Journal of Entomology and Zoology Studies

Available online at www.entomoljournal.com

J E Z S Journal of Entomology and Zoology Studies

E-ISSN: 2320-7078
P-ISSN: 2349-6800
JEZS 2015; 3(4): 391-394

Received: 18-06-2015
Accepted: 21-07-2015

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Study of Relative Abundance of Different Mosquito Genera in Different Habitats at Peshawar

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Abstract
To study the relative abundance of different mosquitoes Genera (*Culex, Aedes* and *Anopheles)* in different habitats the present research work was carried out in Entomology Research Laboratory of The University of Agriculture Peshawar, during the year 2013. Different habitats like Sewage Water, Water Channels, Ponds, Container Water and Tyres were surveyed from 2nd week of June to 4th week of August for the presence of mosquitoes larvae. Results showed that Genus *Culex* has highest larval population/225cm^3 in sewage water as compared to water channels, ponds and container water while no larvae of *Culex* were recorded in tyres. Genus *Anopheles* has highest larval population/225cm^3 in ponds water as compared to water channels and container water while no larvae of *Anopheles* were also recorded from sewage and tyres water. Larvae of Genus *Aedes* were found abundantly in tyres only. In all the habitats examined maximum numbers of larvae were observed during the 4th week of July. The present study recommends that mosquito habitats like container and tyres water in houses and other public places should be eliminated to avoid diseases like Malaria and Dengue which are transmitted through these insects.

Keywords: Mosquito, genera, habitat, relative abundance.

1. Introduction
The word "mosquito" is formed by *mosca* and diminutive *ito* from the Spanish or Portuguese for "little fly" [1]. Mosquitoes belong to order Diptera with sub order and infra order of Nematocera and Culicomorpha respectively and family Culicidae [2].
Like all flies, mosquitoes go through complete metamorphosis: egg, larva, pupa, and adult. In most species, adult females lay their eggs in stagnant water, some lay eggs near the water's edge; others attach their eggs to aquatic plant [3]. Females of many common species can lay 100–200 eggs during the course of the adult phase of their lifecycle [4].
Adult mosquitoes can be distinguished from other dipterous flies by the presence of scales on the wing veins and wing margins, and by their forwardly projecting long proboscis [5]. Length of the adult varies, but is rarely greater than 16 mm (0.6 in) [6] and weight up to 2.5 milligrams (0.04 grains) [7]. The mosquito larva has a well-developed head with mouth brushes used for feeding, a large thorax with no legs, and a segmented abdomen with spiracles located on their eighth abdominal segments for breathing, their larvae are commonly called as Wrigglers. The mosquito pupa is comma-shaped, the head and thorax are merged into a cephalothorax and it is commonly called a tumbler [4].
In our country the most common Genera of mosquito found are *Anopheles*, *Culex* and *Aedes.* Larvae of the *Anopheles* mosquitoes occur in a wide range of habitats but most species prefer clean and unpolluted water [8]. *Culex* can be found in a fairly wide range of larval habitats but are generally associated with water that has a high organic content. The species utilizes temporary ground water that ranges from mildly to grossly pollute [9]. The most preferred breeding habitats for mosquito of genus *Aedes* are ant traps being the most common indoors and earthenware jars the most common outdoors [10].
Mosquitoes are prominent bloodsuckers that annoy man, mammals, birds and other animals including reptiles, amphibians, and fish. They are probably the most notoriously undesirable arthropods, with respect to their ability to transmit pathogens causing human malaria, dengue, filariasis, viral encephalitides, and other deadly diseases [11]. Because of the economic

importance and the rising health problems related to mosquitoes in our region different habitats were surveyed to find out the relative abundance of different genera of mosquito.

Materials and Methods

To study the relative abundance of different mosquito Genera the present study was carried out at the Research laboratory of the Department of Entomology, The University of Agriculture, Peshawar during the year 2013.

Collection of mosquito

Larvae and pupae of the family Culicidae were collected from different habitats *i.e.* sewage water, irrigation channels, container water, water in old tyres and ponds. The larvae and pupae were collected with the help of a dropper and put in a plastic jar having holes in lid for aeration. The plastic jars were brought into the laboratory and kept in rearing cage at room temperature.

Rearing of mosquitoes

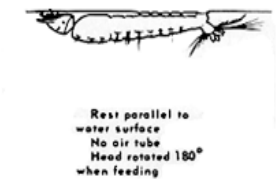
Larvae and pupae collected from different habitats were put into the Petri dishes and were reared in a rearing cage. The rearing cage was covered with muslin cloth to avoid adult escape. A small amount of suji was put into the petridishes as a larval food. After few days adult mosquitoes emerged and left in rearing cage for a few days and were collected after dying. The collected adults were then mounted on cards for identification. The mounted specimens were kept in a collection box and submitted to the research laboratory of the department of Entomology.

Identification

Larvae of mosquito belonging to genus *Anopheles* rests parallel to the surface of water having no siphon tube and keep the head rotated in 180 degree angle when feeding (Fig 1). Larvae of *Aedes* have short and stout air tube with one pair of hair tufts and also lie at an angle to the surface of water (Fig. 2). Larvae of *Culex* have a long slender siphon tube with several pair of hair tufts and lie at an angle to the surface of water (Fig 2). In *Culex* and *Aedes* mosquitoes larvae identification is difficult as both have siphon tube and lies at an angle with the surface of water.

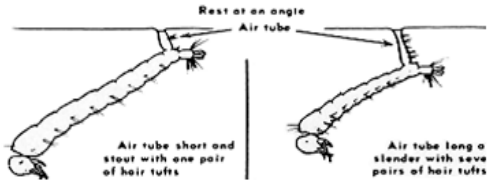
Adult of *Anopheles* has maxillary palp as long as its proboscis, wings spotted and when rests its body and proboscis make single axis (Fig 3). Adult of *Aedes* has dark colour with white spots on their legs, abdomen and head, maxillary palp shorter than its proboscis and its body and proboscis make two axis at resting position (Fig 4). Adult of *Culex* has straw colour, maxillary palp shorter than its proboscis, wings clear, round abdominal tip and its body and proboscis make two axis when land on a surface (Fig 4) [12].

Fig. 1



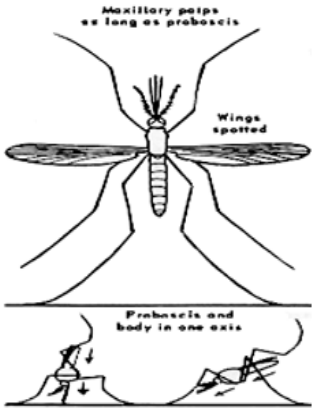
Larva of *Anopheles*

Fig. 2



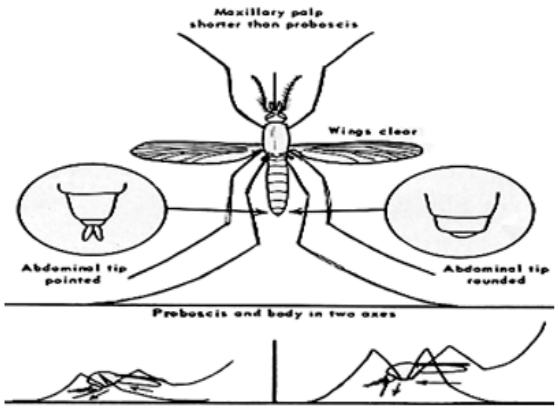
Larva of *Aedes* Larva of *Culex*

Fig. 3



Adult of *Anopheles*

Fig. 4



Adult of *Aedes* Adult of *Culex*

Adult of *Aedes/Culex*

Results and Discussion

Figure 5 shows population trend of Genus *Culex* mosquito larvae in sewage water, water channels, ponds and container water from 2nd week of June to 4th week of August. In sewage water larval density of 105 larvae per 225cm^3 was recorded in 2nd week of June, the larval population in 1st week of July rose to 125 larvae per 225cm^3,the larval density continued to grow during 4th week of July and reached to its peak value i.e. 132 larvae per 225cm^3. A sudden decline has occurred in larval population during 2nd week of August as the larval count fell down to 31 larvae per 225cm^3, this decline continued till 4th week of August as the larval population in the respective week was 12 larvae per 225cm^3. The figure further shows larval population of *Culex* in water channels which was 67 larvae per 225cm^3 during 2nd week of June, this population then rose to 83 larvae per 225cm^3 in 1st week of July, the larval population maintained its increasing trend and the population then enhanced to 89 larvae per 225cm^3 during 4th week of July. In 2nd week of August larval density has decreased to 15 larvae per 225cm^3 and in 4th week of August the larval count fell down to 6 larvae per 225cm^3. Figure 3.1 reveals larval density of *Culex* in ponds which was 97 larvae per 225cm^3 during 2nd week of June, which then rose to 113 larvae per 225cm^3 during 1st week of July. In 4th week of July larvae were in their full bloom having population of 121 larvae per 225cm^3. A huge decline was observed during 2nd week of August in larval density i.e. 23 larvae per 225cm^3, the decline also continued in 4th week of August with larval population of 11 larvae per 225cm^3. Larval density of *Culex* in container water during 2nd week of June was 10 larvae per 225cm^3 which grew to 21 larvae per 225cm^3 during 1st week of July, the population then reached to maximum during 4th week of July which was 29 larvae per 225cm^3, the decline in population was recorded in 2nd week of August which was 15 larvae per 225cm^3. In 4th week of August the larval density was more reduced to 5 larvae per 225cm^3. In tyres not even single larva was observed.

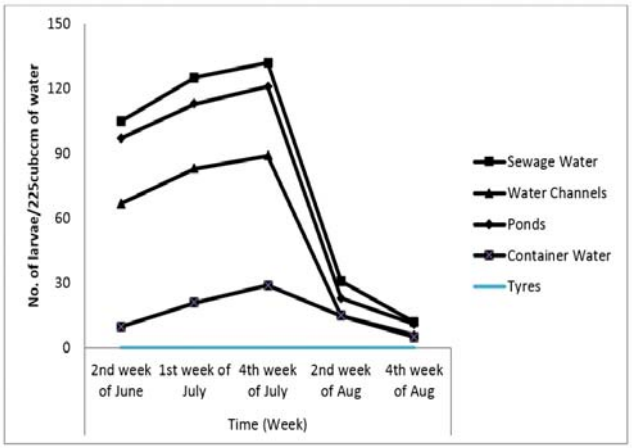


Fig 5: Number of larvae/225cm^3 of *Culex* in different habitats during June-August, 2013

Figure 6 shows the population trend of Genus *Anopheles* mosquito larvae from 2nd week of June to 4th week of August in water channels, ponds and container water. Figure indicates that the number of larvae in water channels was 7 larvae per 225cm^3 in 2nd week of June, the population tends to increase in 1st week of July and thus reached to 14 larvae per 225cm^3. The population of larvae continued to increase and reached to maximum in 4th week of July which was 16 larvae per 225cm^3 which then declined to 4 larvae per 225cm^3 in 2nd week of August and continued to decline and thus fell down to 0 larvae per 225cm^3 in 4th week of August. Figure 3.3 further indicates larval population of *Anopheles* in ponds which was 9 larvae per 225cm^3 in 2nd week of June which gradually raised to 19 larvae per 225cm^{3}in 1st week of July and reached to peak in 4th week of July i.e. 24 larvae per 225cm^3. It then decreased to 5 larvae per 225cm^3 in 4th week of August. Figure 3.3 further reveals that larval population recorded in container water during 2nd week of June was 3 larvae per 225cm^3, with an increase of 2 larvae in 1st week of July i.e. 5 larvae per 225cm^3 while in 4th week of July highest larval population was recorded which 11 larvae per 225cm 3 was. The figure shows decline in larval density during 2nd week of August with 6 larvae per 225cm^3 and zero larvae per 225cm^3 in 4th week of August. No larvae of *Anopheles* were found in sewage water and tyres from 2nd week of June to 4th week of August (Fig 3.3).

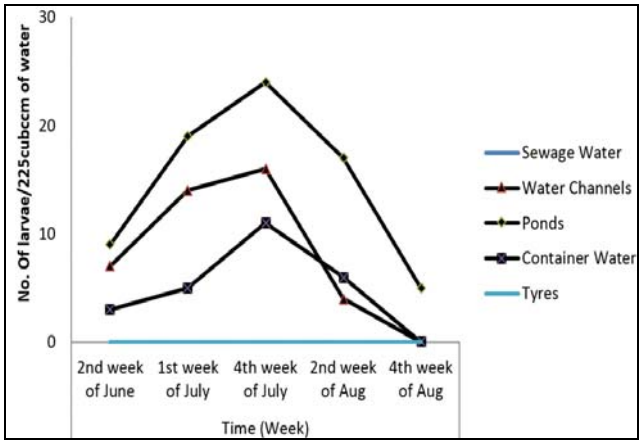


Fig 6: Number of larvae/225cm^3 of *Anopheles* in different habitats during June-August, 2013

Fig 7 revealed that the population of mosquito larvae of Genus *Aedes aegypti* in tyres during the 2nd week of June was 95 larvae per 225cm^3. In 1st week of July the larval density increased and reached to 117 larvae per 225cm^3, the population then grew and got its highest point during the 4th week of July i.e. 126 larvae per 225cm^3. A decline in the number of larvae was noted in the 2nd week of August and thus 42 larvae per 225cm^3 were recorded. A decreasing trend was continued up to the 4th week of August where only 16 larvae per 225cm^3 were recorded. In other habitats such as sewage water, water channels, ponds and container water surveyed no larvae of *Aedes aegypti* were found.

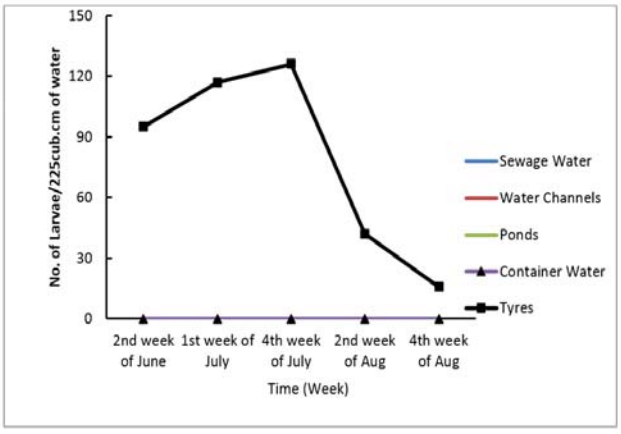


Fig 7: Number of larvae/225cm^3 of *Aedes aegypti* in different habitats during June-August, 2013

Our results were supported by Ali and Rasheed (2009) [13]. They conducted survey from April to June and recorded different species of Genus *Anopheles* and *Culex* from polluted and stream water. Our findings were also in accordance with Ilahi and Suleman (2009) [14] who carried out survey from April to September in different habitats like springs, irrigation channels, rice fields, marches, temporary pools, construction pools, agricultural pools, river margins, ditches, waste water bins, wells and tree holes and recorded different species of mosquitoes from five Genera including *Culex* and *Anopheles*. Our finding shows the presence of *Ae. aegypti* from tyres water and was confirmed by Ilahi and Suleman (2009) [14]. They also recorded *Ae. aegypti* from tyres water.

Our results were also at par with Adeleke *et al*., (2008) [15]. They investigated different larval habitats i.e. ground ponds, gutter/open drains, tyres, domestic containers and tree holes and recorded ten mosquitoes species from the Genus *Culex, Anopheles* and *Aedes*. Study findings were also similar to Mukhtar *et al*., (2003) [16]. They surveyed mosquitoes breeding sites within waste water, irrigation water and recorded different species of *Anopheles, Culex* and *Aedes*.

Conclusion and Recommendations

The present study revealed that in sewage water only Genus *Culex* larvae were recorded. In water channels and ponds larval population of *Culex* was very high as compared to *Anopheles* while *Aedes* was nil in both these habitats. On the other hand container water had also highest *Culex* larvae than *Anopheles.* In the tyres water only *Aedes* mosquito larval population was found. In all the habitats surveyed larval population of the all three Genera mentioned above were most abundant during the month of July and were lowest in the last week of August. Further study is needed for the collection of *Aedes* from tyres at different locations and should be identified up to species level so that immediate steps against the spread of Dengue could be taken. Mosquito habitats like container water and water in tyres etc in houses and public places should be eliminated to avoid diseases like Malaria and Dengue etc. Other habitats like plastic bottles, leaf axils and tree holes and color plastic bowls should be studied on experimental basis.

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