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A STUDY OF TERMITES DESTROYING STRUCTURAL WOOD IN HYDERABAD URBAN SYSTEM

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Abstract:
The diversity of termite fauna attacking different structural - wood in different types of houses such as those made of Reinforced Cement Concrete (RCC) and those made of Tile-Roofed (TR), in different management of houses such as school buildings, banks, Government office buildings and Libraries in the Urban Systems, and the types of damage incurred to the indoor - wood works and to termites on structural wood in relation to various climatic factors such rainfall, temperature and relative humidity are also described.
Key words: *Rainfall. Relative humidity, Termites, Temperature Urban system*

Introduction:

Urban areas represent increasingly large and interconnected spaces in regional landscapes and are important for the spread of exotic species. Urban centers are the origin of commercial transport for a wide variety of material including forest and agricultural products. Urban areas are characterized by a wide spread destruction of a great deal of native vegetation thus affecting biotic components of the environment, which has led to the formation of many habitats through modifying the existing ones particularly with regard to insects.

Wood is one of the most valuable commodities in world commerce, and its natural beauty and physical characteristics are such that it has always been used as building material in different types of buildings almost everywhere in the world. Wood for building purpose is obtained from trees after felling, drying and sawing of the raw material to required shape. The wood inside buildings protected from rain and from the ground contact is known as 'Structural wood (Williams, 1977). Wood is probably the most versatile substance used by people and has only one major fault. It can be break down under biological attack. About one third of the timber produced worldwide is lost due to various biodegrading agents. In tropical and subtropical conditions termites are one of the major causes for the breakdown of wood and are responsible for heavy economic losses.

If the wood is untreated and has no natural resistance to termite attack, the insects will destroy the timber and cause serious damage to property and amenities. Many termite species are voracious consumers of wood and some of these are highly destructive pests of wooden buildings, furniture and plants.

At the outset a brief description of the study areas of Hyderabad Urban system and their environmental conditions are studied. The diversity of termite fauna

attacking different structural - wood in different types of houses such as those made of Reinforced Cement Concrete (RCC) and those made of Tile-Roofed (TR), in different management of houses such as school buildings, banks, Government office buildings and Libraries in the Urban Systems, and the types of damage incurred to the indoor - wood works and to termites on structural wood in relation to various climatic factors such rainfall, temperature and relative humidity are also described.

Material and methods:

Extensive surveys were conducted periodically during January 2009 to April 2011, which includes regular monthly surveys followed by the keen observation of termite damage to different types of structural wood in Reinforced Cement Concrete (RCC) houses and Tile-Roofed (TR) houses present in various localities of Hyderabad (urban system). A total of 120 houses such a Government School Buildings, Libraries, Banks and Government office Buildings were inspected on a monthly basis in the entire urban system, selecting few standard houses of each type in a given locality. The house owners/persons concerned were requested for their co-operation and required to provide information regarding the termite damage in their houses/offices. The indoor wood-works such as doors, frames, window panels, sashes, joists, rafters and well supporting, door and window supporting frames of Tile-Roofed houses were inspected for damage. Other cellulose materials such as books in libraries, wooden almirhas in government offices and banks including clothes used for wrapping the files in the offices and schools in all the two types of houses were also inspected for the signs of termite activity. The earthen-sheet covering, runways (shelter tubes) and small channeled holes on the wood works made by the termite's activity and damage were examined rending and exposing the interior portion using a sharp chisel. The presence of small mounds on the inner and outer walls and on the roof particularly on the top of the walls of these houses was also noted.

Methods

As the subterranean termites usually enter the houses through the cracks in foundations, floors and walls they spread runways up to the structural wood (Johnson, 1981), such types of cracks either in foundation or floor or walls of houses were also inspected. The termites particularly the soldiers and workers damaging the articles were collected in 80% ethanol for species identification. .

The intensities of the damage and deterioration were assessed by eye quantified on the basis of five damage classes (Williams, 1973) and recorded. It has been the usual evaluation method for field tests of wood samples. The five damage classes of structural wood were given numerical symbols as follows.

(i) 'O' no attack
(ii) + a very less attack exploratory nibbles (10% damage)
(iii) + + Slight attack with the wood remaining serviceable (10% to 25% damage)
(iv) + + + moderate attack with wood rendered unserviceable (25% to 50% damage)
(v) + + + + heavy attack with the wood rendered useless for any structural purposes (50 to 75% damage)

Soldier, worker, nymph, larva of *Odontotermes*

Table-1 Diversity of species of termites causing damage to structural wood work in Hyderabad Urban system. (Severe Damage,*Minor Damage)**

Family / Sub family	Species
FAMILY: TERMITIDAE **Sub-Family:** Macrotermitinae	***Odontotermes ceylonicus* (Holmgren) ***Odontotermes redemanni* (Wasmann) **Odontotermes wallonensis* (Wasmann) **Odontotermes brunneus* (Hagen) *** *Microtermes obesi* (Holmgren)**

Table-2: List of different indoor wood-work damaged by Termites in Hyderabad Urban System

Types of structural Wood	*O.C**	*O.R**	*O.W**	*O.B**	*M.O**
RCC House.					
Door Frame	+	+	+	+	
Door Panel	+	+	+		
Window sash	+	+			
Wall shelves	+	+			
TR House :					
Door Frame	+	+	+		
Door Panel	+	+	+		
Window Sash	+	+			
Wall shelves	+	+	+		
Wooden Rafter	+	+			
Joist	+	+			
Ceiling	+	+			+

*Note: O.C= *O.ceylonicus; O.R= O.redemanni;O.W= O.wallonensis;O.B= O.brunneus;M.O= M. obesi*
" + " Mark indicates the damage to wooden works.

Results and Discussion:

Various species of termites recorded within the limits of Hyderabad Urban system are presented in Table - 1 they belonged to one family Termitidae. In Termitidae, *Odontotermes ceylonicues* (Holmgren) *Odontotermes redemanni* (Wasmann),*Odontotermes wallonensis* (Wasmann) *Odontotermes brunneus* (Hagen), *Microtermes obesi* (Holmgren) were recorded. Of all these termites *Odontotermes ceylonicues,* and *Odontotermes redemanni* were recorded causing maximum damage and *Odontotermes wallonensis,Odontotermes brunneus* and *Microtermes obesi* causing minor damage to the structural wood of different types of houses.

The percentage of different types of houses damaged by various species of termites in the urban system is presented in Table 3. It showed that 31 % of the total houses selected at random for sampling, have been damaged by termites, of which maximum were Tile-Roofed houses and Minimum were RCC houses.

The houses damaged caused by *Odontotermes ceylonicues,* (32.4%) the structural - wood in maximum number of the Tile-Roofed houses followed by *Odontotermes redemanni* (18.9%) and *Odontotermes wallonensis* (8.1%) which damaged the structural - wood in of these houses, while *Microtermes obesi* (2.7%) caused damage in minimum number of houses.

The houses damaged caused by *Odontotermes ceylonicues* (18.9%) the structural - wood in maximum number of the RCC houses followed by *Odontotermes redemanni* (10.8%) and *Odontotermes wallonensis* (5.4%) which damaged the structural - wood in these houses, while *Odontotermes brunneus*(2.7%) caused damage in minimum number of houses

Different types of structural – wood damaged by various species of Termites in RCC and Tile-Roofed houses and were studies The studies revealed that in RCC *Odontotermes ceylonicues* damaged Door frames, Door panel Window sash Wall shelves. In Tile-Roofed Houses *Odontotermes ceylonicues* and *Odontotermes redemanni* damaged the Doorframes, Door panels, Window sash wall shelves, Rafter, ceiling Joist.

In RCC houses *Odontotermes ceylonicues* damaged electrical switch board fixed in the wall, *Odontotermes wallonensis* damaged Photo –frame, cloth paper. (Table-4).While in Tile-Roofed houses *Odontotermes ceylonicues* and *Odontotermes redemanni* damaged the Books & Files in the wooden shelves.

Table: 3. Percentage of houses damaged by different species of Termites in Hyderabad Urban System

Species	RCC	TR
Odontotermes ceylonicus	18.9	32.4
Odontotermes redemanni	10.8	18.9
Odontotermes wallonensis	5.4	8.1
Odontotermes brunneus	2.7	-
Microtermes obesi	-	2.7
Total	**37.8**	**62.1**

Percentage of houses damaged by different species of Termites

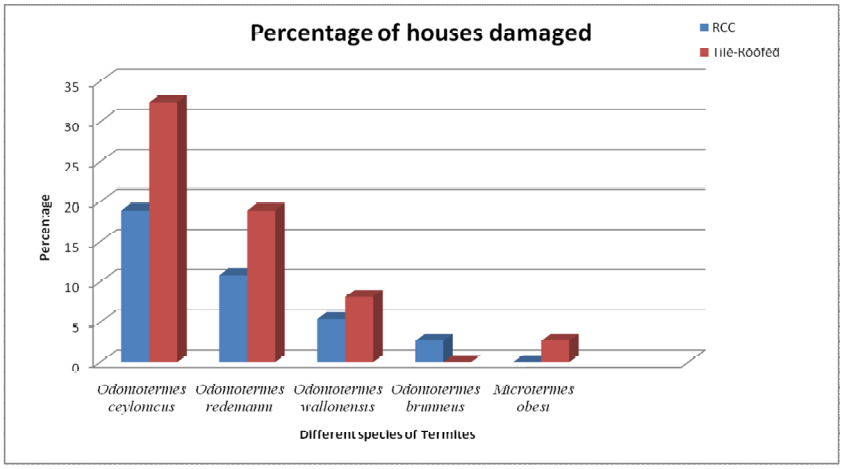

Table: 4. List of different indoor articles Wood damaged by different species of Termites.

Species	RCC	TR House
Odontotermes ceylonicus	Electrical switch board fixed on the wall	Books and Files
Odontotermes redemanni	--	Books
Odontotermes wallonensis	Photo – frame Cloth paper	
Odontotermes brunneus	--	--
Microtermes obesi	-	-

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