

CHAPTER - IV

**SEASONAL ABUNDANCE
AND
DISTRIBUTION**

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INTRODUCTION

Ecology plays an important role in pest management. The concept of ecological pest management is emerging fastly in pest control strategies. Hence, information on ecological aspects of a target species is essential. Geographical distribution, seasonal abundance, habitat, natural enemies, climatic factors are important aspects of ecology of a species. The population of a species is influenced by biotic and abiotic factors. Biotic factor refers to parasites, predators, pathogens, diseases, competations etc. and abiotic factor refers to temperature, humidity, rainfall, light, wind, topography etc. The seasonal abundance has relation with biotic and abiotic factors. Hence this aspect has great importance in ecology and pest management.

Sampling of insect population is an important task in population dynamics which estimate the number of species present in a target area. The information on seasonal abundance of a species suggests the time of occurrence and probable number of the species available in a specific region. Further, it helps in adopting appropriate control measures of target species. The information on seasonal abundance also help in understanding useful and harmful role of mosquito species in human health care of a region. Keeping in view all above facts the present work was carried out.

Review of literature showed that Beklemisher and Shipitsina (1957), Bhatia *et al.* (1958), Foote and Cook, (1959), Das *et al.* (1984), Rao, (1984), Nagpal and Sharma (1987) etc. have contributed on seasonal abundance of mosquitoes in India. However, very little attention is paid on the seasonal abundance of

mosquitoes in Maharashtra except scanty information of health care department.

MATERIALS AND METHODS

The seasonal abundance of mosquitoes have been studied in different places of Kolhapur district namely, Hatkanangale, Kagal, Ajra, Gadhinglaj, Jaysingpur, Panhala and Malkapur. Mosquitoes were collected with the help of suction tube (Fig. 7, 9) for 15 minutes at 15 days interval. The specimen collected during study period were identified by consulting appropriate literature and preserved in Department of Zoology, Shivaji University, Kolhapur. Distributional record of the species have also been studied by visiting and collecting the specimen from above places of Kolhapur district and previous distributional record (Table 1) is given by consulting appropriate literature.

RESULTS

The observations on seasonal abundance of mosquito species belonging to genera *Anopheles*, *Culex* and *Aedes* have been given in Table - 1 and distributional record of the species is given in Table - 2. The results indicate that the species *Anopheles culicifacies*, *Culex pipiens* and *Aedes aegypti* were abundant through out the year while *Aedes indica* sp.nov. was extremely rare. Other species recorded in Kolhapur district were moderate in their occurrence.

DISCUSSION

Success of controlling mosquito borne diseases is dependant on rapidity with which a situation can be currently evaluated. This, inturn, depends on having or quickly obtaining an accurate

population density of potential vector of disease in the area under consideration. The rate of mosquito borne diseases depends on the index of species of the region. The rapid separation and identification of mosquitoes of primary medical importance is an important step in the assessment of disease potential of an area. Review of literature indicates that Foote and Cook (1959), Rao (1984), Nagpal and Sharma (1987, 1995) studied the seasonal abundance of mosquitoes of medical importance in India.

Foote and Cook (1959) designed 32 regions of mosquitoes in the World. India and Ceylon is one of the world region which they visualized. Under this region they studied mosquito borne diseases, namely malaria, yellow fever, dengue, encephalitis and filariasis. They reported that the most important and wide spread vector of malaria in Central and Peninsular India is *Anopheles culicifacies*. This species was also the most important vector in Srilanka. In the foot hill areas of Peninsular India, *Anopheles fluviatilis* species was dominant for causing hyperendemic malaria. Foote and Cook (1959), they also reported *Anopheles varuna* from East-central India, *Anopheles stephensi* from Northern West-coast and Gangas plain, *Anopheles sundaicus* from Calcutta, southward to the middle of Peninsular India along the East coast and *Anopheles annularis* from Orissa.

Nagpal and Sharma (1987, 1995) reported 14 species of the genus *Anopheles* from different parts of India while, Rao (1984) reported 51 species of *Anopheles* and their subspecies and varieties from India giving type locality, taxonomy, distribution, adult bionomics, larval ecology and diseases. However, from Maharashtra State there is no published comprehensive list of *Anopheles* species. In the present study from Kolhapur district, Maharashtra four

species namely, *Anopheles culicifacies*, *An. stephensi*, *An. theobaldi* and *An. subpictus* have been reported. The most prevalent species of *Anopheles* in Kolhapur region was *Anopheles culicifacies* and *Anopheles subpictus* was rare in the region.

As like other states of India, malaria is common disease in Maharashtra, its incidence is studied during the years, 1992-2000 by Girhe and Sathe (2001). They reported that the incidence of malaria during the year 1992-1996 was increasing in order. Maximum, 700 infection cases have been reported during the year, 1996. However, the incidence of malaria declined from the years 1997-2000 by showing only 60 infection cases during the year 2000. The reasons for decline in malaria incidence were the proper strategies of mosquito control adopted by the health department and low rainfall in the region.

Foote and Cook (1959) mentioned the following centres of filariasis in India, the lower parts of the Ganges River basin, some sea-coast areas in Bihar and Orissa on the northeast coast and Travancore state in the south indicating prevalence of the *Culex annulifera* was the chief vector. In the present study, four species of *Culex* namely *Culex epidesmus*, *Culex pipiens*, *Culex modestus*, *Culex malayi* have been reported. As far as filariasis infection through mosquitoes is concern no report is available from Kolhapur region.

Foote and Cook (1959) reported that *Aedes aegypti* was common through out India. It was specially common after the rainy season in West Bengal and Madras but, it was less so in Western India and practically unknown in the mountain provinces along the northern western frontier. The other species, *Aedes albopictus* reported by them was not so closer to man and was less universally

distributed in India. From Maharashtra still a comprehensive list of *Aedes* species is to be published. The present work includes the first record of seven species of genus *Aedes* from Kolhapur district of which three species, *Aedes aegypti*, *A. indicus* and *A. uniformis* are known to science. However, *Aedes kolhapurensis* sp.nov., *A. indica* sp.nov., *A. punchgangi* sp.nov. and *A. sangiti* sp.nov. are newly described and reported from India.

TABLE - 1 DISTRIBUTION RECORD OF MOSQUITOES

Sr. No.	Species	Distribution record in Kolhapur District (Places)	Previous Distribution record in India
A)	Genus Anopheles -		
1	<i>An. culcifacies</i>	Kolhapur, Malkapur, Jaysingpur, Hatkanangale, Ajra, Panhala, Gadhinglaj, Kagal	West Bangal, Arunacha Pradesh, Utter Pradesh, Assam, Orisa, Tamilnadu, Maharashtra etc.
2	<i>An stephensi</i>	Kolhapur, Malkapur	Punjab, Uttar Pradesh, Bihar, Delhi, Goa, Gujrat, Haryana, Kashmir etc.
3	<i>An theobaldi</i>	Kolhapur, Malkapur, Gadhinglaj	Orissa, West Bangal, Uttar Pradesh, Madras, Maharashtra etc.
4	<i>An. subpictus</i>	Kolhapur, Malkapur	Andaman Islands and Lakshadweep, Maharashtra etc.
B)	Genus Culex		
1	<i>Culex epidesmus</i>	Kolhapur, Hatkanangale, Gadhinglaj	-
1	<i>C. pipiens</i>	Kolhapur, Kagal, Hatkanangale, Malkapur, Panhala, Ajra, Gadhinglaj, Jaysingpur	West Bangal, Uttar Pradesh
3	<i>C. modestus</i>	Kolhapur, Hatkanangale	-
4	<i>C. malayi</i>	Kolhapur, Kagal, Ajra	-
C)	Genus Aedes		
1	<i>Aedes aegypti</i>	Kolhapur, Kagal, Ajara, Panhala, Hatkanangale, Jaysingpur, Malkapur	Delhi, Madras, Assam etc.
2	<i>A. kolhapurensis</i> sp. nov.	Kolhapur, Hatkanangale	-
3	<i>A. uniformis</i>	Kolhapur, Panhala	Madras, West Bengal
4	<i>A. indicus</i>	Kolhapur, Panhala	-
5	<i>A. sangiti</i> sp. nov.	Kolhapur, Hatkanangale	-
6	<i>A. punchgangi</i> sp. nov.	Kolhapur, Panhala	-
D)	<i>A. india</i> sp. nov.	Kolhapur	-

TABLE - 2 : SEASONAL ABUNDANCE OF MOSQUITOES

Sr. Mosquito Species No.	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
01) <i>Anopheles culicifacies</i>	+	+	+	+	+	+	+	+	+	+	+	+
02) <i>Anopheles stephensi</i>	-	-	-	-	-	-	+	+	+	-	-	-
03) <i>Anopheles theobaldi</i>	-	-	-	-	-	+	+	-	+	-	-	-
04) <i>Anopheles subpictus</i>	-	-	-	-	-	-	-	+	+	-	+	-
05) <i>Culex epidesmus</i>	+	-	+	-	-	-	-	+	-	-	-	-
06) <i>Culex pipiens</i>	+	+	+	+	+	-	+	+	+	+	+	+
07) <i>Culex modestus</i>	-	-	-	-	-	+	-	-	+	-	-	-
08) <i>Culex malayi</i>	+	+	+	-	-	-	-	-	-	-	-	-
09) <i>Aedes aegypti</i>	-	+	+	+	+	-	-	+	+	+	+	+
10) <i>Aedes kolhapurensis sp.nov.</i>	-	+	-	-	-	-	-	+	-	-	-	+
11) <i>Aedes uniformis</i>	+	-	-	-	-	-	-	-	-	-	-	-
12) <i>Aedes indicus sp.nov.</i>	-	-	-	-	+	-	-	-	+	+	-	-
13) <i>Aedes sangiti sp.nov.</i>	-	-	-	-	-	-	-	-	-	-	+	+
14) <i>Aedes punchgangi sp.nov.</i>	-	-	-	-	-	-	-	-	-	-	+	+
15) <i>Aedes indica sp. nov.</i>	-	-	-	-	-	-	+	+	-	-	-	-