International Journal of Biomedical and Health Sciences
Vol. 4, No. 1, March 31, 2008
Printed in Nigeria

0794-4748/2008 $12.00 + 0.00

http://www.asopah.org

IJBHS 2008013/4104

Resting Site Preferences of *Cimex hemipterus* (Heteroptera; Cimicidae) in Human Dwelling in Benin City, Nigeria

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(Received February 4, 2008)

ABSTRACT: A study was made on the resting site preferences of bedbug *Cimex hemipterus* in relation to sex, physiological state, developmental stage and monthly abundance in Benin City in August and September, 2005, using Baygon® spray insecticide. *C. hemipterus* was collected from various resting sites: edges of seat, crack in seat, space between plywood and iron frame in seat, surface of seat, surface of table. Male and female *C. hemipterus* had peak in space between plywood and iron frame in seat, the males being more than females in ratio 2:1. While the freshly blood-fed females peaked in abundance in this site, the gravid had the bulk population in edges of seat in addition to it. The distribution of males followed the pattern of freshly fed females. Again, the nymphs and adults preferred the space between plywood and iron frame although the adult was more than the nymph in ratio 2:1. This favoured site was well represented in August while September exhibited peak abundance in edges of seat in addition to it. The distribution of *C. hemipterus* from month to month was constant.

Key Words: *Cimex hemipterus*, Resting site preferences, abundance.

Introduction

The bedbugs are blood-sucking parasites of human, bats and occasionally domesticated animals (Usinger, 1966). There are mainly two species: *Cimex lecturalius* the common bedbug which occur mostly in temperate part of the world and the *C. hemipterus*, the tropical bedbug found mainly in tropical countries (Chandler & Read, 1981). Human dwelling, birds' nest and bat caves makes the most suitable habitat for bedbugs since they offer warmth, areas to hide, and most importantly host on which to feed (Dolling, 1991). Within human dwelling, harbourage, include cracks, crevices in walls, furniture, behind wallpapers, wood paneling (Krueger, 2000).

Bedbugs are not known to be vectors of human diseases but they severely reduce the quality of life by causing discomfort, anxiety, sleeplessness and ostracism (Hwang *et al*, 2005). Infestations are common in urban environment, including single-family dwellings, apartment, rooming houses, hotels, healthcare facilities, and college dormitories (Hwang *et al*, 2005).

Although the role of bedbugs in disease transmission is nil, their biting nuisance value makes them important for bionomics studies. Moreover, this is the first report on the bionomics of bedbugs in Benin City. This work was therefore planned to determine the resting site preferences in relation to sex, physiological state, developmental stage and monthly abundance of *C. hemipterus* in human dwelling in Benin City.

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Materials and Methods

Study Area

The study was carried out in the University of Benin, west wing basement Lecture Theater, in the metropolitan area of Benin City, the capital of Edo State, Nigeria. Benin City has previously been described (Aigbodion *et al*, 1999).

The lecture theater sampled is large, about 38.57 meters in length and 22.40 meters in breadth with 125 chairs of similar shape. Each chair is attached by a metal frame to a table of the same length (2.40 meters), the chair and the table being made up of single planks. Each of these planks has several flat iron bracing about 40 meters apart, connected to two parallel rail of thicker iron which rest on iron legs.

The various resting sites sampled were edges of seat, cracks in seats, space between plywood and iron frame in seat, surface of seat and surface of table. Edges of seat involve the various joints of the seat, where woods attached. Crack in seat refers to unusual holes or deformity in appearance of wood used. Space between plywood and iron frame in seats are made up of dark area underneath the plywood and top of several central iron sheet used as bracing for the seat. The rest sites are self explanatory.

Collection Procedure

The bedbugs were collected weekly from August through September, 2005 between 06.30hour and 07.30hour using Baygon spray insecticide. 10 minutes was allocated to collection at the various resting sites, each hiding place being thoroughly searched in each case. 10 minutes was allocated for shifting from one site to another.

Dead bedbug collected were placed in specimen bottle containing 70% alcohol and labeled according to site collection. They were conveyed to the laboratory, identified (Chandler & Read, 1981), sexed, separated into physiological state and developmental stages.

Data Analysis

Data were presented in frequency of occurrence and percentages and analyzed by Kolmogorov-Smirnov one sample test and ratio for deviation from 1:1 (Siegel, 1956; Lewis & Taylor, 1976; Campbell, 1989).

Results

Only *Cimex hemipterus* was recorded in the University of Benin west wing basement lecture theater which was the only place were bedbug was recorded during the sampled period. The number of *C. hemipterus* resting in human dwelling in Benin City according to sex from August to September, 2005 is shown in table 1, Female and Male had peak abundance in space between plywood and iron frame with the least abundance in the surface of seat and table. While the distribution of male and female *C. hemipterus* in edges of seat and tables and surface of table were in ratio 2:1 and 1:2 respectively, those for other sites were 1:1. The overall data shows that males were more than female in ratio 2:1.

Table 2 shows the number of female *C. hemipterus* resting in human dwelling in relation to physiological state in Benin City. There was peak abundance in the space between plywood and iron frame and least number in surface of seat among the freshly blood fed. This was reflected in the pooled data. The gravid deferred by having peak abundance in edges of seat/space between plywood and iron frame in seat. The bulk of the population was freshly blood fed.

Table 3 shows the number of male *C. hemipterus* resting in various sites in human dwelling according to physiological state in Benin City from August – September, 2005. there was peak abundance of freshly blood fed males in the space between plywood and iron frame of seat/edges of seat and least number in surface of table.

Table 4 shows the number of *C. hemipterus* resting in various sites in human dwelling according to developmental stages in Benin City from August – September, 2005. There was peak abundance at the space between plywood and iron frame among the nymph and adult. Only among those resting on the surface of table was the nymph more than the adult, the edges of seat maintaining equal number and the rest sites harbouring more adults. There were more adults than nymph in the ratio of 2:1 as indicated by the poled data.

Table 5 shows monthly abundance of *C. hemipterus* resting in various sites in human dwelling in Benin City. In the month of August the peak abundance was recorded in space between plywood and iron frame in seat while in September edges of seat was added as a site with peak abundance. The pooled data reflected the

distribution pattern in the month of August. There was no significant differences (P > 0.05) in the overall monthly numbers.

Table 1: Number of *Cimex hemipterus* resting in various sites in human dwelling in Benin City, according to sex.

Resting site	Sex		Ratio (M:F)
	Male	Female	
Edges in seat. (ES)	23	10	2:1
Crack in seat. (CS)	12	9	1:1
Space between plywood and iron frame in seat. (SP)	29	20	1:1
Surface of seat. (SS)	2	2	1:1
Surface of table. (ST)	1	2	1:2
Total	**67**	**43**	**1:2**

Table 2: Number of female *Cimex hemipterus* resting in human dwelling in relation to physiological state in Benin City.

Resting site	Physiological State			Total
	Unbloodfed	Freshly bloodfed	Gravid	
Edges in seat. (ES)	0	10	9	19
Crack in seat. (CS)	0	9	6	15
Space between plywood and iron frame in seat. (SP)	0	20	9	29
Surface of seat. (SS)	0	1	1	2
Surface of table. (ST)	0	3	0	3
Total	**0**	**43**	**25**	**68**

Table 3: Number of male *Cimex hemipterus* resting in human dwelling in relation to physiological state in Benin City.

Resting site	Physiological State	
	Unbloodfed	Freshly bloodfed
Edges in seat. (ES)	0	23
Crack in seat. (CS)	0	12
Space between plywood and iron frame in seat. (SP)	0	29
Surface of seat. (SS)	0	2
Surface of table. (ST)	0	1
Total	**0**	**67**

Table 4: Number of *Cimex hemipterus* resting in human dwelling in relation to developmental stage in Benin City.

Resting site	Developmental stage		Ratio (N:A)
	Nymph	Adult	
Edges in seat. (ES)	10	33	1:3
Crack in seat. (CS)	12	21	1:2
Space between plywood and iron frame in seat. (SP)	18	49	1:3
Surface of seat. (SS)	1	4	1:4
Surface of table. (ST)	6	3	2:1
Total	**47**	**110**	**1:2**

Table 5: Monthly Abundance of *Cimex hemipterus* resting in human dwelling in Benin City.

Month	% (No.) Resting per site					
	E.S	**C.S**	**S.P**	**S.S**	**S.T**	**Total**
August	22.9	20.5	43.4	6.0	7.2	52.9
	(19)	(17)	(36)	(5)	(6)	(82)
September	33.8	21.6	41.9	0	2.7	47.1
	(25)	(16)	(31)	0	(2)	(74)
Total	28.0	21.0	42.7	3.2	5.1	157
	(44)	(33)	(67)	(5)	(8)	

Discussion

Infestations of bedbugs are increasing around the world at an alarming rate, and have become a major public health concern (Romero *et al*, 2007). In the present study the bedbug *Cimex hemipterus* were not evenly distributed at their resting sites. The female and male has peak abundance in space between plywood and iron frame probably because this area is not exposed and it offers protection and darkness (Usinger, 1966). Bedbugs do not inhabit exposed resting site because these sites do not offer potential protection (Chandler & Read, 1981), although they are close to their food source.

The edges of seat and space between plywood and iron frame are resting sites of heavy infestations and mating may occur within members of the same species and eggs deposited in these resting sites. The eggs may be cemented to the surface of wood in space between the plywood and the iron frame, a concealed environment (Dolling, 1991).

Bedbugs do not live in areas that are exposed to cold but prefer warm habitat (Snetsinger, 1997). At the surface of seat the temperature could be less than at the edges of seat. Thus accounting for the larger number in the latter site.

There are more blood fed females at the space between plywood and iron frame probably because this area provide warmth which aid the female in their reproductive processes. Also this site is close to their source of food.

There are fewer nymph in the sampled area. This may result from harsh environmental factors that do not support reproduction. This is confirmed by more nymph and adult being found in the space between plywood and iron frame. This resting site is a suitable habitat for the nymph because it offers protection and is also close to food source. The lower survival strategy of the nymph became apparent by its more number on table than adult.

In the month of August *C. hemipterus* probably was affected by the harsh weather in August, which was dry as a result of the break in rainfall and restricted themselves more to the space between furniture and iron frame. In September the weather becomes moist while still warm, a desirable condition by bedbugs (Snetsinger, 1997) encouraging them to utilize edges of seat.

The space between plywood and iron frame in seat and edges of seat, or semblance of such habitat when concentrated on in control programme could eliminate insecticide wastage associated with control process.

ACKNOWLEDGEMENT: We thank the Department of Zoology University of Benin for providing the facilities for this work.

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