

**EFFECT OF CONTAINER SIZE AND GROUP SIZE ON SURVIVAL  
AND WOOD CONSUMPTION OF *MICROCEROTERMES  
CHAMPIONI* SNYDER (ISOPTERA: TERMITIDAE)**

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**Abstract:** Size of container affected the feeding and survival of *Microcerotermes championi*. Maximum feeding was recorded in a container of volume 57.7 cm<sup>3</sup>. Maximum survival was noticed in a container of 157.0 cm<sup>3</sup> volume. Group size effect on survival and wood consumption was also studied. Wood consumption was maximum in group size of 200 workers. Maximum survival, however, was recorded in group size of 50 workers.

**Key words:** Group size, survival, consumption.

### INTRODUCTION

Although several workers (Wood, 1978; Ruyooka and Howick, 1978; Carter, 1981; Collins, 1981; Lenz, 1986; Lenz *et al.*, 1987) have studied feeding preferences of termites of different parts of the world, in Pakistan a lot needs to be done on these lines. The only work available on termites of Pakistan is regarding feeding preferences of *Bifiditermes beelsoni*, *Coptotermes heimi* and *Odontotermes obesus* (Akhtar and Ali, 1979; Akhtar and Jabeen, 1981; Akhtar and Shahid, 1989). In the present paper, effect of container size and group size on survival and wood consumption of *Microcerotermes championi* is discussed.

### MATERIALS AND METHODS

#### *Effect of Container size on survival and wood consumption*

To study the effect of container size on survival and wood consumption, petri dishes of different sizes (Table 1) were used as containers, which were half filled with matrix and kept moist by distilled water.

Workers of *M. Championi* were obtained from the nests brought from the field. They were fed on filter paper for three days prior the start of experiment. Unhealthy and inactive individuals were removed when they appeared in the dishes.

Blocks (measuring 5mm x 25mm x 40mm) of a very palatable wood i.e. *Mangifera indica*, were used in the experiment. Two hundred workers of *M. Championi* were released in each container. Three replicates for each container size were maintained.

Table 1: Some characteristics of the containers

Diameter (cm)	Height (cm)	Base Area (cm <sup>2</sup> )	volume (cm <sup>3</sup> )
5.0	1.0	19.6	19.6
7.0	1.5	38.5	57.7
10.0	2.0	78.5	157.0
11.0	2.0	95.0	190.0
14.0	2.5	154.9	385.0

#### Group size effect on survival and wood consumption

To study the group size effect on the survival and wood consumption, termites in group of 50, 100, 200 and 300 were released in petri dishes (70mm diameter) containing sand as matrix. Blocks (measuring 5mm x 25mm x 40mm) of a very palatable wood *populus euamericana* were made smooth by sand paper and dried at 60 °C for 48 hours and weighed before exposing them to termites. Three replicates for each group size were maintained. After the test period (4 weeks) the blocks were removed and dried at 60 °C for 48 hours and reweighed to know the amount of wood consumed by termites. Survival of termites after the test period was also recorded.

## RESULTS

#### Effect of container size on survival and wood consumption

The results of feeding and survival in relation to the size of the container are given in Table 2. Maximum feeding occurred in a container of volume 57.7 cm<sup>3</sup> (Table 2; Fig.1). There was a negative and non-signification relationship ( $r = -0.243$ ; df.3;  $P > .05$ ) between wood consumption and container size. Survival was minimum (14.0%) when termites were kept in a container of volume 19.6 cm<sup>3</sup> and maximum (70.0%) in a container of volume 157.0 cm<sup>3</sup>. There was also a negative and non-significant correlation ( $r = -0.12$ ; df. 3;  $P > 0.05$ ) between survival and container size.

Table 2: Effect of container size on wood consumption & survival in groups of 200 workers of *Microcerotermes Championi*

Volume of Container (cm <sup>3</sup> )	Mean wood consumed (mg)	Survival (%) after 4 weeks
19.6	218.5	14.00
57.7	308.9	44.30
157.0	297.0	70.00
190.0	303.1	29.00
385.0	223.6	20.65

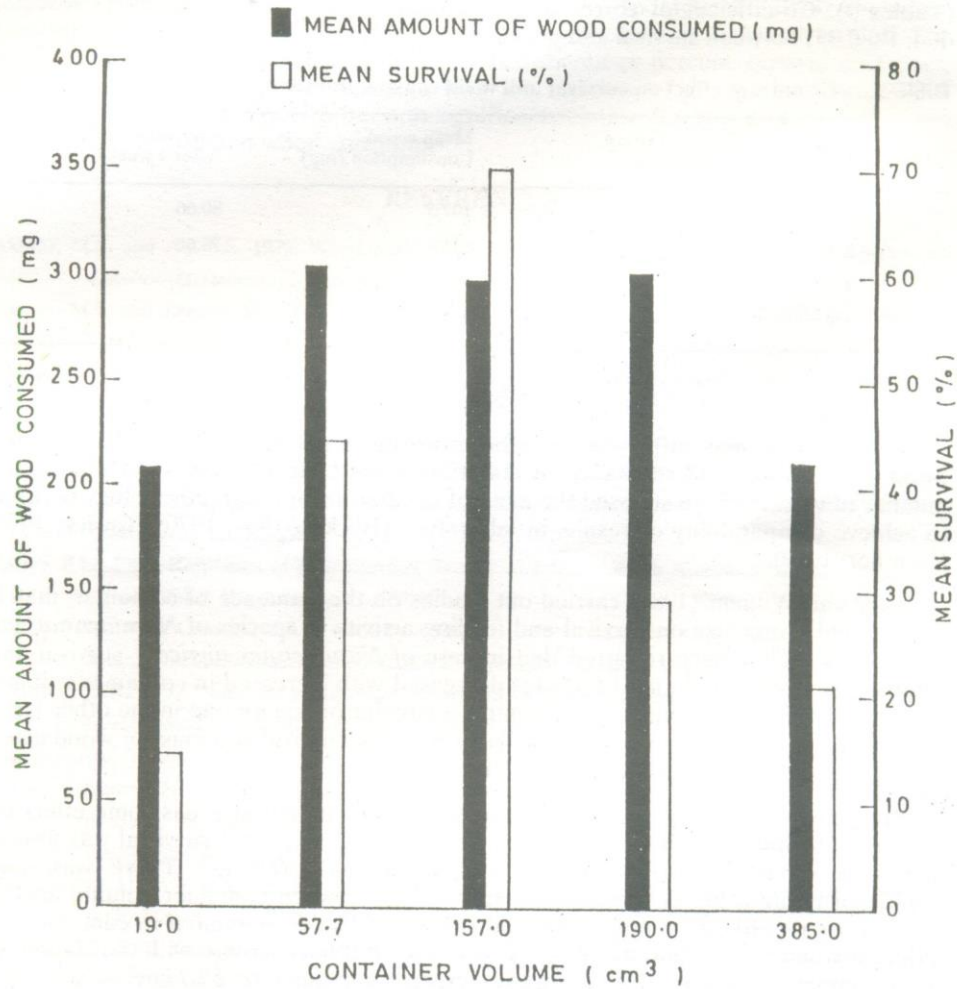


Fig. 1. Effect of container size on wood consumption and survival in a group of 200 workers of *M. championi*.

#### Group size effect on survival and wood consumption

When wooden blocks of poplar (*P. euamericana*) were exposed to termites in group of 50, 100, 200 and 300 individuals, maximum feeding was recorded in a block exposed to a group of 200 termites. While feeding was minimum in a group of 50 termites. There was a positive but non-significant correlation ( $r = 0.74$ ;  $df: 4$ ;  $P > 0.05$ ) between wood consumption and group size. Survival was maximum (80.66%) in group



of 50 workers and minimum survival (44.35%) was noticed in a group of 200 termites (Tables 3). Co-efficient of correlation was negative and non-significant ( $r = -0.35$ ;  $df.4$ ;  $P > 0.05$ ) between survival and group size.

Table 3: Group size effect on survival and wood consumption.

Sr.No.	Group size	Mean wood Consumption (mg)	Survival (%) After 4 weeks
1.	50	107.5	80.66
2.	100	131.3	78.66
3.	200	308.0	44.33
4.	300	228.9	75.22

### DISCUSSION

Many factors may influence the laboratory bioassays regarding effectiveness of wood preservatives and resistance of materials against termite attack. In this regard number of workers have stressed the need of standardization of methodology in order to achieve comparability of results in laboratory (Becker, 1969, 1970; Howick, 1975; Esenther, 1977).

Lenz and William (1980) carried out studies on the influence of container, matrix volume and group size on survival and feeding activity in species of *Nasutitermes* and *Coptotermes*. They have reported that in case of *Nasutitermes nigriceps* survival and wood consumption of 2 gm of termites decreased with increased in container volume. Two vessels with a rectangular base against a circular or square one in the other types of containers used, gave significantly lower values for survival and mass of wood eaten than was to be expected from their volume.

Present studies on *M. championi* revealed that container size has some effect on survival of termites. In the smallest container (volume 19.6 cm<sup>3</sup>) survival was lowest. maximum survival was recorded in a container of 157.0 cm<sup>3</sup>. There was non-significant relationship ( $r = -0.243$ ;  $df.3$ ;  $P > 0.05$ ) between container volume and % survival. As regards the amount of wood consumed by *M. championi* in containers of different volumes, the amount of wood consumed did not increase with the volume of the container. Consumption was maximum in a container of 57.7 cm<sup>3</sup> volume and minimum in a container of 385 cm<sup>3</sup> volume. There was negative and non-significant relationship ( $r = -0.12$ ;  $df.3$ ;  $P > 0.05$ ) between wood consumption and volume of the container. Lenz *et al.*, (1987) have also reported that in case of *Coptotermes acinaciformis*, wood consumption changes significantly ( $P > 0.001$ ) with jar size and was high in 80 ml and 100 ml container and decreased when termites were kept in 400 ml jar.

Termite group size provides a better understanding of the relationship between survival and wood consumption. The information available is more comprehensive for survival than for wood consumption. Some workers (Becker, 1970; Fougrouse and Lucas, 1972; Hinterberger, 1976) have reported that performance (survival) of termites

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improves with the use of larger groups. According to Howick (1978), however, survival and wood consumption declines considerably in very crowded groups. The present studies revealed that as the group size increases percent survival decreases, whereas, wood consumption increases with the increase of group size from 50-200 individuals. There was positive but non-significant relationship ( $r = 0.74$ ;  $df.4$ ;  $P > 0.05$ ) between group size and wood consumption.

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