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DISTRIBUTION AND LARVAL BREEDING HABITATS OF *AEDES AEGYPTI* MOSQUITOES IN AND AROUND URBAN AREA OF HANUMANGARH

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Abstract

Introduction: - *Aedes aegypti* is most common causative agent of Dengue fever. Dengue is a mosquito borne viral disease occurring in tropical and subtropical areas. Dengue fever is most important arboviral infection which takes place in human being. The main aim of this research work is to detect breeding habitat and diversity of *Aedes aegypti* in urban area of Hanumangarh Rajasthan.

Methodology: - The adult *Aedes aegypti* mosquitoes were collected through different size of aspirators from various breeding habitat while larval stages collected and identified in laboratory.

Result: - A total of 750 containers were studied from outdoor and indoor sites of 8 breeding habitats. Most of the *Aedes aegypti* were found form the outdoor breeding sites as compared to indoor one. The most common breeding sites for *Aedes aegypti* was containers in Plastic Drum, Mud pot, Tyres, House hold, Bird water point, Stagnant water, Cattles water point and Pipe leakage etc.

Conclusion: - These studies indicates that the *Aedes aegypti* has adapted to breed in clean and clear water (tap and/or rain water).

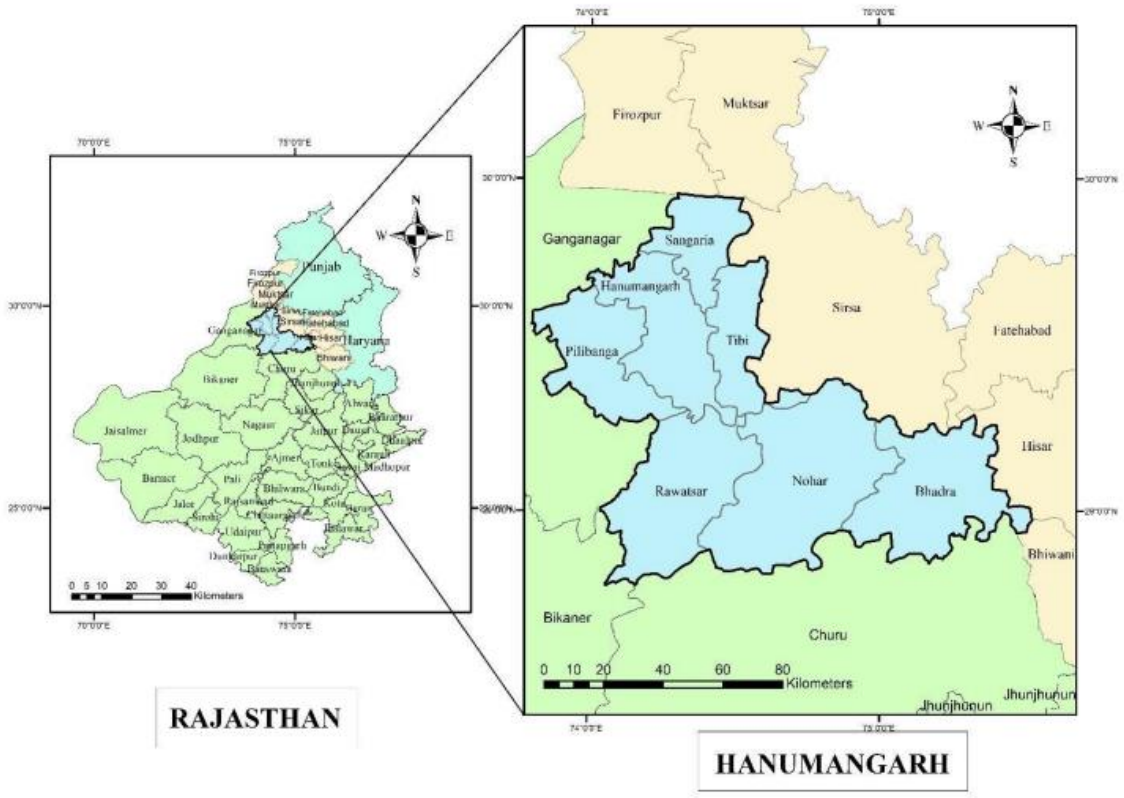
Key Words: - *Aedes aegypti*, breeding site, arboviral, dengue.

Introduction: - *Aedes aegypti* is most common causative agent of Dengue fever. Dengue is a mosquito borne viral disease occurring in tropical and subtropical areas. Dengue fever is most important arboviral infection which takes place in human being. The main aim of this research work is to detect breeding habitat and diversity of *Aedes aegypti* in urban area of Hanumangarh Rajasthan. *Aedes* has 950 species worldwide, out of which 115 species of *Aedes* has been reported from India. *Aedes albopictus* also found in similararea of distribution in Asia and played as a vector for Dengue and Chikunguniya [1].

The district headquarter Hanumangarh is situated on the bank of Ghaggar River which is the present form of the last mythological river Saraswati. Ghaggar River, which is called as 'Nali' in local dialect divides the district headquarter into two parts. In the north of Ghaggar River, Hanumangarh Town and in the south the habitation of Hanumangarh Junction is situated.

Originating in Africa, *Aedes aegypti* probably invades other transcontinental via trading and transport ships that resupplied in Africa ports during the fifteen through seventeenth centuries [2, 3]. In todays scenario *Aedes aegypti* is widespread in Asia [4] and following epidemic dengue activity experienced in south-east Asia [5]. Although *Aedes aegypti* currently has a wide distribution in maximum tropical and subtropical region. The current distribution on does not reflect the maximum range of its potential distribution as defined by historical records.

Urban areas with high-density of water storage receptacles are suitable for breeding of *Aedes* mosquitoes [6]. In most of these areas small number of *Aedes* breeding habitats exist even during the adverse months of the year and consistently serve as the primary producers of *Ae. aegypti*, referred as "Key Containers" [7] which are region specific for *Aedes* breeding site. [8]. Key containers in Philippines include plastic & metal drums and plastic containers [9] while it is roof gutters in Australia [10]. In India, cement tanks and plastic containers were identified as major breeding habitats of *Aedes aegypti* [11–12]. In the capital city Delhi, India overhead tanks and curing tanks were identified as key containers of *Aedes* breeding [12].



Courtesy-District Environment Plan - MNIT Jaipur, Rajasthan

Fig 1: - Area map of Hanumangarh

Methodology: - The latitude of Hanumangarh, Rajasthan, India is 29.625996, and the longitude is 74.287491. Hanumangarh, Rajasthan, India is located at India country in the Cities place category with the GPS coordinates of 29° 37' 33.5856" N and 74° 17' 14.9676" E. Periodic investigation were undertaken from Jan. 2023 to Dec. 2023. Mosquitoes and larval stages were collected with the help of suction tube and torch and dipping method for larval stage. Specimens were reared in laboratory and identified using standard taxonomic keys as given by Roy & Brown (2003) [13].

The adult *Aedes aegypti* mosquitoes were collected through different size of aspirators from various breeding habitat while larval stages collected and identified in laboratory.Mosquito larvae were collected from discarded tires and other artificial containers with a plastic cup, pipette, or classical dipper. To decrease the effect of disturbance, tires and other larger containers were approached cautiously and the cup was immersed fast at the water surface instead of slowly "scooping" the water. For smaller containers the water was transferred to pans for immature stages collection. Water in tires and containers of which the opening was too narrow was sucked up with a pipette.

Table 1: Month wise density (No. per man hour) of mosquito *Aedes aegypti* in Hanumangarh city (Jan 2023 to Dec 2023) values are monthly average data of one year

Month	Bus stand and railway Junction area	Satipura	Suresia	Civil lines	P&T Colony	Canal colony
January	NR	NR	1	0	NR	1
February	NR	NR	1.5	0	NR	1.25
March	2.25	1.25	2.5	1	NR	3.25
April	2.75	1	3.15	1.5	1.5	2.25
May	1.75	1.15	3.75	1.25	1.25	3.15
June	2.25	3.25	4.75	2.5	2.25	4.75
July	6.75	6.75	7.25	4.15	4.25	7.15
August	15.5	11.15	16.5	8.75	8.15	18.75
September	19.15	13.5	23.25	10.75	9.75	22.15
October	14.5	12.15	18.25	6	6	15.75
November	3	4	3.15	NR	2.25	1.15

December	1	NR	0	NR	NR	NR
Total	**68.9**	**54.2**	**82.55**	**35.9**	**35.4**	**78.35**

NR: Not reported

Table 2: Occurrence and abundance (No. per man hour) of mosquito *Aedes aegypti* in Hanumangarh city (Values are monthly average of one year data) (Jan 2023 to Dec 2023)

Month	Plastic drum	Mud pot	Tyres	House hold	Bird water point	Stagnant water	Cattles water point	Pipe leakage
January	–	–	–	–	–	–	–	–
February	–	–	–	–	1	–	–	–
March	2	3	4	2	3	–	2	1
April	2	3	5	3	5	3	4	3
May	2	2	2	4	6	3	3	4
June	4	1	3	5	15	2	6	4
July	5	4	5	11	10	4	8	6
August	7	7	6	10	12	7	14	7
September	5	5	4	12	13	5	10	9
October	7	2	2	8	9	5	6	6
November	–	–	–	5	6	2	5	1
December	–	–	–	4	4	2	5	–
Total(377)	**34**	**27**	**31**	**64**	**84**	**33**	**63**	**41**

Result

A total of 750 containers were studied from outdoor and indoor sites of 8 breeding habitats. Most of the *Aedes aegypti* were found form the outdoor breeding sites as compared to indoor one. The most common breeding sites for *Aedes aegypti* was containers in Plastic Drum, Mud pot, Tyres, House hold, Bird water point, Stagnant water, Cattles water point and Pipe leakage etc. (Table 2)

The preffered locations of *Aedes aegypti* was Suresiya (**82.55**) followed by Canal colony (**78.35**) Bus stand and railway Junction area (**68.9**). (Table1)

The preffered breeding habitats of *Aedes aegypti* was Bird water points (84.22%) followed by House hold (64.17%) and cattle water point (63.17%). (Table 2)

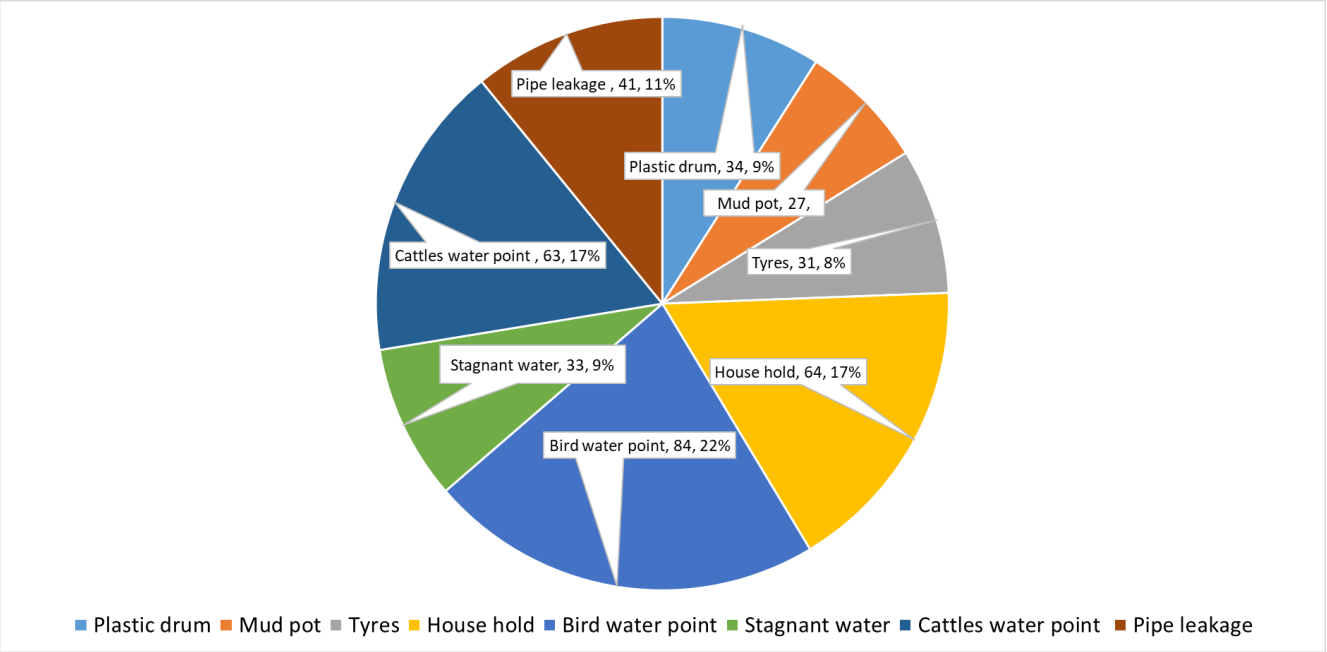


Fig 2:-Occurrence and abundance (No. per man hour) of mosquito *Aedes aegypti* in Hanumangarh city (Values aremonthly average of one-year data) (Jan 2023 to Dec 2023)

Discussion

Water quality parameters of aquatic habitats may also play a critical role in determining the survival rate of mosquitoes [17, 19]. *Aedes aegypti* exhibits a great deal of specialization in breeding site selection and consequently the distribution of this species is limited by those sites [20]. Since the presence of water in containers is probably the most important factor in determining the breeding of mosquitoes, especially *Aedes* and Culex species, a mosquito control programme should be established in Hanumangarh city. For the control of container breeding mosquitoes it is possible to use different methods in integration and these include covering water holding containers [16, 34], using appropriate biological control agents [16], public health education [14, 15, 21], creating knowledge and awareness of the residents on mosquito-borne diseases [21], eliminating water-filled unused containers [14, 15], draining of containers once a week [18], and proper waste management system for all housing areas [15]. However, targeting specific types of water-holding containers would enable a more focused approach to vector control than attempting to eliminate all water-holding containers [22].

Conclusion

These studies indicate that the *Aedes aegypti* has adapted to breed in clean and clear water (tap and/or rain water). This study involved only collection and identification of mosquito larvae from tires, household containers, and discarded water holding materials so that it needs further investigation to look for mosquito larvae in natural water holding containers and larger water tanks. There has to be a viral isolation through collecting the adult females to look if they harbor the dengue disease pathogen. It also needs awareness creation of the population not to be affected by the disease in case epidemic may occur.

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