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Diversity of mosquitoes in three foot hill villages of Sirumalai hills Dindigul, India

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ABSTRACT

*A study on mosquito fauna in three foot hill villages on the western side of Sirumalai hills, Dindigul, Tamilnadu was carried out for the period of six months. Both resting and biting adults and immature forms were collected. A total number of 505 mosquitoes belonging to 12 species of 4 genera were identified. The alpha diversity index calculated for the three villages did not vary much. It was high in Thoppampatti (0.91) and least in Valaiyapatti village (0.69). The dominant species was *Armigeres subalbatus* (48.11%) followed by the two important vectors, *Aedes aegypti* (13.66%) and *Culex quinquefasciatus* (11.62%).*

Key words: Bio-diversity, Mosquito larvae, Anopheles, Culex, Aedes, Armigers.

INTRODUCTION

Biodiversity is the richness of an ecological community and India is recognized as one of the richest centers of biodiversity in the world posing rich measure of all living organisms when biodiversity is viewed as a whole [1]. The diversity among insects has always been of keen interest to the entomologists but also to those who are engaged in different environmental programme [2] as insects are bioindicators of environment. Mosquitoes among insects are the most important single group of insects in terms of public health importance, which transmit a number of diseases such as malaria, dengue, Japanese encephalitis and filariasis causing millions of deaths every year. In India the major mosquito vectors of these diseases belong to the genera Anopheles, Culex, Aedes and Mansonia [3].

The knowledge on biodiversity of mosquitoes in an area provides adequate information on population diversity, distribution pattern and preferential habitat selection which will help to evolve a suitable strategy and implement the same for the meaningful suppression of the mosquito

population and in turn to reduce the mosquito menace [4]. In last few years cases of chikungunya and other viral fever were reported in foot hill villages of Sirumalai hills. Hence in the present investigation was taken to study the diversity of mosquitoes in three villages at the foot hill of Sirumalai hills, Dindigul District, Tamilnadu, India.

MATERIALS AND METHODS

Sirumalai Hills is situated on the eastern side of the Dindigul district, between 10° 07' – 10° 18' Northern latitude and 77° 55' – 78° 12' Eastern longitude. The three foot hill villages selected for the present study namely Rajathanikottai, Thoppampatti and Valaiyapatti were located on the western side of Sirumalai Hills. The average temperature ranges from 26°C to 38°C and the rainfall is 700 mm. The selected villages have 100 to 120 houses with the population of 1500 to 1800/village. The main occupations of the villagers are cattle rearing, brick making and agriculture. Sanitary conditions in these villages are poor. The drinking water source is from a bore well and supplied through the street taps.

Only out door collections were made in the present study. Immature forms of mosquitoes were collected by dipper method [5] from the temporary pools and other breeding sources in the study area and were reared to adults in the laboratory. The emerged adults were preserved in plastic vials for later identification. The resting adults were collected from the cattle shed using aspirator and from the bushes using sweep net. The biting adults were collected between 6 to 8 Pm by the method followed by Pandian [6] near human dwellings and cattle shed. The collected specimens were later identified in Center for Research in Medical Entomology, Madurai using the standard keys of Barraud (1934) [7] and Christopher (1933) [8]. Alpha biodiversity index is used to quantify the species richness in a given area.

RESULTS AND DISCUSSION

Table: 1 Number of mosquitoes recorded in the study area during the study Period (2010-2011)

S. No	Name of the mosquitoes	Number of collected mosquitoes	Intra species diversity (%)	Intra generic diversity (%)
1.	<i>Anopheles subpictus</i>	2	4	9.09
2.	<i>Anopheles stephensi</i>	15	33	
3.	<i>Anopheles fluviatilis</i>	6	13	
4.	<i>Anopheles vagus</i>	23	50	
5.	<i>Aedes aegypti</i>	69	55	24.53
6.	<i>Aedes albopictus</i>	16	13	
7.	<i>Aedes w - albus</i>	38	31	
8.	<i>Aedes vittatus</i>	1	1	
9.	<i>Culex quinquefasciatus</i>	59	64	18.21
10.	<i>Culex vishmii</i>	18	20	
11.	<i>Culex tritaeniorhynchus</i>	15	16	
12.	<i>Armigeres subalbatus</i>	243		48.11
	Total	505		100

A total number of 505 mosquitoes belonging to 4 genera (Anopheles, Aedes, Culex and Armigeres) were collected during the study period (Table 1). The diversity of mosquitoes in these

three villages showed the availability of resting places for males, and favorable ambient factors like temperature and rainfall. Though more diversity was seen but their density was less during the study period. The most dominant species collected were *Armigeres subalbatus* (48.1%) followed by *Aedes aegypti* (13.66) > *Culex quinquefasciatus* (11.62%) and the least collected species was *Ae. vittatus* (0.19%). Rudra and Chandra [9] reported a collection of 2306 mosquitoes belonging to 14 species and 6 genera in three seasons from four villages of Dooars forest in West Bengal, India and also reported that the number of mosquitoes were more in rainy and in winter season. Sevarkodiyone and Selvaraj Pandian [10] observed thin diversity of mosquitoes in villages near hills and hillocks at Vadipatti in Madurai district.

The adult anopheline mosquitoes were collected mainly from their resting place namely cattle shed. *An.stephensi* generally anthropophilic and exophilic in urban areas but in rural areas they are zoophilic and prefer to rest in cattle sheds [11]. *An.fluviatilis* a foot hill malarial vector even at low density [12] prefers cattle shed for resting [13]. In the present study the larvae of *An. subpictus* were collected from temporary pools near cattle shed and the adults are zoophilic, feeding mostly on bovines and occasionally on human and are reported as secondary vector of JE [14]

Among the genus culex, adult *Cx. quinquefasciatus* were collected in all three villages. They breed in water having high degree organic pollution and feed on wide variety of vertebrate hosts [15]. The larvae of *Cx. tritaeniorhynchus* and *Cx.vishnui* were collected in rice field near the villages in lesser density. These mosquitoes breed in clean water and the study period was also coincided with paddy cultivation. Kanojia et al. [16] have reported that the irrigation system and paddy cultivation provide a perennial source of breeding places for these mosquitoes.

Table 2 Biodiversity of mosquitoes recorded in the study area during the study period (Oct 2010-Feb 2011)

Name of the village	Genus Recorded	Number of species recorded	Percentage of occurrence index	Species richness
1.Rajathanikottai	Aedes	4	50.0	0.84
	Anopheles	1	12.5	
	Culex	3	25.0	
	Armigeres	1	12.5	
	Total	4	9	
2. Thouppampatti	Aedes	3	33.4	0.91
	Anopheles	3	33.4	
	Culex	3	22.2	
	Armigeres	1	11.1	
	Total	4	10	
3.Valaiyapatti	Aedes	1	14.3	0.69
	Anopheles	2	28.6	
	Culex	3	42.9	
	Armigeres	1	14.2	
	Total	4	7	

The adult *Ae.aegypti* and *Ae.albopictus* were collected in peridomestic areas in the selected villages. *Ae.aegypti*, the principle vector of dengue in urban areas invaded into the foothill villages due to the changes in the life style of villagers which provide ample breeding sources for these mosquitoes. In many places *Ae.aegypti* and *Ae.albopictus* larvae were collected at the same site (grinding stones and cement tanks). Wongkoon et al.[17] in Thailand collected both *Ae.aegypti* and *Ae.albopictus* larvae in concrete tanks near households in mountainous areas *Ae.albopictus* generally inhabits forest area [18, 17] and breed in tree holes but in mountainous areas they prefer to breed in artificial outside containers [19]

In all the three villages adult *Armigeres subalbatus* were collected more in number outside the house in the evening time. They are hematophagous; exophilic mosquitoes breed in foul smelling and stagnant water .[20]

Table 2 shows the species richness (' α ' index) of mosquitoes in the selected villages and the percentage of occurrence. Four species of anopheles, four species of aedes, three species of culex and one species armigeres were collected in all the three villages. The occurrence of *Armigeres subalbatus* and Aedes species were more in all three villages. The species richness index was comparatively higher in Thoupampatti village (0.91) followed by Rajathanikottai (0.84) and in Valaiyapatti (0.69).

The present study showed more diversity of mosquitoes during the study period in the selected three foot hill villages of Sirumalai Hills but their density were less. .

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