. Other genera recorded were *Bulbitermes* (2 spp.), *Hospitalitermes* (1 sp.), *Nasutitermes* (3 spp.) and *Glyptotermes* (1 sp.). Termites of the genus *Nasutitermes* was the most abundant in both transects, with *N. ceylonicus* (16 hits) followed by *N. fletcheri* (10 hits) and *Nasutitermes* sp. 1 (7 hits).

Microhabitats of collected termite species comprised; (A) tree stumps & logs (16 spp.), (B) fallen branches

and twigs (14 spp.), (C) leaf litter & humus (14 spp.), (D) runways on trees (11 spp.), (E) soil (7 spp.) (F) arboreal nests (1 sp.) (Table 1). The 3 *Nasutitermes* species were present in all the microhabitats except arboreal nests. *Hospitalitermes monoceros* foraged uncovered over the ground and across gravel roads. Absence of termite mounds within the sanctuary was a significant observation.

The termites recorded represented different functional groups based on known feeding habits and included wood-feeders (<sup>ψ</sup>), soil/wood interface-feeders (<sup>⊙</sup>), fungus-growers & feeders (\*) and lichen feeders (°) (Table 1). Species Diversity of termites in Transect 2 (H'=2.368) was higher than in Transect 1 (H'=2.148). Data from 40 sampled sections (2 transects) gave a species accumulation that increased progressively (Figure 1).

**Table 1. Details of termites recorded from Udawattakale forest sanctuary**

### Family Kalotermitidae

1. *Glyptotermes* sp.1<sup>ψ</sup> (C)

### Family Termitidae

#### Subfamily Nasutitermitinae

2. *Bulbitermes* sp. 1<sup>⊙</sup> (B, C)
3. *Bulbitermes* sp. 2<sup>⊙</sup> (A)
4. *Hospitalitermes monoceros*<sup>°</sup> (D, F)
5. *Nasutitermes ceylonicus*<sup>⊙</sup> (A,B,C,D,E)
6. *N. fletcheri*<sup>⊙</sup> (A, B, C, D,E)
7. *Nasutitermes* sp. 1<sup>⊙</sup> (A, B, C, D, E)

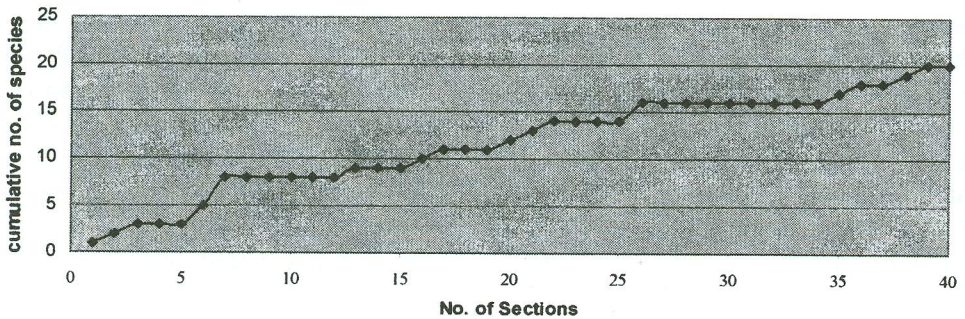
#### Subfamily Macrotermitinae

8. *Odontotermes assmuthi*\* (D)
9. *O. bellahunisensis*\* (A, B, D)

10. *O. ceylonicus*\* (C)
11. *O. escherichi*\* (D)
12. *O. feae*\* (A, B, D)
13. *O. globicola*\* (C, D, E)
14. *O. guptai*\* (B, C, E)
15. *O. hainanensis*\* (A, B, C, E)
16. *O. horni*\* (A, B, C,)
17. *O. obesus*\* (A, B, C)
18. *O. redemanni*\* (B, C)
19. *Odontotermes* sp.2\* (A, B)
20. *Odontotermes* sp.5\* (A)
21. *Odontotermes* sp.6\* (A)
22. *Odontotermes* sp.7\* (A, B, D)
23. *Odontotermes* sp.8\* (D)

(A-F) - Microhabitats of termites

Super scripts – Represent feeding habits



**Figure 1. Species accumulation curve for termites in 2-transects in Udawattakele.**

### Discussion

The 23 termite species identified included four previously unrecorded species; *N. fletcheri*, *O. bellahumisensis*, *O. guptai* and *O. hainanensis*, from Sri Lanka. The rich representation of the family Termitidae (22 spp.) at this site is in accordance with its wide distribution amounting to ¾ of the world species. Similarly the large representation of the genus *Odontotermes* (16 spp.) confirms its status as the most specious genus in Sri Lanka (Sands, 1975). Among the known microhabitats of termites, absence of mounds is an indication of the absence of *Hypotermes obscuriceps*, a common mound building termite in Sri Lanka, in *Udawattakele*. Of the known tree nesting species at the site (6 spp.), only nests (3) of *Hospitalitrmes monoceros* were seen at an observable height. Genus *Nasutitermes* is known to feed on highly decayed wood, hence their high abundance in this forest site with tree stumps, logs, fallen branches and twigs. Slightly high Diversity Index obtained for transect 2 can be attributed to the thick leaf litter

content and moist conditions favourable for termites. Sampling being a more rigorous collection method, recorded more species than random collections with equal effort. Progressive increase and plateauing of species accumulation curve (Figure 1) indicate that transect protocol is a reliable estimate of termite diversity in a forest.

### References

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