ISSN 2278 – 5442 EISSN 2278 – 5434

discovery life

Biodiversity of mosquitoes fauna of Tehsil Sironj, Vidisha, Madhya Pradesh, India

Rajesh K. Khatik[1☼], Surendra Goyal[2], Milin K. Agrawal[3]

1. Assistant Professor, Department of Zoology, Govt. LBS College, Sironj, Vidisha, MP. India; E- mail: saprerajesh@gmail.com
2. Dept. of Sericulture, Resham Project Kendra, Seronj, Vidisha, MP. India; E-mail: drsurendra.goyal70@gmail.com
3. Assistant Professor, Division of Microbiology, Department of Botany, St. Mary's P. G. College, Vidisha, MP. India; E-mail: drmilin.agrawal@gmail.com / drmilin_agrawal@yahoo.com

☼**Corresponding author**: Assistant Professor, Department of Zoology, Govt. LBS College, Sironj, Vidisha, MP. India. E-mail: saprerajesh@gmail.com

Publication History
Received: 21 January 2014
Accepted: 17 March 2014
Published: 1 April 2014

Citation
Rajesh K Khatik, Surendra Goyal, Milin K Agrawal. Biodiversity of mosquitoes fauna of Tehsil Sironj, Vidisha, Madhya Pradesh, India. *Discovery life*, 2014, 6(16), 31-35

ABSTRACT

The aim of the study was carried out the biodiversity of mosquito fauna in five villages of Tehsil Sironj, district Vidisha, Madhya Pradesh namely Bagroda (site-1), Bhatoli (site-2), Chaurakhedi (site-3), Deopur (site-4), Patan (site-5). A total number of 1647 mosquitoes that belongs to three genera i. e. Anopheles, Aedes and Culex and nine species i. e. *Anopheles annularis, Anopheles culicifacies, Anopheles fluviatilis, Anopheles subpictus, Aedes aagypti, Aedes albopictus, Culex quinquefasciatus, Culex triteaniorhynchus* and *Culex vishnui* were collected from five villages in and around from Oct. 2011 – Sep. 2012. Greater numbers of the culicines (56.89%) were collected from the area, as compared with the anophelines (30.66%).

Keywords: Biodiversity, mosquito, Anopheles, Aedes, Culex, Vidisha, Sironj.

1. 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 (Sathe and Girhe, 2001). Biodiversity encompasses the variety of all living organisms on the earth. India has rich biological diversity and one of the 12 mega diverse countries of the world (The biological diversity Act, 2003). Diversity of

© 2014 Discovery Publication. All Rights Reserved

insects is of great importance to the environmentalist as they are bioindicators. Among the insects, mosquitoes are medically important group of insects and they transmit diseases like malaria, dengue, filariasis and JE in India. In the recent years, the distribution range of both mosquitoes and mosquito borne diseases are proliferating in large number everywhere due to rapid urbanization, excessive deforestation, and resistance among mosquitoes to pesticides, construction of dams and development of new agro ecosystem (Edillo et al., 2004). Despite several attempts to control them, these remarkably adapted insects continue to coexist with man, feeding on him and his domesticated animals (Aditya et al., 2006). Hence it is essential to make an inventory of the diversity of mosquitoes in different places periodically (Pandian, 1998) to prevent the outbreak of mosquito borne diseases.

The diversity among insects has always been of keen interest to the entomologists but also to those who are engaged in different environmental program as insects are bio-indicators of environment (Devi and Jauhari, 2005). More than 3,400 species of mosquito have been recorded worldwide. 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 (Reuben, 1978). Malaria still remains as one of the greatest challenges of public health. Nearly two million people dies of malaria annually around the globe; at least one death occurs every 20second and another 200-500 million fall ill form it often severely (Abai et al., 2007). Mosquito borne diseases such as malaria, filaria, dengue, yellow fever and encephalitis are continuing to be major health problems for the people in tropical countries (Service, 1993). Mosquitoes alone transmit disease to more than 700 million people annually (Awolola et al., 2007). Malaria kills three million people annually. Including one child every 30 sec. (Black et al., 1988) therefore, protection from mosquito bites is one of the best strategies to reduce the disease or reduce the incidence.

Vidisha district of Madhya Pradesh is endemic for malaria and the control activities are mainly carried out in the municipal areas. In last few years, in the villages of Tehsil Sironj, Vidisha, cases of chikungunya and viral fever has been reported and hence in the present study an attempt has been made to find out the diversity of mosquitoes in the Tehsil Sironj, Vidisha, Madhya Pradesh.

2. MATERIALS AND METHODS

2.1. Study area

This study was carried out from October 2011 to September 2012. The study villages are at Tehsil Sironj, District Vidisha, M. P. and lies between 23^0 20' and 24^0 22' north latitudes, and 77^0 16' and 78^0 18' east longitudes. It covers an area of 7,371 km^2 (District administration. Retrieved 2010-08-19). The annual rainfall and temperature of District Vidisha is about 1100 mm and 23°C - 34°C respectively. The villages have about 200-250 houses and the main occupation of the people is agriculture, bricks making, cattle rearing etc.

Five Sampling site were selected of the Villages of Tehsil Sironj, District Vidisha namely (Figure 1 and 2).

Site-1: Village Bagroda
Site-2: Village Bhatoli
Site-3: Village Chaurakhedi
Site-4: Village Deopur
Site-5: Village Patan

2.2. Collection of mosquitoes

For the present study, adult mosquitoes that were resting indoor, outdoor and biting man were collected by:

1) Aspirator (Hausher, Gainesville, FL, USA) both oral and mechanical,
2) Spray sheet collection by spraying the room from four corner by Pyrethrum and collecting the knock down mosquito over a white cloth placed inside the room before spraying,
3) CDC-light trap (Hausher, Gainesville, FL, USA) during dawn and dusk.

Indoor collections were conducted by spraying pyrethrum with aerosol 0.6% Pyrethrin synergised with 1.4% Piperonyl butoxide to knock down the mosquitoes. Using forceps, the mosquitoes were picked up and transferred to test tubes with mesh screen cover. Outdoor collections were also conducted in the present study, both immatures and adults were collected randomly at different sites in the villages. Resting and biting adult mosquitoes were collected in the evening between 6.00 to 8.00 pm near cattle shed and human dwellings using mechanical aspirator and human landing method. The collected specimens were preserved in plastic vials for later identification. Immature forms of mosquitoes were collected by dipper method (WHO, 1975) and reared in enamel trays in the laboratory. The emerged adults were collected and stored in vials and all the collected mosquitoes were identified using pertinent

© 2014 Discovery Publication. All Rights Reserved

Figure 1

Site Map of Sironj Tehsil

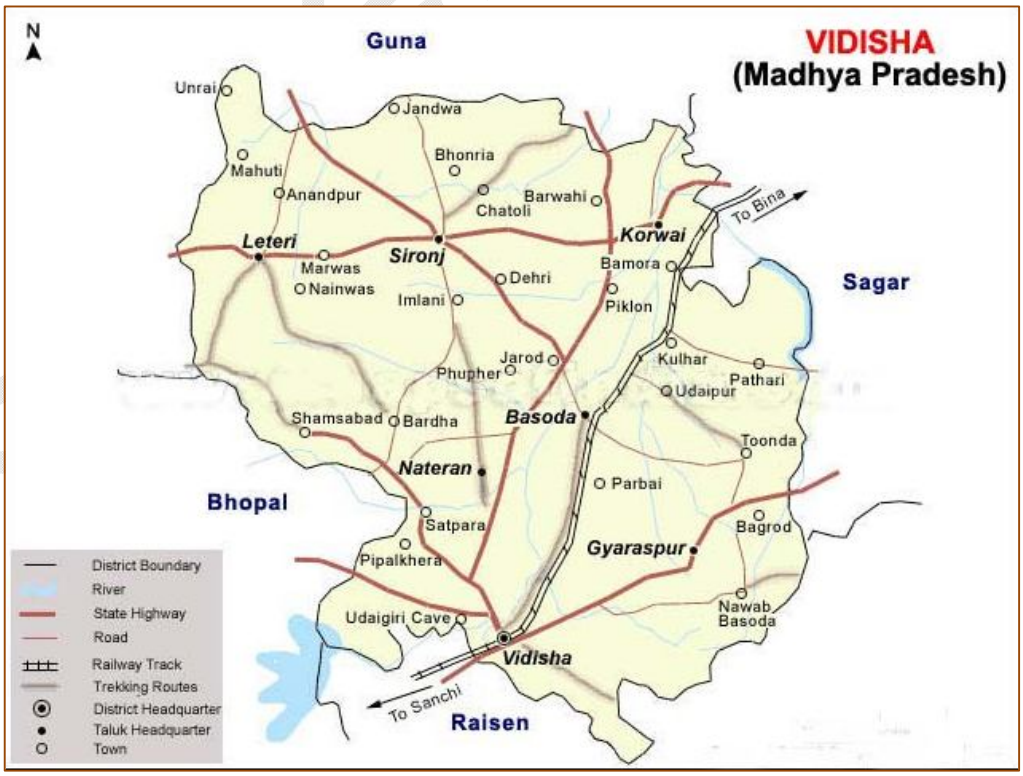

Figure 2

Site Map of Vidisha District

Rajesh K. Khatik et al.
Biodiversity of mosquitoes fauna of Tehsil Sironj, Vidisha, Madhya Pradesh, India,
Discovery life, 2014, 6(16), 31-35,
www.discovery.org.in/dl.htm

www.discovery.org.in
© 2014 Discovery Publication. All Rights Reserved

Table 1
Showing Mosquito Sp. collected in Tehsil Sironj.

Se. No.	Species of mosquitoes	Total number of mosquitoes collected	% of total collection	Inter generic variations of collected mosquitoes (%)	Intra generic variations of collected mosquitoes (%)
01.	*Anopheles annularis*	11	0.67	30.66	2.17
02.	*Anopheles culicifacies*	148	8.98		29.31
03.	*Anopheles fluviatilis*	54	3.28		10.69
04.	*Anopheles subpictus*	292	17.73		57.83
	Total of Genus collected	**505**	**30.66**		**100.00**
05.	*Aedes aegypti*	43	2.61	12.45	20.98
06.	*Aedes albopictus*	162	9.84		79.02
	Total of Genus collected	**205**	**12.45**		**100.00**
07.	*Culex vishnui*	113	6.86	56.89	12.06
08.	*Culex triteaniorhynchus*	307	18.64		32.76
09.	*Culex quinquefasciatus*	517	31.39		55.18
	Total of Genus collected	**937**	**56.89**		**100.00**
	Grand Total	**1647**	**100.00**	**100.00**	

keys (Christophers, 1933; Barraud, 1934; Rao, 1984). The percentages (%) of total collection, inter and intra generic variations of collected mosquitoes done by the following formulas:

$$\text{Total collection of mosquitoes} = \frac{\text{Total number of species collected}}{\text{Grand Total}} \times 100$$

$$\text{Inter generic variations of collected mosquitoes} = \frac{\text{Total number of genus collected}}{\text{Grand Total}} \times 100$$

$$\text{Intra generic variations of collected mosquitoes} = \frac{\text{Total number of species collected}}{\text{Total of genus collected}} \times 100$$

3. RESULTS

In the present study, a total of 1994 adult mosquitoes were collected, belonging to 09 species in 03 genera: Anopheles (04 spp., n = 505), Aedes (02 spp., n = 205) and Culex (03 sp., n = 937) at different sites in the villages during October 2011 to September 2012 namely *Anopheles annularis, Anopheles culicifacies, Anopheles fluviatilis, Anopheles subpictus, Aedes aagypti, Aedes albopictus, Culex quinquefasciatus, Culex triteaniorhynchus* and *Culex vishnui* (Table 1). The genus Culex (56.89%) was more dominant than the Anophelines (30.66%) and Aedes (12.45%). Among the 09 species, the most dominant species was *Culex quinquefasciatus* (31.39%) followed by *Culex tritaeniorhynchus* (18.64%), *Anopheles subpictus* (17.73%), *Aedes albopictus* (9.84%), *Anopheles culcifascies* (8.98%), *Culex vishnui* (6.86%) and least collected species were *Anopheles fluviatilis* (3.28%), *Aedes aegypti* (2.61%) and *Anopheles annularis* (0.67%). The results showed maximum diversity of mosquitoes during the study period which may due to the availability of permanent and temporary breeding places, resting places, suitable rainfall, temperature and humidity.

4. DISCUSSION

Among the mosquitoes collected during the study period, the genus Culex was the most dominant one (56.89%). *Culex quinquefasciatus* was recorded as the predominant species and they are the principal vector of bancrofitian filariasis, predominantly found in the tropics and temperate regions (Sharma, 2001). It is known as "house mosquito"

© 2014 Discovery Publication. All Rights Reserved

and anthropophilic in nature. The larvae of this mosquito were collected in open ditches, paddy fields, ponds and they thrive abundantly in stagnant dirty water (Mak, 1986; Hidayati et al., 2005). The lack of adequate waste water disposal and poor sanitation provide a rich source of breeding places of this mosquito.

Anopheleses are most dangerous amongst the three genera and are responsible for spreading of malaria. Among Anopheles*, Anopheles fluviatilis* and *Anopheles culicifacies* adults were collected near cattle shed and these two species are major rural malarial vectors in India. There is acute need of action to reduce the breeding sites of mosquitoes and public awareness regarding mosquitoes and the diseases caused by them.

The next predominant species was *Aedes aegypti* and *Aedes albopictus.* The larvae were collected in coconut shell, plastic cups, cement tanks, tyre and grinding stones with full of water and the adults were collected in early evening hours near human dwellings. The Asian tiger mosquitoes *Aedes aegypti* and *Aedes albopictus* are the main vectors of dengue fever in the tropical and subtropical regions (Hammond, 1966; Knudsen, 1995).

The mosquito fauna presented a sizeable number of specimens in February, followed by a large increase in April and a decline in June and August. In October, the number of specimens began to increase again. The Anophelines were favoured in April and mainly in June and October, when the population curve was above the confidence interval. The least favourable period was from December-February. For the representatives of the Culicines, the period between December-April was the most favourable, while the lowest abundances were recorded between June-October.

5. CONCLUSION

In the present study, there was a higher diversity of the culicines than anophelines in the same area. The reduction of anopheline diversity in and around selected area may be associated with the major ecological changes, including the extensive use of insecticides, modified agricultural practices, increased industrial development, natural calamities and other factors. The population densities of the local mosquito vectors in numerous countries are affected by deforestation and subsequent land uses (Yasuoka et al., 2007). In this study, results on species diversity may help in the future planning of vector control measures. Results of this study also support the reports by the Primary Health Centre (PHC) regarding the decrease of malarial cases from selected villages of Sironj Tehsil of Vidisha District.

REFERENCES

1. Abai MR, Hamidian SA, Ladonni H, Hakimi M, Esmail KM, Sheikhzadeh K, Kousha A, Vatandoost H. Fauna and Checklist of Mosquitoes (Diptera: Culicidae) of East Azerbaijan Province, Northwestern Iran. *Iranian J Arthropod-Borne Dis*, 2007, 1 (2), 27-33.
2. Aditya G, Pramanic MK, Saha GK. Larval habitats and species composition of mosquitoes in Darjeeling Himalayas, India. *J. Vecr Borne Dis*., 2006, 43 (1), 7-15.
3. Awolola TS, Oduola AO, Obansa JB, Chukwurar NJ, Unyimadu JP. *Anopheles gambiae s.s.* breeding in polluted water bodies in urban lagos, Southwestern Nigeria. *J Vect Borne Dis*, 2007, 44, 241-244.
4. Barraud PJ. The fauna of British India including Ceylon and Burma. Diptera, Vol V, 1934, Taylor and Francis, London.
5. Black CW, Ferrari AJ, Rai SK, Sprenger D. Breeding structure of a colonising species: *Aedes albopictus* (Skuse) in the United States. *Heredity*, 1988, 60, 173-181.
6. Christophers SR. The fauna of British India including Ceylon and Burma. Diptera Family Culicidae, Tribe Anophelini. Vol IV, 1933, Taylor and Francis, London.
7. Devi NP, Jauhari RK. Habitat biodiversity of mosquito richness in certain parts of Garhwal (Uttaranchal), India. Southeast Asian *J. Trop. Med. Pub. Health*, 2005. 36 (3), 616-622.
8. District administration. Retrieved. 2010-08-19
9. Edillo FE, Toure YT, Lanzaro GC, Dolo G, Taylor CE. Survivorship and distribution of immature *Anopheles gambiae s.l.* (Diptera: Culicidae) in Banambani Village, Mali. *J. Med. Entomol*, 2004, 41 (3), 333-339.
10. Hammond WM. Bulletin World Health Organisation, 1966, 44, 643-649.
11. Hidayati H, Mohd. SA, Nazni WA, Lee HL. Insecticide resistance development in *Culex quinquefasciatus* (Say), *Aedes aegypti* (L.) and *Aedes albopictus* (Skuse) larvae against malathion, permethrin and temephos. *Tropical Biomedicine*, 2005, 22 (1), 45-52.
12. Knudsen AB. Global distribution and continuing spread of *Aedes albopictus*. *Parasitologia*, 1995. 37 (2), 91-97.
13. Mak JW. Problems in filariasis control and the need for human behaviour and socio-economic research. *Southeast Asian journal of Tropical Medicine and Public Health*, 1986, 17, 479-485.
14. Pandian RS. Biodiversity of mosquito fauna and efficacy biopesticides against mosquitoes in an urban area in Tamilnadu, *Indian journal of Environmental Science*, 1998, 2, 7-10.
15. Rao RT. The Anophlines of India. *Indian Council of Medical Research, New Delhi.* 1984.
16. Reuben R. A report on mosquitoes collected in the Krishna-Godavari delta, Andhra Pradesh. *Indian J. Med. Res*, 1978, 68, 603-609.
17. Sathe TV, Girhe BE. Biodiversity of mosquitoes in Kolhapur district. Maharashtra. *Rivista D Parassitologia*, 2001, XVIII (LXII) (N.3), 193-198.
18. Service MW. Mosquitoes (Culicidae). In: Lane RP, Crosskey RW, editors. *Medical insects and archnids*. 1993, pp. 120-246. Champin & Hall, London.
19. Sharma VP. Health hazards of mosquito repellents and safe alternatives. *Current Science*, 2001, 80 (3), 341-342.
20. The biological diversity Act. National Biodiversity Authority, India, 2003, pp. 57.
21. WHO. Manual on practical entomology in malaria vector bionomics and organization of antimalarial activities. 1975, Part I and part II, Offset Publication, No.13, Geneva.
22. Yasuoka J, Levins R. Impact of deforestation and agricultural development on anopheline ecology and malaria epidemiology. *American Journal of Tropical Medicine and Hygiene*, 2007, 76 (3), 450-460.

© 2014 Discovery Publication. All Rights Reserved