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Full Length Research Paper

RELATIVE ABUNDANCE OF MOSQUITOES IN NNAMDI AZIKIWE UNIVERSITY, AWKA

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ABSTRACT
Mosquito sampling was conducted at NnamdiAzikiwe University, Awka, Anambra State, Nigeria from May to July, 2008 to determine the species of mosquitoes and their distribution in the University. Eight study sites including: Faculty of Law, Faculty of Social Sciences, Science Village, School Hostels, Multipurpose Hall (MPH), Zoology Laboratory and Medical Centre were chosen. A total of 960 mosquitoes were sampled with 4 genera and 13 species. The adult (254) and larval (716) stages were collected. Sampling techniques employed were the human bait and resting method for adults only, while the scooping method was used for larval sampling.*Culexquinquefasciatus* with 46% relative abundance had the highest density in both catches while*Eratmapoditechrysogaster*with 0.1% relative abundance had the least density. It is pertinent to stress that *Culexquinquefasciatus* was the second most prevalent (32.3%). Only *Aedesaegypti*were present in all the eight study sites in the University. Among the chosen sites, Science village (27.19%) had the highest percentage abundance followed by School hostels (20.63%) while Faculty of Social Sciences had the lowest (5.21%).
Key words:Relative abundance, Mosquitoes, Nnamdi Azikiwe University, Awka

INTRODUCTION
Mosquito is a common insect in the family Culicidae (Harbach, 2007). They are small slender–bodied insect that have 6 delicate legs and 2 wings covered in scales (Rey, 2001). Over 3,500 species of mosquitoes have been described from various parts of the world (Harbach, 2007). Mosquitoes have worldwide distribution and are found in both tropics and temperate regions of the world (Molavi, 2003). The only areas from which they are absent are the Antarctica and a few islands (Service, 1993).
Mosquitoes are known to transmit both human and animal diseases. Among the public health and veterinary important arthropods, mosquitoes rank first in the spread of such diseases as malaria, yellow fever, filariasis, dengue fever, encephalitis as well as other viral and bacterial diseases (Gillet, 1972; Service 1980).
Vector control is a major component of the Global Malaria Control Strategy (GMCS) and still remains the most generally effective measure to prevent malaria transmission (World Health Organization, 1993). However, successful application of vector control measures in a given location requires the understanding of the bionomics of mosquitoes especially *Anopheles* species responsible for malaria transmission, including correct and precise identification of the target species (Coluzzi, 1994) and its distribution (Coetzee *et al.*, 2000). Control measures can be directed at either the immature stages of mosquitoes or at the adult or at both stages at the same time. The larval stages of mosquitoes can be controlled by using larvicides. The adults

can be controlled by personal protection strategies such as the use of insecticide and insect repellents (Okeke*et al.,* 2013).

The total eradication of mosquito and mosquito borne diseases remain a problem due to large number of mosquito species and their varied ecology (Fang, 2010). Understanding the abundance of mosquito species in a habitat is essential for an efficient application of mosquito control methods (Okeke*et al.,* 2013). However, this study would provide adequate information on mosquito species and their relative abundance in some selected areas in NnamdiAzikiwe University Awka, Anambra State Nigeria.

MATERIALS AND METHODS

Sampling Site

The study was conducted at the permanent site of NnamdiAzikiwe University Awka, Anambra State. Awka is the capital of Anambra State and located in the lowland rain forest zone of Southern Nigeria.Awka is located between latitude 5˚ and 6˚25´ and longitude 7˚E and 8˚E (Obiakor, 2010).Field investigation was carried out in eight locations in the University which include: Faculty of Law, Faculty Social Sciences, School hostels, (male and female), Science village, Department of Zoology laboratory, Medical centre and Multi-purpose hall.

Study Design

The sampling period lasted from May to July, 2008. The sampling incorporate both adult and larva collections. The adult collections were done between 7:00pm to 9:00pm and for larva between 8:00am to 10:00am in all the locations.

The adult mosquitoes were collected using the human bait and resting methods. Ten larval scoops per site were doneusing a standard scoop cup measuring 350cl. Also some artificial breeding habitat and ovipositor trapswere used. The trap design consisted of 150cl cylindrical plastic bottles with the conical regions cut off and placed inverted on the cylindrical portion. The trap contained a solution of glucose; yeast was added to ferment the glucose to produce Carbon (IV) oxide (CO_2). The trap was sealed at the top edge but leaving 2cm diameter mouth of the inverted conical region open to let off CO_2 for attracting mosquitoes to lay eggs in the traps.

RESULTS

Mosquitoes numbering 960 were collected during the sampling period as represented in Table 1. The sampling yielded 254 adult mosquitoes which represent 26.46% of the total catch while the larvae collected were 706 indicating 73.54% of the total number of mosquitoes collected during the sampling period. 13 species of mosquitoes were identified. They include*Culexquinquefasciatus, Culextigripes, Eretmapoditechrysgaster, Mansoniaafricana, Aedesaegypyti, Aedesalbopictus, Aedessimpsoni, Aedesvittatus, Aedesafricana, Anopheles funnestus, Anopheles nili, Anopheles constani*and *Toxorhynchite* species. Among these species, *Culexquinquefasciatus*with a population of 442 representing 46% appears to be the most abundant species while *Eretmapoditechrysogaster*with a population of 1(0.1%) was the least prevalent.

The result shown in Table 2 indicates that School hostels and Law faculty had the highest density with 8 different species while the Department of Zoology laboratory and Faculty of Social Sciences recorded the least with 3 different species. Also, there was fluctuation in the number and types of species in each location. However, not all species were found in all locations except*Culexquinquefasciatus*and*Aedesaegypt*

Table 1: Percentage Abundance of Mosquito Species Collected During the Sampling Period

Species	Population	Percentage Abundance
Culexquinquefasciatus	442	46%
Culextigripes	38	3.9%
Aedesaegypti	310	32.3%
Aedesalbopictus	49	5.1%
Aedessimpsoni	27	2.6%
Aedesvittatus	2	0.2%
Aedesafricanus	14	1.5%
Anopheles nili	18	1.9%
Anopheles funestus	48	5%
Anopheles constani	5	0.5%
Eretmapoditechrysogaster	1	0.1%
Mansonia Africana	3	0.3%
*Toxorhynchites*sp	3	0.3%
Total	960	100%

Table 2: Abundance of Various Species at Different Location

Location	Species obtained	Number	Percentage Abundance
Science village	*Culexquinquefasciatus*	81	
	Aedesaegypti	154	
	Aedesalbopictus	2	
	Aedessimpsoni	21	
	Aedesafricanus	3	
		261	**27.19%**
Multipurpose Hall	*Culexquinquefasciatus*	33	
	Aedesaegypti	19	
	Aedessimpsoni	2	
	Aedesvittatus	2	
		56	**5.83%**
School hostels	*Culexquinquefasciatus*	77	
	A. aegypti	10	
	Culextigripes	37	
	Eretmapoditechrysogaster	1	
	MansoniaAfricana	3	
	Anopheles funestus	48	
	Anopheles constani	4	
	Anopheles nili	18	
		198	**20.63%**
Medical centre	*C. quinquefasciatus*	75	
	A. aegypti	52	
	A. albopictus	9	
	A. simpsoni	1	
		137	**14.27%**
Social sciences	*C. quinquefasciatus*	41	
	A. aegypti	8	
	A. simpsoni	1	
		50	**5.21%**
Zoology laboratory	*C. quinquefasciatus*	38	
	A. aegypti	28	
	A. africanus	6	
		72	**7.50%**
Law faculty	*C. quinquefasciatus*	97	
	A. aegypti	39	
	*Toxorhynchites*spp.	3	
	Anopheles constani	1	
	C. tigripes	1	**19.38%**
	A. africanus	4	
	A. albopictus	39	
	A. simpsoni	2	
		186	
	Total	**960**	**100%**

DISCUSSION

The result of the present study showed that thirteen (13) species of mosquitoes were collected. The increase in the variety of mosquito's species sampled in the University accounts for the many bushy and forest areas in the university. Another reason which may be associated with the species diversity is the activities going on in the university premises which include road constructions, buildings, bore holes and many others. These activities consequently created artificial breeding site for mosquitoes. The presence of farms in the study area may have also contributed to mosquito's species diversity. Similar reports were given by Okeke*et al*.,(2013) who stated that the preponderance of *Aedesaegypti*over other species could be as a result of the presence of artificial containers in and around the study area which provided favourable breeding sites.

Results of this study showed that *Culexquinquefasciatus* has the highest density with a prevalence of 46%. This indicates the high survival and fecundity rate of the species. In addition, the geographical location of the university i.e. the area is located in the tropics, could add to the optimum biotic and abiotic factors for the survival of the species. The composition of the various locations may be responsible for the high abundance of *Culexquinquefasciatus*. This supports the report of previous researchers who stated that *Culex*species were found to breed in both artificial containers that are contaminated with organic matters and also in polluted groundwater pools (Okeke*et al*., 2013; Aigbodion*et al.,* 1995).

The result of the study further showed that *Aedesaegypti*was the second most abundantwith the percentage abundance of 32.3%. This could be attributed to the rainfall pattern during the study period and presence of monkeys in the study area. Lymphatic filariasis and yellow fever outbreak is imminent. This supports the findings of Ottesen, (2006) who stated that lymphatic filariasis is also transmitted by various species of mosquitoes including *Anopheles, Mansonia, Culex and Aedes.* The disease affects 120 million people with 40 million having overt disease and 80millionhidden damage. The occurrence of *Aedes, Anopheles* and *Culex*is suggestive of the prevalence of vector-borne diseases such as malaria, yellow fever, dengue fever and filariasis in the area (Afolabi*et al*., 2013). Okeke*et al*., (2013) reported that *Aedesaegypti*had the highest abundance of 36.00% in the 2nd week of their study which is the onset of rainfall. The highest abundance of *Aedesaegypti* in Science village may be as a result of the several temporal habitats created due to road constructions in the area. This is in line with the findings of (Afolabi*et al.,* 2013**;** Okeke*et al*., (2013) who stated that *Aedesaegypti* was found to have the highest abundance in temporary habitats. Afolabi*et al.,* (2013) reported that*Aedes*and *Culex*were evenly distributed across the study area, but the abundance of *Culex*(71.73%) was more than that of the *Aedes*(26.8%). In contrast, Adeleke, (2010) observed that *A. aegypti*was generally predo-minant in Ikenne, Ogun State, Nigeria. Likewise, Adebote*etal*., (2006) and Afolabi*etal*. (2010) observed that *Aedes*mosquito was the most predominant in Zaria and indiscriminately breeds in various habitats including the tree holes.

The variation in the percentage abundance of mosquitoes by location with Science village having the highest percentage abundance (27.19%) followed by School hostels (20.63%) while least in Multipurpose hall (5.83%) revealed that the mosquitoes sampled have a high preference for human host.

CONCLUSIONS

The study revealed that Nnamdi Azikiwe University has habitat favourable for the breeding, growth and survival value of mosquitoes particularly those species that transmit diseases. Sequel to this, there may be outbreak of mosquito borne diseases like yellow fever, dengue fever and helminth infection in the study area. The discovery of Toxorhynchid species is good news. Effort should be geared towards collecting this species, breed them artificially in large numbers and allow them to be released in the natural environment to check the abundance of mosquitoes especially those that transmit diseases. There is a strong indication that there may be some species of mosquitoes not sampled in the study area. This is because of the bushy and forest nature of the study area. Further researches should be carried out on how to obtain a good number of Toxorhynchid species in the University premises.

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