

NESTING PATTERN OF THE TERMITE *ODONTOTERMES WALLONENSIS* (WASMAN) (ISOPTERA: TERMITIDAE)

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(Accepted 15 April 2012)

ABSTRACT – The colony foundation and development and pattern of young and established nest of *O.wallonensis* were investigated in and around Bidar area of Karnataka state. Swarming of alate of the species occurred during pre monsoon and continued throughout the wet months. After pairing, alates of the species will select sites in the crevices of the soil or in loose soil for the foundation of a colony. The active construction of the mound was observed during the cool hours of the day in the rainy months the young nest *O.wallonensis* was dome shaped with one or two domes like turrets.

In young colonies the fungus comb were aggregated in the central cavity and the royal chamber was situated beneath usually at the centre. The established nests of species were extended by addition of vaults galleries runways etc. the mound nest was extended horizontally in *O.wallonensis*.

Keywords : *O.wallonensis*, fungus garden, nest, royal chamber, swarming.

INTRODUCTION

Termites are social insects. Establishment and maintenance of colonies are taken place by the division of labour in the termite society. The process of construction of the mound by termites has been studied by Luscher (1956) most of the macrotermitinae nest are found completely beneath the ground surface, termite of the genera odontotermes. However construct surface mounds which vary in structure among the other species and sometime within the same species from different areas. Noirot (1970) and Ronwal (1970) have made some observation on the nesting behavior *O.wallonensis*. The present study reveals the detailed nesting pattern of young and established nests of *O.wallonensis* in Bidar area in Karnataka state.

MATERIALS AND METHODS

The young and establishing nests (about 20-30cm height and 100-260cm in circumference) of *O.wallonensis* in the field were chosen as materials for the present study. The methods adopted for the present study has described by the Basavalingappa. Age of the nest was determined by the size of the mound. The vertical section of the young and established mound nest were taken to study the measurement of mound nest such as height, circumference, depth of mound and royal chamber from the ground level, location of royal chamber, weight of the fungus garden and weight of the queen have been recorded.

OBSERVATIONS

Colony foundation and development

Swarming of alates during monsoon month of the year has been observed. The alate of spices of termites appeared only in the normal colonies of above 3 to 4 year of age. It has been observed that alates were present in colony for 6 to 10 weeks before swarming under favorable condition such as high humidity (65-95 RH) and low temperature (25-27°C). The entire colony appeared in stimulated condition in Bidar. It was found that the alates of *O.wallonensis* swarming out during the pre-monsoon month (April and May) and it continued throughout the wet months. In *O.wallonensis* the alates emerged out from the mound itself and as well as from the emergence hole made away from the nests. The Swarming took place at the beginning of the rainy season usually after rains either early in the morning or in the evening.

Dealation

The emerged alates of species of termites had a short flight of usually about 5 to 10 minutes and sometimes even for hours. After a short flight they were found lighting on the ground shedding their wings was observed. Alates while moving on the grass, foliage materials in the ground their wings stuck to them. Alates in such case found bending the thorax up and down in this process wings were found cut off from the body. In other case the male follow the female and helped the female to break her wings by cutting with the mandibles at the suture and vice-versa.

Pairing and formation of Copularium

After delation the female shows the “calling Posture” by raising abdomen in close observation female rapidly vibrated her abdomen, male were found attracted to such female and went close to her with approach of male and female started moving ahead followed by the male when the female and male were acceptable to each other, female was found selecting a suitable site either in the crevice or in the loose soil. Both male and female alates were indulged in excavating royal cell. Later both the reproductive forms with their mouth parts smoothed the floor and roof of the cell. It appeared as if it was plastered.

Formation of Nest in *O. wallonensis*

After formation of copularium the process of egg laying, hatching of young one and attaining of the adult stage took place within 10 to 120 days. The first batch of workers was found foraging and feeding the royal couple. These workers were found excavating a cavity above the royal cell and constructing a small fungus-garden on which the fungus was grown. Such fungus was found to be feed by the young and adults. As the population of workers increased in the colony. It has been observed that, in the field they started constructing the mound above the ground level by *O. wallonensis*. The construction of the above ground turrets was carried by the workers of

Table 1 : Measurements of the young mound nests of *Odontotermes wallonensis*.

Sr. No.	Circumference of the mound (cm)	Height of the mound (cm)	Depth of the royal chamber (cm)	Depth of the mound (cm)	Weight of the fungus garden in (kg)	Situation of royal chamber	Weight of the queen (gm)
01	85	11	22	32	0.35	Centre	2.00
02	130	20	29	46	1.00	Centre	3.15
03	160	18	27	40	1.45	Centre	2.13
04	180	18	27	44	1.00	Centre	2.00
05	200	20	29	35	1.10	Centre	2.50
06	210	11	21	43	2.20	Excentric	4.07
07	220	15	28	42	0.85	Centre	2.00

Table 2 : Measurements of the established mound nests of *Odontotermes wallonensis*.

Sr. No.	Circumference of the mound (cm)	Height of the mound (cm)	Depth of the royal chamber (cm)	Depth of the mound (cm)	Weight of the fungus garden in (kg)	Situation of royal chamber	Weight of the queen (gm)
01	280	10	18	30	2.30	Excentric	4.01
02	290	16	25	45	2.30	Excentric	Nil
03	330	16	37	55	2.20	Excentric	Nil
04	350	12	37	40	1.70	Excentric	8.75
05	370	19	30	42	1.30	Excentric	4.61
06	360	22	36	51	2.14	Excentric	4.62
07	380	27	32	58	2.11	Centre	3.96
08	410	37	28	62	1.10	Excentric	6.50
09	408	40	19	53	2.25	Excentric	5.72
10	480	45	38	50	1.40	Excentric	4.61

this species. They brought the excavated soil particles in their mandibles and found placing particle by particle along with saliva and thus raised the above ground turrets. The inner surface of such turrets as well as the mound wall was finely plastered by their mouth parts. It has been observed that the workers of this species constructed the mound only during the cool hours of the day and night as well in the field it has been observed. The active construction of the mound was found during the rainy and spring seasons rather than the summer months.

Nesting pattern of the young nests of *O. wallonensis*

There are seven mounds were selected to take the measurements such as height, circumference, and depth of the royal chamber, depth of the mound, location of the royal chamber, weight of the fungus-garden and weight of the queen of the young nests of *O. wallonensis* are given in the Table -1.

The mound was dome shaped with one or two turrets erected on the ground surface. The inside wall of the turret was thin and smooth (0.6 to 2.2cm), and it was found that the aeration pits are located as in the nest of other termites.

Internal structure of the young nests of *O. wallonensis* was a simple



Fig. 1 : The young Mound nest of *O. wallonensis* with only dome shaped turrets



Fig. 2 : Vertical section of the young mound nest of *O. wallonensis* showing the aggregated fungus garden



Fig. 3 : Fungus garden of *O. wallonensis* showing the exist and entrance holes.



Fig. 4 : King on the head of queen in their royal chamber after excavated from the mound of the termite *O. wallonensis*



Fig. 5 : Established Mound nest of *O. wallonensis* showing numerous turrets scattered horizontally on the ground.



Fig. 6 : Vertical section of nest of *O. wallonensis* showing the vaults with fungus garden arranged vertically adjacent to each other.

cavity containing aggregated fungus-garden as in the young nest of other *Odontotermes Species*. The fungus garden was dome/plate like shape having exited and entrance holes which are more or less horizontally or oval in shape (Fig-1). The colour of the fungus garden in the young nests of this species was similar to that of the young nest of other *Odontotermes Species* was yellowish brown. The royal chamber of *O. wallonensis* was usually found to be situated at the base of the mound nest just beneath the fungus-garden. The royal chamber was bow shape roof was arch was plane and smooth. The queen and king were found in the royal chamber was similar to that of *Odontotermes species*. The length and width of the royal chamber was ranging from 3.7 to 5.2 cm. and 1.8 to 2.3 cm. respectively (Fig-4).

Nesting pattern of the established nest of *O. wallonensis*

The measurements such as circumference, height, depth of the royal chamber, depth of the mound, location of the royal chamber, weight of the fungus-garden and weight of the queen of the established nests of *O. wallonensis* are given in the Table-3. There are ten mound were selected for measurement. The mound structure of the established nest of this species was found various structures such as galleries vaults runway etc. for the accommodation of growing population.

The shape of the turrets of the established mound nests of *O. wallonensis* was conical and turrets were more in number. In some mounds of this species the turrets were open type. The turrets of the established nests of *O. wallonensis* were scattered on the ground. The mound nests were found having numerous vaults which were arranged horizontally. The vaults were like saucer, situated mostly adjacent to each other and vertically. In many of the nests, there are as many vaults as those of turrets. The vaults were connected with one another by galleries. The shape of the fungus-garden was as found similar to young mound except the size and colour. In the establishment the colour of the fungus garden was blackish brown.

The royal chamber was bit fragile and consist a number of exit and entrance holes. The location of the royal chamber in the established nest varied. The royal chamber was comparatively big, thick having exit and entrance holes. The length and width of royal chamber were ranging from 8cm to 12cm and 2.5cm to 3.4cm respectively. The fungus garden in the established nest was situated around the royal chamber. The nest was usually excentric.

DISCUSSION

Sensarm (1962) reported in *O. assmuthi* that, swarming took place only once in a year. Basavalingappa (1970) reported that swarming took place soon after the pre-monsoon showers generally in April month. Further, he observed the continuation of swarming throughout the wet months. In Algeria, Harris (1956) has observed the issuing out of alates of *Anacanthotermes ochraceus* from the emergence holes at a distance of 2 meter from the mud brick wall which was known to be termite colony. Grasse (1942) found that presence of soldiers and workers near the holes as stimulating agents for the alates. At the time of emergence of the alates of many species of termites the workers and soldiers were found forming a protective circle around the openings. Roonwal (1962) reported: that swarming of alates in *O. wallonensis* usually took place after rains during the month of June and September (in Orissa) and in the month of December (in Bombay). He also observed that, the swarming in *O. wallonensis* take place after sunset, sometimes continued for the whole night. The swarming in *O. wallonensis* occurred in the evening during the months of October in India (Manipur). The assemblage of numerous workers and soldiers near the emergence holes was also observed while swarming was in process. In present investigation, the swarming *O. wallonensis* was observed during the pre-monsoon months (April/May) after showers and it continued throughout the wet months. In present study it was observed that, the alates emerged from the specially made emergence holes which were found about 2 to 25 metres distance from the mound. Koenig (1779) was the first author to describe the swarming in Indian termite and he stated that, the time of swarming out of alates was different. Usually they swarmed most abundantly before monsoon.

According to Noirot (1970), a large number of workers and soldiers were found. The emergence holes were made by the workers; soldiers are around opening for protection of worker who are indulged in making opening and later for guarding the alates of *O. wallonensis*. The alates emerged form the emergence holes from the mound the swarming of alate was meant for the dispersal and founding new colony. In *O. wallonensis* it was observed that, the construction of mound during the cool hours of the day and night. The active construction of the mound observed during the rainy and winter months when climatic condition was favourable. Normally the growth of the nest in *O. wallonensis* was observed by addition of new vaults and fungus garden near to existing one. Later on they are found connected with galleries and tunnels while

excavating new vaults. In the growing nest few more turrets were observed erected on the surface of the mound in young nest of *O.wallonensis* shows that internal structure of young nest is found simple central cavity, which was excavated just above the royal chamber. The central cavity extended upwards to turrets which were dome shaped. The royal chamber was small bow shaped with few entrance holes for the movement of workers and soldiers. The mound nest was growing horizontally rested on a horizontal base consisting of compact clay which in turn was supported by conical pillar. The wall found to be transversed by system of galleries whose arrangement varied from one nest to another. In some species had homogeneous structure consisting of chamber. In the established of *O.wallonensis* the location of the royal cell was varied. They are comparatively large in size and were built in direct connection with soil. The royal chamber in the young nest of species containing queen and king with large numbers of eggs but not fungus garden. The establishment nests of termite were found having number and network galleries. The vaults were horizontally distributed below the ground level. The vaults were connected with one another by galleries which finally connected to the royal chamber. For each species macrotermitinae the fungus garden has well defined structure and architecture where as large variation occurs different species

In the present investigation the fungus garden in the young nest of *O.wallonensis* was found situated in the central cavity just above the royal chamber. With growth of colony in other species of termite more and more fungus garden were found constructed which were housed in separately excavate vaults arrange one above the other.

In *O.wallonensis* the fungus garden was dome or plate like the entrance holes. The fungus garden more or less oval in shape in horizontal direction. At the base the fungus comb was found concave. The colour of the fungus garden in young nest was yellowish brown. In established nest it was brownish black. Rich growth of the fungus was observed in both young and established nest (Fig-3).

ACKNOWLEDGMENT

The author are thankful to Professor and Head, Department of Zoology Dr. Babasaheb Ambedkar Marathwada University Aurangabad for providing laboratory facilities for completion of this work.

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