IDENTIFICATION OF MOSQUITO LARVAL SPECIES AT SHREE SWAMINARAYAN ACADEMY

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Shree Swaminarayan Academy
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SUMMARY

Mombasa City is the second largest city in Kenya. It has a rapidly growing population, and some areas experience overcrowding, numerous open dump sites, inadequate drainage, stagnant water and ample breeding sites for mosquitoes. These factors make Mombasa particularly vulnerable to vector-borne diseases like Malaria, Dengue fever and Chikungunya among others.

The aim of this project was to identify the mosquito larval species within our school in artificial breeding places. Our group concentrated in the School's Kindergarten section. The research involved setting up artificial mosquito breeding sites around the school compound, visiting them every seven days and making observations.

The procedure for observation was to count the number of mosquito larvae and record, identify the larva following the mosquito mapper tutorial and destroying the breeding sights. We concluded that most dominant mosquito species in Nyali area is *Aedes*. This justifies the large number of records about dengue fever and chikungunya virus in Mombasa County.

We recommend that the mosquito control measures be targeted at eradicating the larval stage other than targeting the adults. This can be done by the use of a larvicide designed primarily to impact mosquito larvae thereby reducing the risks to non-target organisms. The community should also be educated on the importance of dumping stagnant water.

Depending on the size and layout of the larval area larvicide applications can take place on land or in the air. Successful implantation demonstrably reduces though not totally eliminates the number of adult mosquitoes in a given control area, minimizing the need for more intensive and to some controversial adult control actions.

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RESEARCH QUESTION:

1. Are different species of mosquitoes in the Kindergarten section at Shree Swaminarayan Academy?
2. *Is Aedes* mosquito species the most common in our school due to cases of dengue fever and chikungunya recorded in the school?

INTRODUCTION (PROBLEM/PURPOSE)

The aim of our group was to identify the types of mosquitoes which breed in the Kindergarten section in our school. The playing field consists of tunnels, old tyres and many shady trees surrounding the area. There are eight class rooms, a music room, kitchen and the offices. Right in front of the classroom we have a nursery picnic area which is surrounded by large trees and flower gardens. We also have garden seats made of cement under which we collected a huge number of samples.

According to the Kindergarten head teacher there has been an outcry by the parents on the mosquito bites during play. A few cases have also been noted in the classrooms which are frequently sprayed with insecticides. According to her records 15 cases of chikungunya were reported in February and March, 2018.

Although the school spends a lot of money termly to spray insecticides all over the compound, we have not managed to completely eradicate the mosquitoes.

It was a challenge collecting samples in the play area since the place was constantly used for play. Even so a total of 30 larvae were sampled from the area.

HYPOTHESIS

1. There are different species of mosquitoes in the Kindergarten section at Shree Swaminarayan Academy
2. *Aedes* mosquito is the species that would be found commonly in due to cases of dengue fever and chikungunya recorded in the school.

LITERATURE REVIEW

Mosquitoes can act as vectors for many disease- causing viruses and parasites. Infected mosquitoes carry these organisms from person to person without exhibiting symptoms themselves. Seasonal factors that impact the prevalence of mosquitos and mosquito-borne diseases are primarily humidity, temperature, and precipitation.

According to the mosquito information website (Interviewmania, 2018); both male and female mosquitoes feed on nectar and plant juices, but in many species the mouthparts of the females are adapted for piercing the skin of animal hosts and sucking their blood as ectoparasites. In many species, the female needs to obtain nutrients from a blood meal before it can produce eggs, whereas in many other species, it can produce more eggs after a blood meal.

Viral diseases, such as yellow fever and chikungunya, are mostly transmitted by*Aedes* mosquito. Dengue fever is the most common cause of fever in Mombasa. This disease is spread through the bites of infected mosquitoes and cannot be spread from person to person. Severe dengue can be fatal, but with good treatment, less than 1% of patients die from dengue.

The parasitic diseases collectively called malaria is caused by various species of *Plasmodium*, a parasite that is carried by female mosquitoes of the genus *Anopheles*.

According to the report by Tiaan de Jager and Taneshka (2019), the most effective method of preventing the emergence of adult mosquitoes is to destroy larval habitats such as ponds, marshes, swamps, fields, ditches and artificial containers like flowerpots, old tires and water jugs. In areas like ponds and marshes biological methods like introduction of micro-organisms that feed on the mosquito larva can be used to avoid destruction of other organisms.

RESEARCH METHODS

Equipment and material

The following equipment and material were used in the study:

- artificial breeding site e.g 2 litres of water in a dark corner
- Dropper from Biology laboratory
- 250ml Beaker
- Magnifier lens – X60 and X100 Macro lens
- Petri Dish
- Paper towel
- Globe Observer Application under Mosquito Habitat Mapping Protocol.
- smart phone

Step 1: Identification and location of the mosquito breeding site.

We took a tour around the Kindergarten section of the school in search of a suitable mosquito breeding site, such as dark corners of the classrooms, hollow spaces between tree trunks, dark area under the merry go round and the flowerbeds.

Step 2: Breeding of mosquitoes.

Plastic containers were placed in a dark corner within the flower beds, class rooms and in the playground. The study site was visited after every seven days. After that the water was sampled to investigate the number of eggs, larvae and pupae present as shown in figure 2.

Step 3: Identification of mosquito larvae.

A sample of water containing mosquito larvae was collected from the study site using 250 ml plastic beaker and a dropper. The sampled larvae were placed on a slide covered with paper towel to drain the excess water. The macro lens was attached to a smart phone camera, placed vertically/directly above the larvae sample on the slide and its light turned on.

The mosquito larvae species was then identified using its distinctive morphological structures like pectin shape, siphon tufts and comb scale shape as well as anal brush on the saddle following the Globe Observer tutorial.

Step 4: Elimination of breeding site.

After the successful identification of the larvae, the breeding was eliminated using the mosquito vector control methods such as oiling and pouring out the water

RESULTS

Result 1: Identification and location of the mosquito breeding site.

Plastic containers were placed in a dark corner within the flower beds, class rooms and in the playground. The study site was visited at every seven days as seen in Figure 1.

Figure 1: Identification and setting up of artificial breeding sites around the Kindergarten section of the schools.

Step 2: Breeding of mosquitoes.

After that the water was sampled to investigate the number of eggs, larvae and pupae present as shown in figure 2.

Figure 2 Observing mosquito breeding sites by our team

Step 3: Identification of mosquito larvae.

A sample of water containing mosquito larvae was collected from the study site using 250 ml plastic beaker and a dropper. The sampled larva was placed on a slide covered with paper towel to drain the excess water. The macro lens was attached to a smart phone camera, placed vertically/directly above the larvae sample on the slide and its light turned on (figure 3a).

The mosquito larvae species was then identified using its distinctive morphological structures like pectin shape, siphon tufts and comb scale shape as well as anal brush on the saddle following the globe observer tutorial. From the morphological features observed, we concluded that the larvae species found around the Kindergarten section of the school was *Aedes egyptii* species.

Figure 3a: Observation of morphological features of the mosquito larvae in the laboratory.

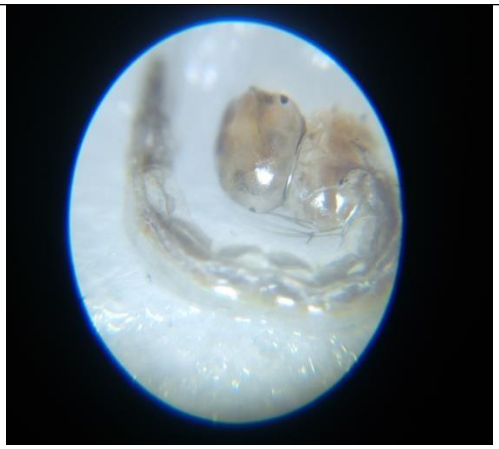

Figure 3b: Morphological features of the larvae

The findings on the morphological features are summarized in the table below.

Morphological feature	**Observation**	**Shape description**	***Aedes genus***
Presence of Siphon	Yes	Cylindrical	
Pecten presence	yes		
Siphon hair	yes	Single tuft, single hair	
Saddle	Yes	Partially covers the anal segment	
Comb scale shape	Yes	pitchfork	
Tufts	No	No tuffs between pecten	***Aedes aegypti***
Anal brush	Yes	Next to the saddle	***sp.***
Hooks on the Thorax	Yes	Dark hooks seen.	

Result 4: Elimination of breeding sites.

The artificial breeding sites were eliminated by pouring water out.

DISCUSSION

From the larvae identification protocol followed using the mosquito mapper identification, we concluded that the type of mosquitoes that breed in the school's Kindergarten section is *Aedes* mosquito. This explains the prevalence occurrence of dengue fever and chikungunya in the area. These diseases *Aedes* lay their eggs in artificial containers but, in addition, will use natural containers such as a tree hole or a coconut shell. Other species of *Aedes* mosquitoes breed in floodplains after rain events, in irrigation ditches, in woodland pools, brackish swamps and salt marshes.

CONCLUSSION.

Our research findings ruled out our first hypothesis in that only one species, *Aedes*, was identified in our school compound. However, our findings were in agreement with our second hypotheses that *Aedes* species would be commonly found at our school due to the reported cases of occurrence of dengue fever and chikungunya at the Kindergarten. We did not find any Anopheles larvae during the study. The type of mosquito that breeds in Nyali area is *Aedes* mosquito. This may explain the low incidence of malaria within the Nyali sub-county as malaria is caused by the *Anopheles* mosquito. It is therefore important to educate the community on the importance of destroying breeding sites.

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