Journal of Fundamental and Applied Sciences

ISSN 1112-9867

Available online at http://www.jfas.info

Research Article

Special Issue

POTENTIAL BREEDING SITES FOR AEDES ALBOPICTUS AND AEDES AEGYPTI: ASSESSMENT AGAINST DIFFERENT CONTAINER TYPES

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Published online: 10 November 2017

ABSTRACT

An assessment towards potential breeding sites for Aedesmosquitoeson different types of container was conducted in the UniversitiTeknologi MARA, Tapah Campus and other three peripheral areas.Sample was collected by dipping using pipette. A total of 34 containers were identified as positive out of total 147 containers surveyed. Plastic container recorded the highest number of positive container (41%), followed by can and tyre (12%), natural container, vase and old furniture (9%), bottle (6%) and water dispenser (3%). Kg TersusunBatu 3 showed the highest number of positive container (N=16), followed by Kg Tapah Road (N=12), Taman Tapah (N=4) and UiTMTapah (N=2). The number of Ae. albopictus (85%) collected was higher and found in all locationas compared to Ae. aegypti (15%). Source reduction by eliminating any potential breeding sites can be implemented to curb the population of Aedes mosquitoes.

Keywords: Aedesalbopictus, Aedesaegypti, breeding sites, container, university

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doi: http://dx.doi.org/10.4314/jfas.v9i6s.58

1. INTRODUCTION

Developmental activities and untreated household wastes have accentuated the problem of dengue vector proliferation directly or indirectly [1][2].Aedesalbopictus and Aedesaegypti are the two mosquitoes species that are responsible for the transmission of dengue in Malaysia[3]. They can be found in various places including artificial and natural containers [3].Artificial containers are made up of materials like rubber, plastic, pottery (earthen) and porcelain [2]. The container dwelling mosquitoes like Aedes spp. able to exploit these containers as larval habitats as it can hold substantial amount of water and make it suitable for breeding sites[4]. Presence of mosquito breeding sites permits oviposition of more gravid female mosquitoes thus increase their population[5]. Many dengue cases are also recorded in the campuses of higher learning institutions in Malaysia[6]. However, only few larval surveys are conducted in these campuses, and because of such lack of information may affected the effectiveness of dengue control programs by university and local authorities. Therefore, this study was conducted to determine the container breeding preferences of Aedes mosquitoes by larval survey in the campus of the UniversitiTeknologi MARA, Perak Branch, Tapah Campus and selected areas peripheral to this campus.

2. METHODOLOGY

The container survey was conducted for four months from December 2016 to March 2017 in the campus of the UniversitiTeknologi MARA, Perak Branch, Tapah Campus. The three other places near to this campus were also chosen namely Taman Tapah, KampungTersusunBatu 3 and KampungTapah Road. The campus is located in between trunk road of Kuala Lumpur and Ipoh and adjacent to two major neighbouring town which are Kampar and Bidor. The landscape of the campus encompasses of administrative and academic buildings, hostels and planted with ornamental trees. This study was conducted according to the method described by [6]. Sample collection was carried out by dipping, using pipette;and then the number, type and water condition of containers that may serve as potential breeding sites were examined and recorded accordingly [6]. The water sample from collected containers were kept in the laboratory for further observation and the emerged adult mosquitoes were then pinned and identified[6].

3. RESULTS AND DISCUSSION

Table 1 presents the total numbers of surveyed containers from four locations, whereas Fig. 1 presents the percentage of positive containers according to the types of container. A total of 147 containers were surveyed as potential breeding sites for Aedes mosquitoes. However, only 34containers were identified as positive which showing the presence of larvae. As expected in our preliminary study, plastic containers recorded the highest number of positive containers (N = 14; 41%), followed by can and tyre (N=4; 12%), natural container, vase and old furniture (N=3, 9%), bottle (N=2, 6%) and water dispenser (N=1, 3%). In terms of location, Kg TersusunBatu 3 showed the highest number of positive container (N=16), followed by Kg Tapah Road (N=12), Taman Tapah (N=4) and the least is UiTMTapah (N=2). The proactive measures taken by university authorities like scheduled maintenance of the landscape, proper waste management and pest control has eliminated the potential site for Aedes breeding thus contributed to this result. The selected areas mentioned in this study were surrounded by houses with some of it with poor drainage systems and ornamental plants can be easily found in their premises compound. According to[7]the formation of stagnant water should be avoided and it can be done when all the residents give full attention towards cleanliness. It is because clogged drains with clear stagnant water could serve as artificial larval containers for Aedes larvae[8].

Table 1. Number of surveyed containers from different locations

Container Type	Number of Container Surveyed	No. of Positive Container / Location				All Location	
		UiTMTapah	Taman Tapah	Kg TersusunBatu 3	Kg Tapah Road		
		N	N	N	N	N	%
Plastic Container	53	1	2	6	5	14	26.42
Vase	41	-	-	2	1	3	7.317
Can	24	-	1	1	2	4	16.67
Tyre	8	-	-	4	-	4	50
Old Furniture	5	-	-	1	2	3	60
Bottle	7	-	-	1	1	2	28.57
Water dispenser	4	1	-	-	-	1	25
Natural	5	-	1	1	1	3	60
Total	147	2	4	16	12	34	23.13

N = number of container; - = nil

From the total number of container surveyed, natural containers and old furniture showed the highest percentage (60%) of positive containers with mosquitoes larvae, followed by tyre (50%), bottle (29%), plastic container (26%), water dispenser (25%), can (17%) and vase (7%). This result was supported by [6] stated that natural containers, especially tree holes were the primary breeding sites for mosquitoes.Almost all types of positive container were found in Kg TersusunBatu 3 and KgTapah Road shows indirectly the characteristics of that area. As stated by [9],mosquitoes are very unique and attracted to moist and watery condition even in the smallest accumulations.

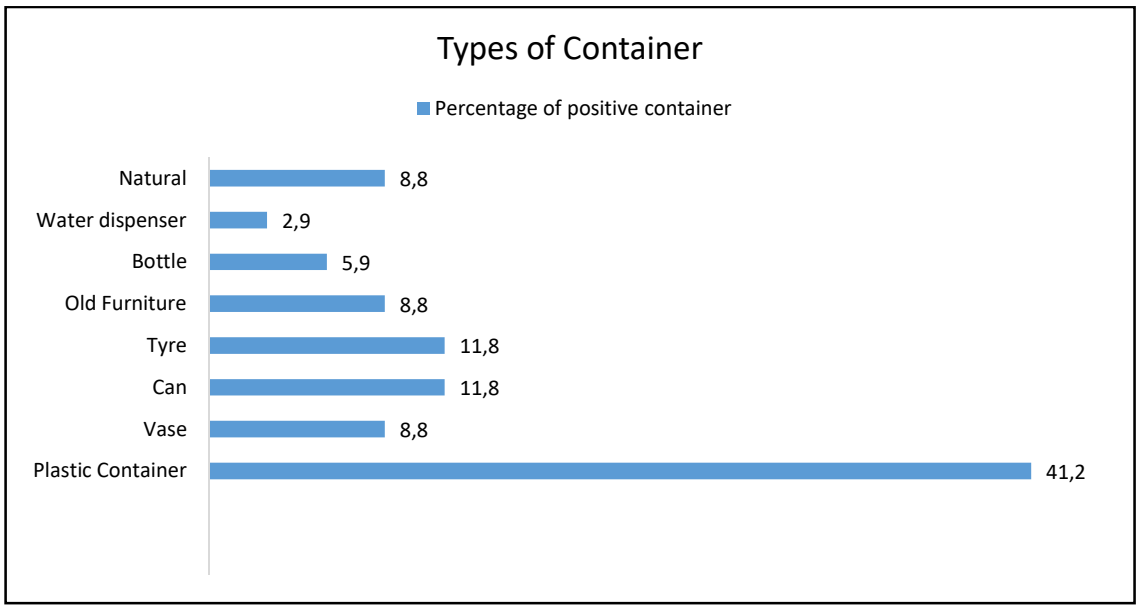

Fig.1. Types of positive container (%)

Table 2 presents the number of Aedes mosquitoes found in this study. The number of Ae. albopictus (85%) recorded was higher and found in all locations compared to Ae. aegypti (15%). Ae. albopictus was capable of breeding in a wide range of container types which are artificial (plastic containers, tyres, cans, latex collecting cups, metal boxes, etc.) and natural (tree holes, plant axils, coconut shells, etc.); and reported in many studies such as [6, 10-12]. According to [13], Aedes mosquitoes are very selective in determining their breeding sites and one of the crucial things is type of container. As reported by[6], the flight range of Ae. albopictus females is likeAe. aegypti. Therefore, the dispersal of Ae. albopictusis expected to be the same as Ae. aegypti[6].

Table 2. Number of mosquito according to species and location

Species of Mosquito	UiTMTapah	Taman Tapah	Kg TersusunBatu 3	Kg Tapah Road	All Location	
	N	N	N	N	N	%
Aedesalbopictus	2	4	14	9	29	85
Aedesaegypti	-	-	2	3	5	15
Total					34	100

N = number of container; - = nil

This study also focused on the water quality of surveyed containers. As described by [6],water quality was classified into three groups: clear water, turbid water and polluted water. Even Aedes mosquitoes can lay their eggs in moist soil, but they still prefer water as their main breeding site. Thus,acknowledged the importance of water quality in ensuring the success of their reproductive strategy [9]. Clear water is defined as water free from opaqueness; turbid water as water having sediments and suspended foreign particles; polluted water as water containing wastes and oily matter[6]. The water condition for most of the surveyed containers was clear (88%), followed by turbid water (9%) and polluted water (3%). From this study, Ae. albopictus and Ae. aegyptiwere found mostly in the clear and turbid waters. According to [6, 8], Aedes larvae required clear, but not necessarily clean water to complete their life cycles. However, a study done by [14-15] reported that eggs and larvae of Aedes mosquitoes were also able to hatch and develop in polluted water.

Table 3. Number of mosquito according to types of water quality

Type of Water Quality in Positive Container	UiTMTapah	Taman Tapah	Kg TersusunBatu 3	Kg Tapah Road	All Location	
	N	N	N	N	N	%
Clear water	2	4	14	10	30	88.2
Turbid water	-	-	1	2	3	8.8
Polluted water	-	-	1	-	1	2.9
				Total	34	100

N = number of container; - = nil

There are some factors that influence the selection of favourite breeding sites such as water quality, incidence of light, existing eggs, available food and local vegetation [9]. According to [16], container that retained water for long periods time can be a suitable breeding habitats for mosquitoes. Abiotic factor like rainfall also played a vital role in dengue transmission as it can serve many breeding sites for Aedes mosquitoes [17]. The ability of Aedes mosquitoes to accommodate in various ranges of environmental conditions are very fascinating [9]. Aedes mosquitoes can choose any alternative breeding sites to oviposition when the ideal containers are eliminated from the favourable environment [18].Some studies also relate the ability of Aedes mosquitoes to survive in various environmental conditions with the effect of microbial activity presence in the body [14, 19].

4. CONCLUSION

The importance of this study is not only restricted in providing additional information about the Aedes spp. breeding sites preference but also would like to emphasize that we need to combat the spread of vector population aggressively. Source reduction is one of the common method used to remove oviposition sites thus reducing the population of Aedes mosquitoes. It is done by eliminating potential breeding sites for both artificial and natural containers. Fogging alone would not be able to control dengue. Therefore,Integrated Vector Management

(IVM) as proposed by [6] is still relevant and should be implemented. IVM offers a holistic approach that integrates all aspects of efforts with regard to available health facility and resources. A comprehensive coordination of all human activities that have an influence on vector-borne diseases, including health, water, solid waste management and sewage disposal must be addressed profoundly. Locals must be equipped with adequate knowledge and full of awareness to ensure the preventive measures work effectively.

5. ACKNOWLEDGEMENTS

We would like to thank UniversitiTeknologi MARA for facility and financial support under research grant 600-RMI/IRAGS 5/3 (9/2015).

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How to cite this article:
Mahfodz Z, Musa N N, Hasmi N A, Ismail H N, Pardi F. Potential breeding sites for Aedesalbopictus and Aedesaegypti: Assessment against different container types. J. Fundam. Appl. Sci., 2017, *9(6S), 778-787*.