

Occurrence And Distribution Of Mound Building Termites In And Around Kuvempu University Campus, Shimoga, Karnataka State, India

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Abstract

Three mound building termites, viz., *Odontotermes wallonensis*, *Odontotermes obesus* and *Odontotermes redemanni* Roomwal and Chhotani (1960), were identified from Kuvempu University campus, Jnana Sahyadri and adjacent Bhadra reservoir area. The shape of the mound of *O.obesus* was conical and extended vertically, consisting of one or more hallow conical turrets erected on the surface of the ground. Royal chamber in the mounds was usually placed at the base just beneath the fungus garden. The structure of mound of *O. wallonensis* was dome shaped with one or more turrets extended horizontally the wall of the turret was thin and smooth. The shape of the turrets were more in number, scattered on the ground with numerous vaults. In the established old mounds the fungus garden was enclosed in the vaults. The shape of the fungus garden was dome shaped and its colour was blackish-brown. The location of the royal chamber was excentric. The mound of *O. redemanni* was dome shaped with one or more turrets extended horizontally, low in height without any buttresses. The outer mound wall was thick, solid and devoid of openings. The fungus garden was situated in separate chambers which served as egg depository. A well developed royal chamber was located below the ground level. The occurrence and distribution of termites and their mounds in the area revealed that the rich humidity and cellulose material available supported the high density of termites.

Key words : *Distribution, Occurrence, Odontotermes obesus, Odontotermes redemanni, Odontotermes wallonensis, Bhadra reservoir area.*

Introduction

There are about 2000 species of identified termites around the world. Termites are soft bodied insects which are found in temperate and tropical countries. They are social insects having fascinating social behavior. According to Emerson (1959), out of 2000 species in the world there are 300 species known from Indian region. of the several genera found in India the genus *Odontotermes* is the dominant and so far 40 species have been described under this genus (Sen Sarma 1962). The process of construction of the mounds by termites has been studied by Luscher (1956). Weidner (1956), has illustrated the structure of nest of macrotermitinae. Most of the macrotermitinae nests were found completely beneath the ground level. Termites of the genera, *Odontotermes* and *macrotermes*, however, construct surface mounds which vary in structure among different species and sometimes within the same species in different areas (Weesner, 1969; Noirot, 1970).

The process of mound construction in termites is quite interesting and fascinating. The mound nests are constructed from the soil mixed with organic materials. The principle structural building material is made from the combination of soil particles and saliva. The second material known as carton is made of saliva and fecal pellets and which is usually used to build the partitions within the nest. Soil particles are selected, transported, rearranged, cemented together and mixed with organic matter Lee and Wood (1971). There are about a dozen species of termites occurring in Karnataka state. Roonwal and Chhotani (1960), reported the mound building species *Odontotermes obesus*, *Odontotermes redemanni* and *Odontotermes wallonensis*. Basalingappa (1972), reported the *Odontotermes feae* in and around Dharwad. The nesting pattern of the termites *Odontotermes obesus* (Rambur) and *Odontotermes wallonensis* (Wasmann) (Isoptera: Termitidae) was also reported in and around Dharwad. The colony foundation and development pattern of young and established nests of *Odontotermes obesus* and *Odontotermes wallonensis* was investigated (Veeranna and Basalingappa, 1989).

Occurrence, nature and structure of the mounds of the termite *Odonototermes brunneus* (Hagen) from Belgaum District was researched by Patil and Basalingappa (1993). The present investigation makes an attempt to study the occurrence and distribution of mound building termites in and around Kuvempu University campus and adjacent Bhadra reservoir area.

Materials And Methods

The present investigation deals with the study of mound building termite diversity and structure of mounds. For the present study, the elevated study areas such as (i) Kuvempu University, Jnana Sahyadri Campus, (ii) Bhadra reservoir area adjacent to University campus were selected. These two areas are characterized by landscape with a few small streams and channels. The area is situated between 75° - 15' and 75° - 50' eastern longitude, 13°-25' and 13°-50', northern latitude, the average annual rainfall in the study areas varies from 1200 mm to 2600 mm. It receives maximum rainfall during the months of June-July, temperature ranges from 10°C in winter to 32°C in summer and humidity of this area is 73% in monsoon, 82% in summer and 65-68% in winter. These areas exhibit red rocky and black cotton soil. Survey of the above mentioned areas was carried out for investigating the occurrence, nature, structure of the mound and number of the mounds of different species viz., *Odontotermes wallonensis*, *Odontotermes obesus* and *Odontotermes redemanni*. To count the termite mounds of different species indirect counting and look See method (William, 1997) was adopted a suitable point is selected and all the visible mounds are counted. With this method a high level of accuracy at a given time was obtained.

Results

A survey on occurrence and distribution of termites in and around Kuvempu University campus was conducted during the month of February-March 2004. The Kuvempu university campus sheltered 3 species of mound building termites. All the three identified species of termites belongs to the genera *Odontotermes* viz., *Odontotermes obesus*, *Odontotermes wallonensis* and *Odontotermes redemonni* of which *Odontotermes obesus* was found to be more abundant (Table-1 and Fig-1).

Mound Structure

The mound building termites, viz., *O. wallonensis*, *O. obesus* and *O. redemanni* were identified from Kuvempu University campus, Jnana Sahyadri and adjacent Bhadra reservoir area. The shape of the mound of *O. obesus* was conical structure consisting of one or more hollow conical turrets erected on the surface of the ground. The mound structure of *O. wallonensis* was dome shaped with one or two turrets; the wall of the turret was thin and smooth. The shape of the turrets was conical and turrets were more in number and scattered. The mounds of *O. redemanni* were dome shaped low in height without any buttresses. The outer mound wall is thick and solid and devoid of openings.

Internal Structure

Odontotermes obesus

The thickness of the wall of the turrets in the young mounds was 0.8 to 2.8 cm. The turret wall mostly possessed the aeration pits. Royal chamber in the young mound nest was usually placed at the base of the mound just beneath the fungus garden. The established old nests were complicated with various structures such as, galleries, vaults, runways etc., the mound nest was found growing in vertical direction in conical shape. The different chimneys of the mound were communicated with galleries. In the established nests the colour of the fungus garden was blackish-brown spread around the royal chamber where the masses of eggs were observed.

Odontotermes wallonensis

The wall of the turret was thin and smooth. The shape of the turrets was conical and more in number and scattered on the ground with numerous vaults, the number also varies. The fungus garden was present in the vaults. The shape of the fungus garden was dome shaped and its colour was blackish-brown. The locations of the royal chamber in the nests was excentric.

Odontotermes redemanni

The outer mound wall was thick and solid and devoid of openings. The fungus garden situated in separate chamber served as egg depository. A well developed royal chamber was constructed below the ground level. It measured 24.5 cm in length and 18 cm in breadth. Numerous pinholes of 1-2 cm in diameter connect the royal chamber to outside through which only workers and soldiers could move.

Royal Chamber

Odontotermes obesus

Royal chamber in the young mound nest of *Odontotermes obesus* was usually placed at the base of the mound just beneath the fungus garden. The location of the royal chamber in the established nests was comparatively big, thick having existed and entrance holes of 2 to 5 mm in diameters and its length and breadth were ranging from 11.80 ± 0.84 cm and 9.50 ± 0.55 cm respectively. The fungus garden in the established nests was found situated around the royal chamber. Normally only one royal chamber was found in each mound and it was very well protected. The length and weight of the queen and king was 5.56 ± 0.46 cm, 8.46 ± 1.02 gm and 0.68 ± 0.054 cm, 181 ± 18.84 mg respectively (Table-2).

Odontotermes wallonensis

The royal chamber of young mounds of *Odontotermes wallonensis* (Photo-5) was found situated at the base of the mound nests beneath the fungus garden. The locations of the royal chamber in the nests were excentric. The length and breadth of the royal chamber was 23.35 ± 0.71 and 17.46 ± 0.48 cm respectively. The length and weight of the queen and king is 8.10 ± 0.51 cm, 9.27 ± 1.31 gm and 1.60 ± 0.31 cm, 196 ± 11.85 mg respectively (Table-2).

Odontotermes redemanni

A well developed royal chamber was situated below the ground level. The royal chamber measured 24.94 ± 0.80 cm in length and 18.69 ± 0.81 cm in breadth. Numerous pinholes of 1-2 cm in diameter connected the royal chamber to outside through which only workers and soldiers could move. The length of the queen was 8.16 ± 0.37 cm, weight was 10.18 ± 1.20 gm whereas king measured 1.42 ± 0.34 cm and weight 133 ± 4.52 mg respectively (Table-2).

Discussion

The present study reports that the area in and around Kuvempu University campus sheltered three species of termites and all the three species belong to the genera *Odontotermes*. They are, *Odontotermes obesus*, *Odontotermes wallonensis* and *Odontotermes redemanni*, of which *Odontotermes obesus* was found to be abundant.

The observation of occurrence and the structure of the mounds of *O. obesus* falls in live with that of Annandale (1923). who reported the unilocular types of mounds occurring in *O. obesus*. As described by Noirot (1970) the unilocular type of nests found in the established nests of *Odontotermes* are due to rapid changes taking place in the central portion of the nests in the usual way of extension (by simple excavation) from the center to the

periphery. Similar observations were made by Veeranna and Basalingappa (1989), where they have reported the mounds of *O.obesus*, was conical in shape with one or more hollow conical turrets which opened directly to the nest chamber.

In the present study, the observations on the mounds of *O.wallonensis* is in conformity with Gautam (1980), who stated that multicolour type of mounds occur in shrub land areas possessed many perforations to keep the mound cool during the intense hot seasons. The internal structure of mound of *O.wallonensis* did not differ from other multiocular mound building species as described by Roonwal (1970), Rajagopal (1983) and Veeranna and Basalingappa (1989). The structure and shape of the royal chamber of *O. brunneus* was found similar to those of other mound building species of *Odontotermes* as described by (Rajagopal, 1983; Veeranna and Basalingappa, 1989). The exit and entrance holes present in the walls of the roof, floor and at the junction of roof and floor in the royal chamber serve the purpose of traversing the workers and soldiers. Centrally located large fungus garden and its nearby fungus gardens served as the egg depositories and nurseries as the huge clumps of several hundred thousands of freshly laid eggs and freshly hatched nymphs were frequently found. These fungus gardens found as food reservoir for young growing nymphs. The mounds of *O. redemanni* are dome shaped and low in height which is similar to that of observations made by Sen Sarma (1962) and Basalingappa (1968). The study revealed that the three species of termites inhabited this area and caused damage to building and crops in the adjacent areas.

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Table 1: Number of mounds enumerated from the study area

Sl. No.	Termite mounds	No. of mounds inside the University campus	No. of mounds outside the University campus	No. of mounds in Bhadra reservoir area
1.	<i>O. wallonensis</i>	26	30	15
2.	<i>O. obesus</i>	84	92	45
3.	<i>O. redemanni</i>	21	26	06

Table 2: Details of mound structure

Sl. No.	Termite mounds	Royal Chamber		Queen		King	
		Length in cms	Breadth in cms	Length in cms	Breadth in cms	Length in cms	Breadth in cms
1.	<i>O. obesus</i>	11.80 \pm 0.84	9.50 \pm 0.55	5.56 \pm 0.46	8.46 \pm 1.02	0.68 \pm 0.54	181 \pm 18.84
2.	<i>O. wallonensis</i>	23.35 \pm 0.71	17.46 \pm 0.48	8.10 \pm 0.51	9.27 \pm 1.31	1.60 \pm 0.31	96 \pm 11.85
3.	<i>O. redemanni</i>	24.94 \pm 0.80	18.69 \pm 0.81	8.16 \pm 0.37	10.18 \pm 1.20	1.42 \pm 0.34	133 \pm 4.52

Fig. 1. Graphical representation of number of mounds enumerated from the study area.