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# Seasonal fluctuations of *Aedes aegypti* (Diptera; Culicidae) in some areas of Udaipur city, Rajasthan

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**Abstract**
Surveys on the seasonal fluctuation of *Aedes aegypti* were under taken in some areas of Udaipur during April 2016 to March 2017. The *Aedes aegypti* population was present to be prevalent in all the sites in Udaipur. Water containers, tires, tin cans, bucket, flower pots were found to be the preferred breeding habitats of *Aedes* mosquitoes in the city. The adult mosquitoes rest in cool shaded place such as under furniture, laundry areas and cupboards. Out of 6722 houses surveyed 156 houses and 139 containers were reported positive for *Aedes aegypti*. The house container index and breteau index were increased during the post – monsoon season. The containers indices was very high (8.2%) in the Rampura area in September 2016. The container index in the areas of the Pratap Nagar and Tekri were recorded to be high during the same duration. The house index for *Aedes aegypti* ranged from 0.5 to 10.0, 0.5 to 9.6 and 0.4 to 10.5 in the Pratap Nagar, Tekri and Rampura respectively.

**Keywords:** *Aedes aegypti*, Udaipur city, Breteau index, house index, container index

## Introduction
Dengue infection is very important viral disease that passes through mosquitoes to humans. Today it infects 125 countries. This disease is a serious public health issue in the tropical and sub tropical areas and an affects estimated 2.5 billion people are living in areas. Mattingly (1957) [6] suggested that the breeding habitats used by *Aedes aegypti* are rock holes, then shaded rock holes, then horizontal fallen tree and finally holes in vertical standing trees. Brett (1938) [1] proved that dark coloured clothing was preferred by *Aedes aegypti*. Black colour is the most attractive colour for *Aedes aegypti* followed by red which also has a similar low reflectance factor. White colour was avoided because of its high reflection factor and yellowish khaki showed to be more repellent than white. Globally *Aedes* has 950 species out of which 115 species of *Aedes* has been reported from India. *Aedes albopictus* also has similar area of distribution in Asia and played vector for Dengue and Chikunguniya (FL Soper, 1967) [7].

## Materials and Methods
In the year April 2016 to March 2017 surveys were carried out in some locations of the city irrespective of the risk for dengue/ DHF. Different areas *viz.* Pratap Nagar, Tekri and Rampura were surveyed in Udaipur city. The entomological indices: House Index (HI), Container Index (CI), and Breteau Index (BI) were used for measuring the larval population. The data on larval collections were recorded in the pre-arranged and pre-planned survey forms. The larval Identification was done by using taxonomic Keys. The data were examined and different indices like house index (HI) container index (CI) and Breteau index (BI) were counted.

House Index = No. of house positive (Larval)/No. of house inspected*100
Container Index = No. of container positive/No. of container inspected*100
Breteau Index = No. of container positive/No. of house inspected*100

## Results and Discussions
The data for *Aedes aqgypti* in the different areas is shown in Table 1, 2, 3. During the pre monsoon season overhead tanks and cement tanks served as breeding sites for *Aedes aegypti.* The breeding of *Aedes aegypti* spreads to other habitats such as coolers, containers and tyres in post monsoon. Out of 6722 houses surveyed, 156 houses and 138 countainers were reported positive for *Aedes aegypti*. The house index, container index and breteau index were increased during the post-monsoon season. The container indices was very high (8.2%) in the Rampura area in September 2016. The entomological indices *viz.* house index, container index and breteau index for the number of *Aedes aegypti* increase from July to October and declined afterwards. The increase in breeding indices during the post-monsoon period was due to the increased quantity of potential breeding areas due to the rains in these months. Dewan Chand *et al*. (1961) [2], Krishna Marthg *et al.* (1965) [5] and Katyal *et al.* (1996) [4] suggested higher densities of *Aedes aegypti* in the month of October. In Southeast Asia, strong correlation was amongst dengue vectors and rainfall has been well established Gould *et al*. (1970) [3]. *Aedes albopictus* were also reported in Udaipur city in present study.

**Table 1:** Data for *Aedes aegypti* in Tekri area.

| Months | Total Houses checked | Total House Positive | Total Container checked | Total Container Positive | HI | CI | BI |
|---|---|---|---|---|---|---|---|
| April 2016 | 153 | 1 | 167 | 1 | 0.6 | 0.5 | 0.6 |
| May 2016 | 147 | 2 | 157 | 1 | 0.3 | 0.6 | 0.6 |
| June 2016 | 187 | 4 | 191 | 5 | 2.1 | 2.5 | 2.6 |
| July 2016 | 143 | 7 | 153 | 6 | 4.8 | 3.9 | 4.1 |
| August 2016 | 189 | 5 | 193 | 4 | 2.6 | 2.0 | 2.1 |
| September 2016 | 186 | 18 | 196 | 15 | 9.6 | 7.6 | 8.0 |
| October 2016 | 193 | 4 | 201 | 5 | 2.0 | 2.4 | 2.5 |
| November 2016 | 197 | 2 | 205 | 3 | 1.0 | 1.4 | 1.5 |
| December 2016 | 196 | 1 | 203 | 2 | 0.5 | 0.9 | 1.0 |
| January 2017 | 201 | 0 | 207 | 0 | 0 | 0 | 0 |
| February 2017 | 198 | 0 | 211 | 0 | 0 | 0 | 0 |
| March 2017 | 185 | 1 | 204 | 1 | 0.5 | 0.4 | 0.5 |
| Total | 2175 | 45 | 2288 | 43 | 2.0 | 1.8 | 1.9 |

HI = House Index; CI = Container Index; BI = Breteau Index

**Table 2:** Data for *Aedes aegypti* in Pratap Nagar area.

| Months | Total Houses checked | Total House Positive | Total Container checked | Total Container Positive | HI | CI | BI |
|---|---|---|---|---|---|---|---|
| April 2016 | 192 | 2 | 182 | 1 | 1.0 | 0.5 | 0.5 |
| May 2016 | 171 | 3 | 187 | 1 | 1.7 | 0.5 | 0.5 |
| June 2016 | 197 | 5 | 203 | 7 | 2.5 | 3.4 | 3.5 |
| July 2016 | 203 | 9 | 190 | 9 | 4.4 | 4.7 | 4.4 |
| August 2016 | 160 | 8 | 115 | 6 | 5.0 | 5.2 | 3.7 |
| September 2016 | 190 | 19 | 187 | 13 | 10.0 | 6.9 | 6.8 |
| October 2016 | 205 | 5 | 193 | 4 | 2.4 | 2.0 | 1.9 |
| November 2016 | 190 | 2 | 186 | 4 | 1.0 | 2.1 | 2.1 |
| December 2016 | 197 | 1 | 202 | 1 | 0.5 | 0.4 | 0.5 |
| January 2017 | 198 | 0 | 190 | 0 | 0 | 0 | 0 |
| February 2017 | 192 | 1 | 192 | 1 | 1.5 | 0.5 | 0.5 |
| March 2017 | 200 | 2 | 194 | 2 | 1.0 | 1.0 | 1.0 |
| Total | 2295 | 57 | 2221 | 49 | 2.4 | 2.2 | 2.1 |

HI = House Index; CI = Container Index; BI = Breteau Index.

**Table 3:** Data for *Aedes aegypti* in Rampura area.

| Months | Total Houses checked | Total House Positive | Total Container checked | Total Container Positive | HI | CI | BI |
|---|---|---|---|---|---|---|---|
| April 2016 | 171 | 2 | 174 | 1 | 1.1 | 0.5 | 0.5 |
| May 2016 | 167 | 3 | 172 | 1 | 1.7 | 0.5 | 0.5 |
| June 2016 | 195 | 5 | 201 | 6 | 2.5 | 2.9 | 3.0 |
| July 2016 | 148 | 8 | 159 | 8 | 5.4 | 5.0 | 5.4 |
| August 2016 | 197 | 6 | 110 | 5 | 3.0 | 4.5 | 2.5 |
| September 2016 | 189 | 20 | 205 | 17 | 10.5 | 8.2 | 8.9 |
| October 2016 | 198 | 5 | 207 | 4 | 2.5 | 1.9 | 2.0 |
| November 2016 | 200 | 3 | 209 | 3 | 1.5 | 1.4 | 1.5 |
| December 2016 | 205 | 1 | 201 | 0 | 0.4 | 0 | 0 |
| January 2017 | 201 | 0 | 197 | 0 | 0 | 0 | 0 |
| February 2017 | 194 | 0 | 206 | 0 | 0 | 0 | 0 |
| March 2017 | 187 | 1 | 200 | 2 | 0.5 | 1.0 | 1.0 |
| Total | 2252 | 54 | 2241 | 47 | 2.3 | 2.0 | 2.0 |

HI = House Index; CI = Container Index; BI = Breteau Index.

## Conclusions

The *Aedes aegypti* population was present to be prevalent in all the sites in Udaipur. Water containers, tires, tin cans, bucket, flower pots were found to be the preferred breeding habitats of *Aedes* mosquitoes in the city. The adult mosquitoes rest in cool shaded place such as under furniture, laundry areas and cupboards. Out of 6722 houses surveyed 156 houses and 139 containers were reported positive for *Aedes aegypti.* The house container index and breteau index were increased during the post - monsoon season. The containers indices was very high (8.2%) in the Rampura area in September 2016. The container index in the areas of the Pratap Nagar and Tekri were recorded to be high during the same duration. The house index for *Aedes aegypti* ranged from 0.5 to 10.0, 0.5 to 9.6 and 0.4 to 10.5 in the Pratap Nagar, Tekri and Rampura respectively.

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