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Influence of colour on oviposition of mosquitoes breeding in artificial containers in Abeokuta, Ogun State, Nigeria

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ABSTRACT

Nine species of mosquitoes were encountered during the study period. *Ae. aegypti* was the most abundant species constituting 75.39% of the total larvae collected followed by *Culex quinquefasciatus* (7.92%) and *Aedes metallicus* (6.83%). Other species were *Aedes circumleteolus* (6.54%), *Culex dutoni* (1.62%), *Aedes albopictus* (0.85%), *Aedes taylori* (0.74%), *Aedes caballus* (0.08%) and *Aedes myormioformis* (0.04%). Black containers harboured the highest number of larvae (32.12%) followed by yellow (24.01%), green (23.39%), red (15.40%) and white (5.00%) containers. Bamboo stumps bred the highest number of larvae (60.66%) followed by calabash gourd (26.04%) and plastic (13.27%).

Mosquitoes are important vectors of several human diseases such as malaria, yellow fever, filariasis, dengue and haemoraphagic fever (Amusan *et al.* 2005). Mosquitoes belong to the phylum arthropoda, class insecta, order diptera and family culicidae (WHO, 1997). Unlike male mosquitoes, a female mosquito must bite a host and take blood meal to obtain the necessary nutrients for the development and maturation of eggs in the ovaries. The speed of digestion of blood meal depends on temperature and in most tropical species takes only 2 to 3 days, but in other, temperate countries, blood digestion may take as long as 7-14 days (Service, 1999). When fully gravid, the female mosquito searches for favourable aquatic environment to oviposit (Lehane, 1991). The choice of habitat varies greatly and could be related to the environmental factors of the habitats (Mafiana *et al.* 1998).

Apart from habitat related factors, the background colour and intensity of light striking the water surface could influence the choice of breeding sites by the female ovipoistor (Bates, 1940; Williams, 1962; Collins and Blackwell, 2000). Information on effects of container colour on oviposition of mosquitoes are rather scanty. It is against this background that the present study was designed to investigate the influence of colour on oviposition of mosquito species breeding in artificial containers in Abeokuta, Ogun State, Nigeria.

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MATERIALS AND METHODS

The Study Area: The study was carried out at the University of Agriculture, Abeokuta (UNAAB) latitude $7^{o}10^{1}$ and longitude $3^{o}2^{1}$. It is on an elevation of about 500m above sea level.

Collection of mosquito larvae: Three replicates of artificial containers namely; plastic, bamboo stumps and calabash guard was coated red, yellow white, green and black. The containers were filled with water and placed in an uncultivated plot in order to avoid disturbance. The mosquito larvae were collected weekly by pouring the content of each container through a small sieve of about 0.55 mm mesh size that retained the larvae. The water was then poured back into the container and larvae were decanted into labeled specimen bottle for identification in the laboratory. The containers were prevented from drying up by refilling it constantly with tap water. Collection of the larvae was done between January to June, 2005.

***Larval Identification*:** The mosquito larvae were identified with the aid of dissecting microscope using gross morphological keys as described by Christopher (1933) and Hopkins (1952).

RESULTS AND DISCUSSION

A total of 8,696 larvae belonging to nine species were collected in different containers during the study period (Table 1). *Ae. aegypti* was the most abundant species (75.83%) followed by *Cx. quinquefasciatus* (7.92%). *Ae. aegypti, Ae. circumluteolus, Ae. metallicus, Cx. dutoni,*and *Cx quinquefasciatus* bred in all the containers while *Ae. albopictus* bred only in bamboo stumps while *Ae. f. myormioformis* bred only in calabash guards. Bamboo stumps harboured the highest number of larvae (60.66%) and species (08) while plastic harboured the least number of larvae (13.27%) and species (05). The difference in number and type of larvae collected in all the containers was however not statistically significant (p >0.05).

Black containers also recorded the highest number of larvae (32.12%) and species (08) while white coloured containers harboured the least number of mosquito larvae (5.00%) but red containers recorded the least number of species (Table 2). *Ae. aegypti, Ae. albopictus* and *Ae. metallicus* oviposited in all the study colours while *Ae. circumluteolus, Cx dutoni* and *Cx. quinquefasciatus* oviposited only in red, yellow, black and white containers. *Ae. taylori* bred only in green and black containers, *Ae. caballus* oviposited only in black containers while *Ae. F. myormioformis* oviposited in white containers only. There was no significant difference in number and type of larvae collected in different coloured containers (p >0.05).

Table 1. Mosquito species collected in the different containers in Abeokuta.

Species	Containers			Total	%
	Bamboo	Calabash	Plastic		
Aedes aeygpti	3838	1,672	1.049	6556	75.83
Ae. circumluteolus	340	236	13	569	6.54
Ae. albopictus	18	56	00	74	0.85
Ae. metallicus	235	270	89	594	6.82
Ae. taylori	64	00	00	64	0.74
Ae. caballus	07	00	00	7	0.08
Ae. myormioformis	00	03	00	3	0.04
Culex dutoni	124	14	02	140	1.62
Cx. quinquefasciatus	672	13	04	689	7.92
Total	5275	2264	1,157	8696	
Percentage (%)	60.66	26.04	13.27		

Table 2. Mosquito species collected in relation to container colour in Abeokuta.

Species	Containers						
	Red	Yellow	White	Green	Black	Total	%
Aedes aeygpti	1,300	1,1130	411	1,607	2,100	6556	75.39
Ae. circumluteolus	00	314	04	198	53	569	6.54
Ae. albopictus	30	06	04	08	26	74	0.85
Ae. metallicus	07	62	06	214	305	594	6.83
Ae. taylori	00	00	00	05	59	64	0.74
Ae. caballus	00	00	00	00	07	07	0.08
Ae. myormioformis	00	00	03	00	00	03	0.03
Culex dutoni	00	124	06	02	08	140	1.61
Cx. quinquefasciatus	02	452	01	00	234	689	7.92
Total	1,339	2088	435	2,034	2,792	8,696	
Percentage (%)	15.40	24.01	5.00	23.3	32.1		

Out of the nine species of mosquitoes encountered, *Ae. aegypti* occurred in all containers and utilized all container colours. It was also the most abundant mosquito species throughout the study. This indiscriminate breeding habit has long been reported by Okorie (1970), Mafiana *et al.* (1998), Anyanwu *et al.* (1999), and Adeleke, (2003). Bamboo stumps were the most preferred containers for ovipositon as it harboured the highest number of larvae and species followed by calabash guards. The wooden nature of the two containers could have presented a better attraction for ovipositing females as most of the species encountered had been described as forest/treehole breeders (Gillet, 1972; Mafiana, 1989).

Black containers were more attractive to ovipositing mosquitoes than other colours. This observation corroborates the report of Williams (1962). The reaction of mosquito species to a dark medium could have some evolutionary significance. The dark colour mimics tree-hole habitats of which prolific breeding of most species encountered usually take place (Gillet, 1972). White containers recorded the least number of larvae, but it is the most preferred colour after black containers as seven out of nine species were recorded. The red colour containers were however the least preferred colour.

Colours, most importantly black, yellow, green and red can therefore be incorporated into oviposition traps in the control of mosquito vectors.

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