

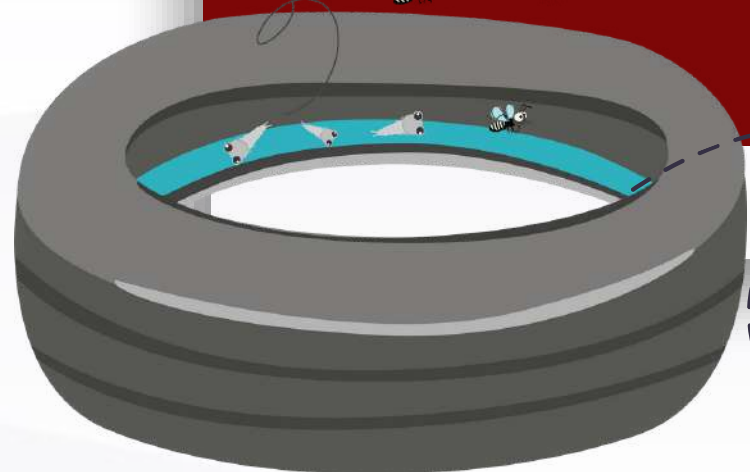


# Water pH that affects the survival rate, life cycle and size of *Aedes aegypti*

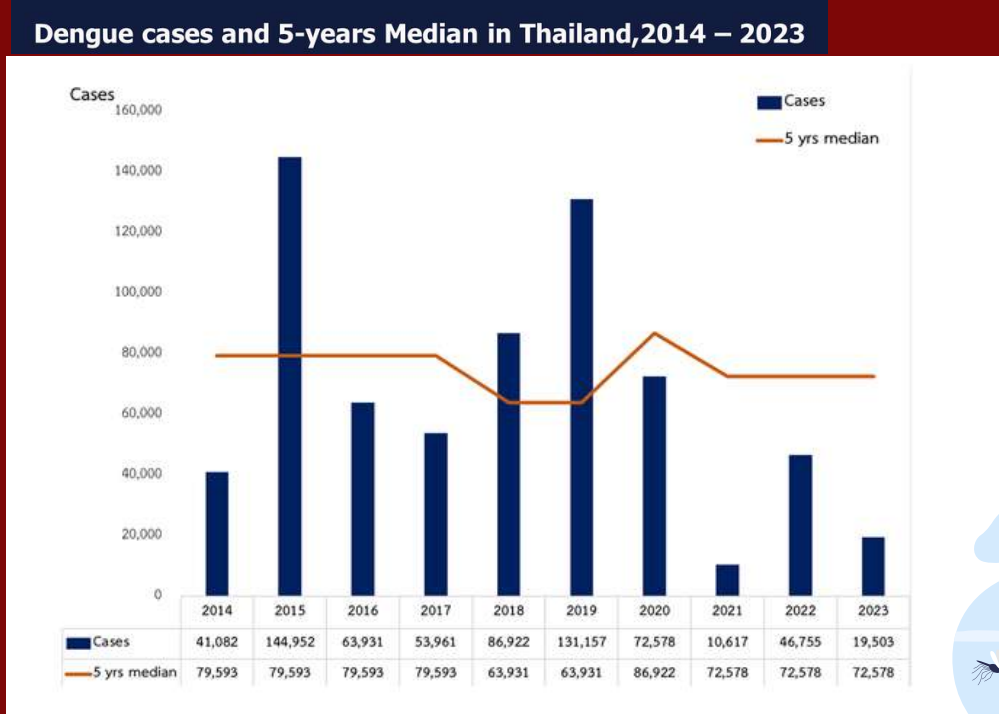
**Researcher : Phuwit Thongjerm and Passawut Maikaen**

**Advisor : Patchara Pongmanawut and Pacharee Chaipetch**

**School : Princess Chulabhorn Science High School Trang**



# INTRODUCTION



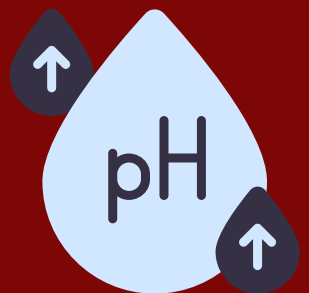
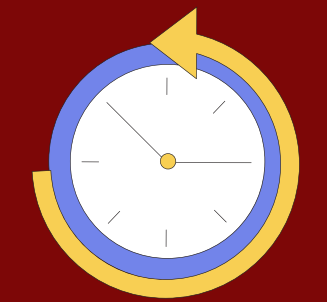
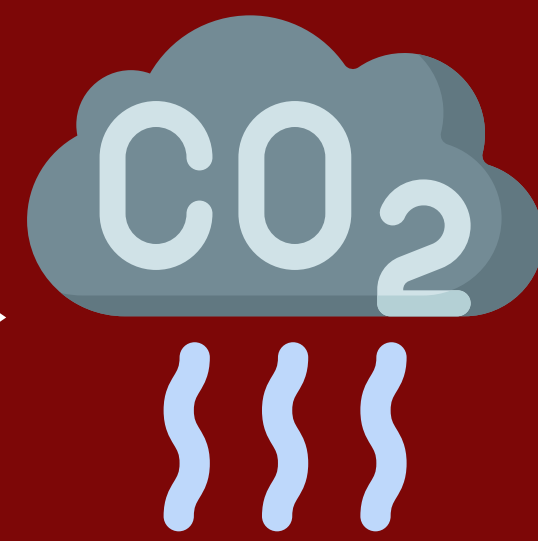
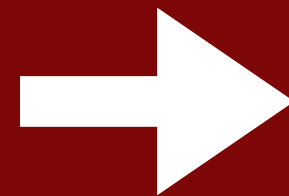
Past



Present



Future



# Reserch Question

1. Does the pH of natural water sources affect the *Aedes ssp.* size ?
2. Is the survival rate of *Aedes* different when raising the larvae in water with pH 4-9 ?
3. When raising mosquito eggs in water with pH 4-9, is the hatching rate of *Aedes* larvae different
4. Does the water pH 4-9 affect the *Aedes ssp.* life cycles ?
5. Does the water pH 4-9 affect the *Aedes ssp.* size ?

# Research outline

## 1st section : Nature Gather

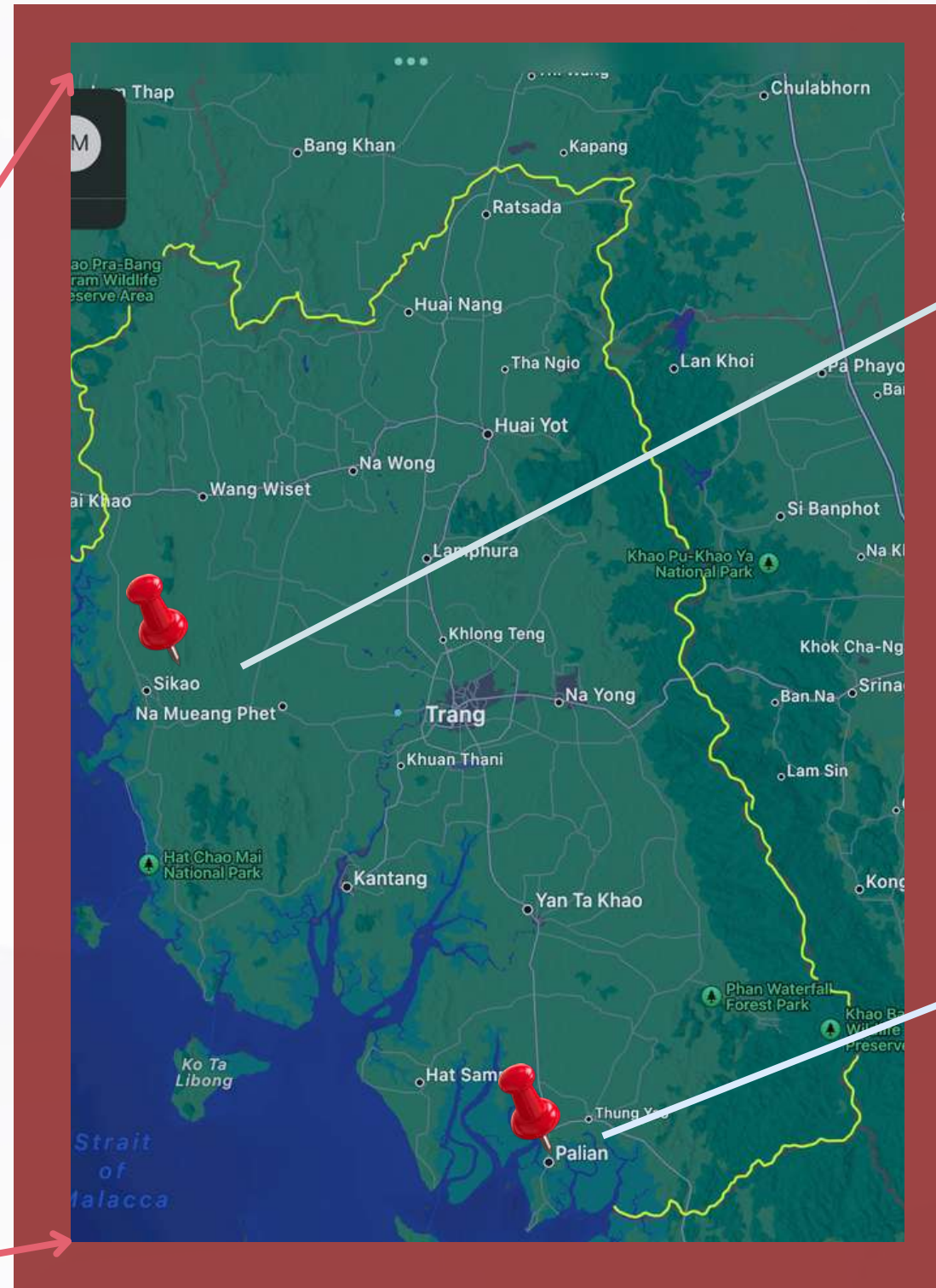
- Observe the breeding site
- Classify the types of larvae found
- Size of *Aedes aegypti*

## 2nd section : Experimentation

- Hatching rate
- life cycle
- Size of *Aedes aegypti*



# 1st section : Study site



DATE 7/12/23



DATE 21/11/23

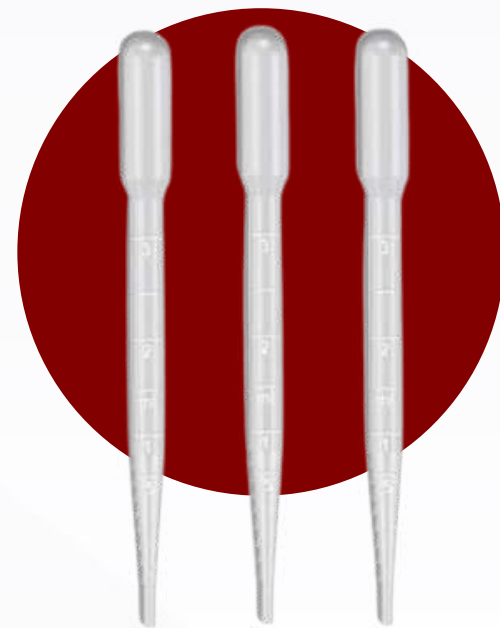
**Located in Trang province, southern Thailand  
( 7.3145N and 99.6731E)**

# 1st section :

## Material



**HI98103  
Checker  
pH Tester**

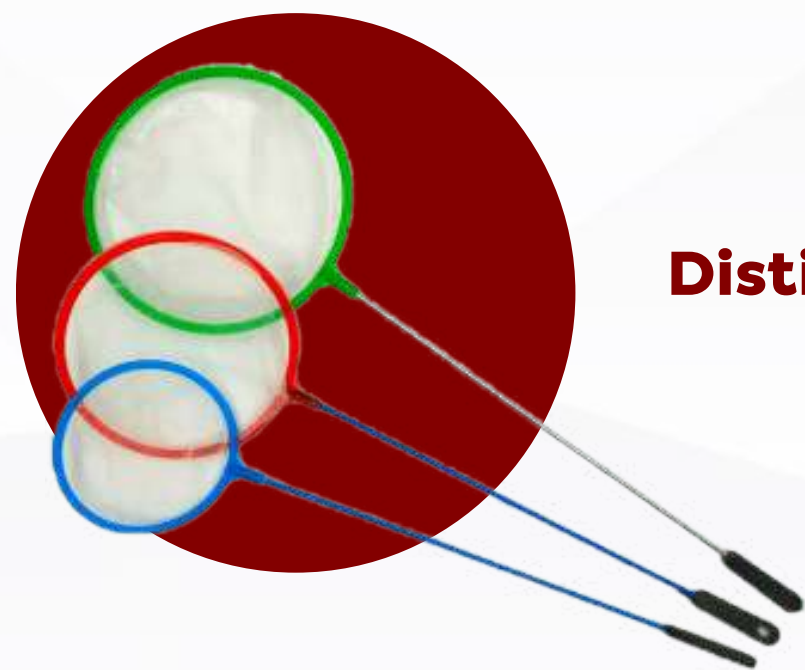


**Different size  
of Droper**



**Zip-lock bag  
(collect  
sample)**

**Sieve for  
shoveling**



**Distilled water**



**Water bowl**

# 1st section :

## Method

**Observe the container  
with the larvae around  
the house**



**Measure and record the  
pH of water found  
by HI98103 pH Tester**

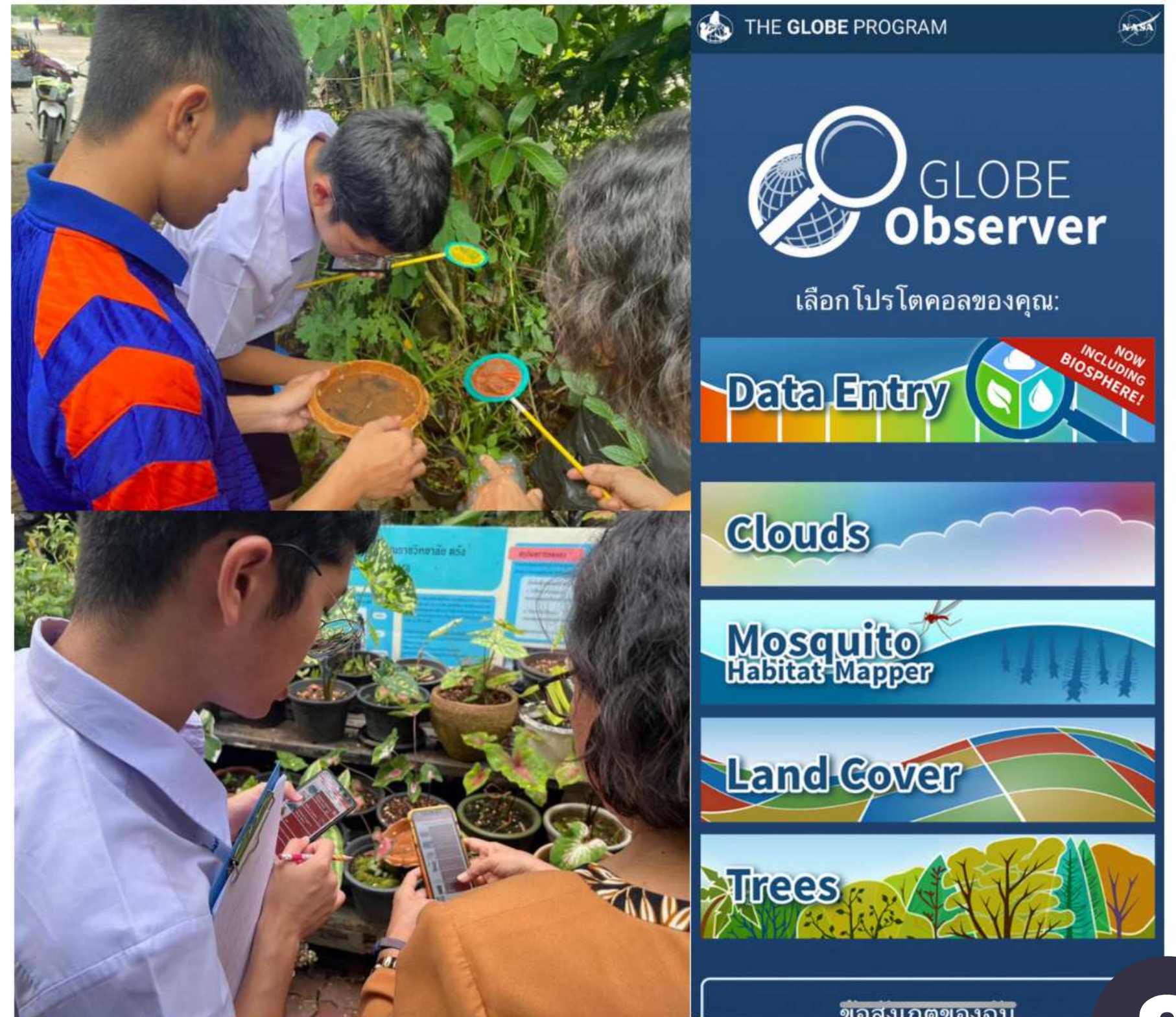


# 1st section :

## Method

**Count the number of larvae and pupa then record the data into Globe observer application**

**Collect water samples and larvae from water containers into zip-lock bag**






# 1st section :

## Method

## Mosquito Habitat Mapper

Mosquito Habitat Mapper



Measured Date: 2023-11-21

Organization Name: Princess Chulabhorn Science High School Trang

Site ID: 333006

Site Name: 47NNH768952

Mosquito Habitat Mapper



Measured Date: 2023-12-07

Organization Name: Princess Chulabhorn Science High School Trang

Site ID: 334611

Site Name: 47NNJ354366

Mosquito Habitat Mapper



Measured Date: 2023-11-21

Organization Name: Princess Chulabhorn Science High School Trang

Site ID: 333001

Site Name: 47NNH764052

Mosquito Habitat Mapper



Measured Date: 2023-11-21

Organization Name: Princess Chulabhorn Science High School Trang

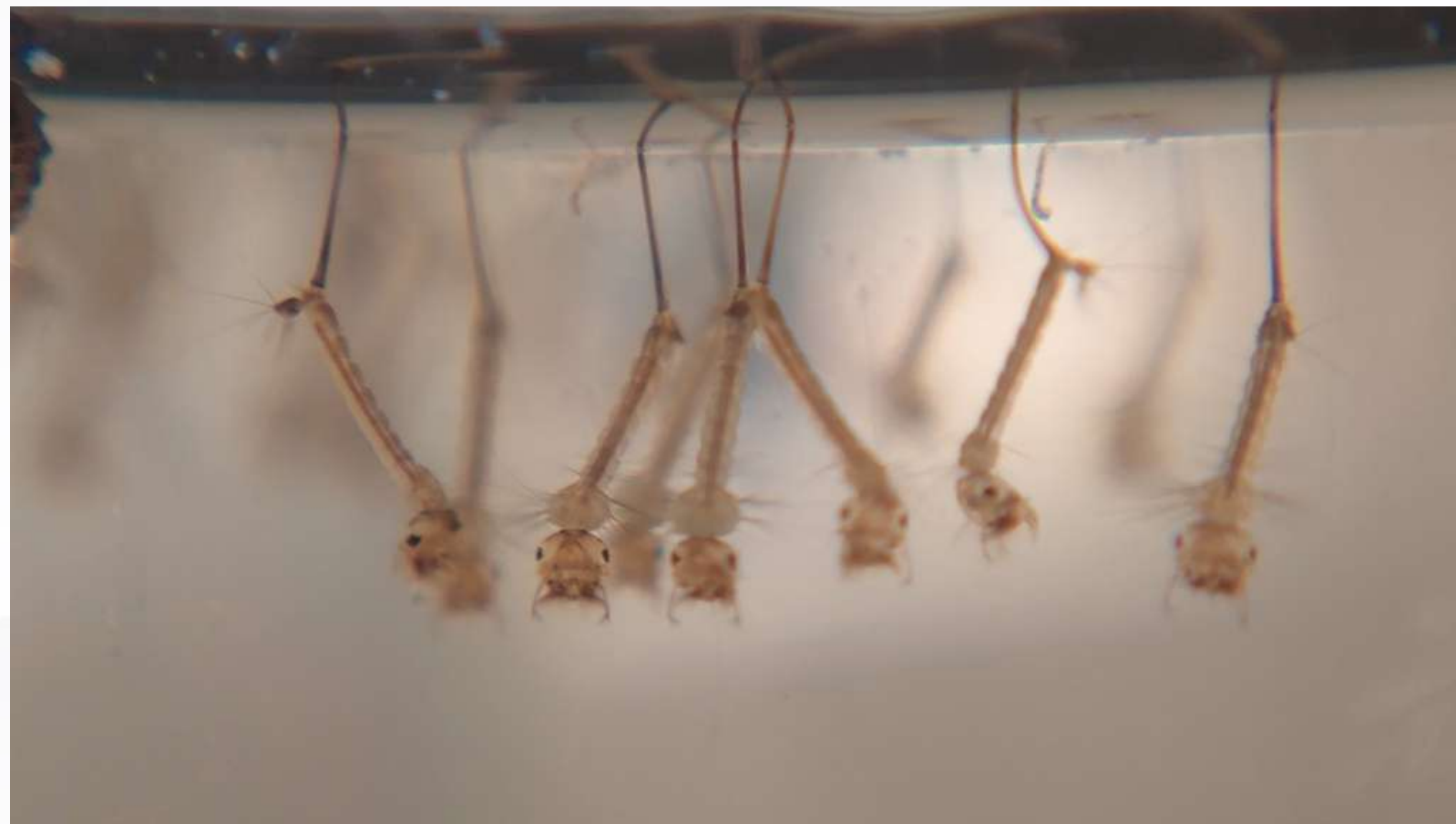
Site ID: 333006

Site Name: 47NNH768952

# 1st section :

## Method

Take the photo of larvae and Classify  
the types of larvae found  
record the data into globe observer  
by using Mosquito Habitat Mapper



# 1st section :

## Method

## Mosquito Habitat Mapper

Mosquito Habitat Mapper



Measured Date: 2023-11-21

Organization Name: Princess Chulabhorn Science High School Trang


Site ID: 333006

Site Name: 47NNH768952

Latitude: 7.193517

Longitude: 99.695605

Mosquito Habitat Mapper



Measured Date: 2023-12-07

Organization Name: Princess Chulabhorn Science High School Trang


Site ID: 334612

Site Name: 47NNJ363369

Latitude: 7.571132

Longitude: 99.329067

Mosquito Habitat Mapper



Measured Date: 2023-12-07

Organization Name: Princess Chulabhorn Science High School Trang

Site ID: 334612

Site Name: 47NNJ363369

Latitude: 7.571132

Longitude: 99.329067

Elevation: 20m

Mosquito Habitat Mapper



Measured Date: 2023-12-07

Organization Name: Princess Chulabhorn Science High School Trang

Site ID: 334611

Site Name: 47NNJ363369

# 1st section :

## Method

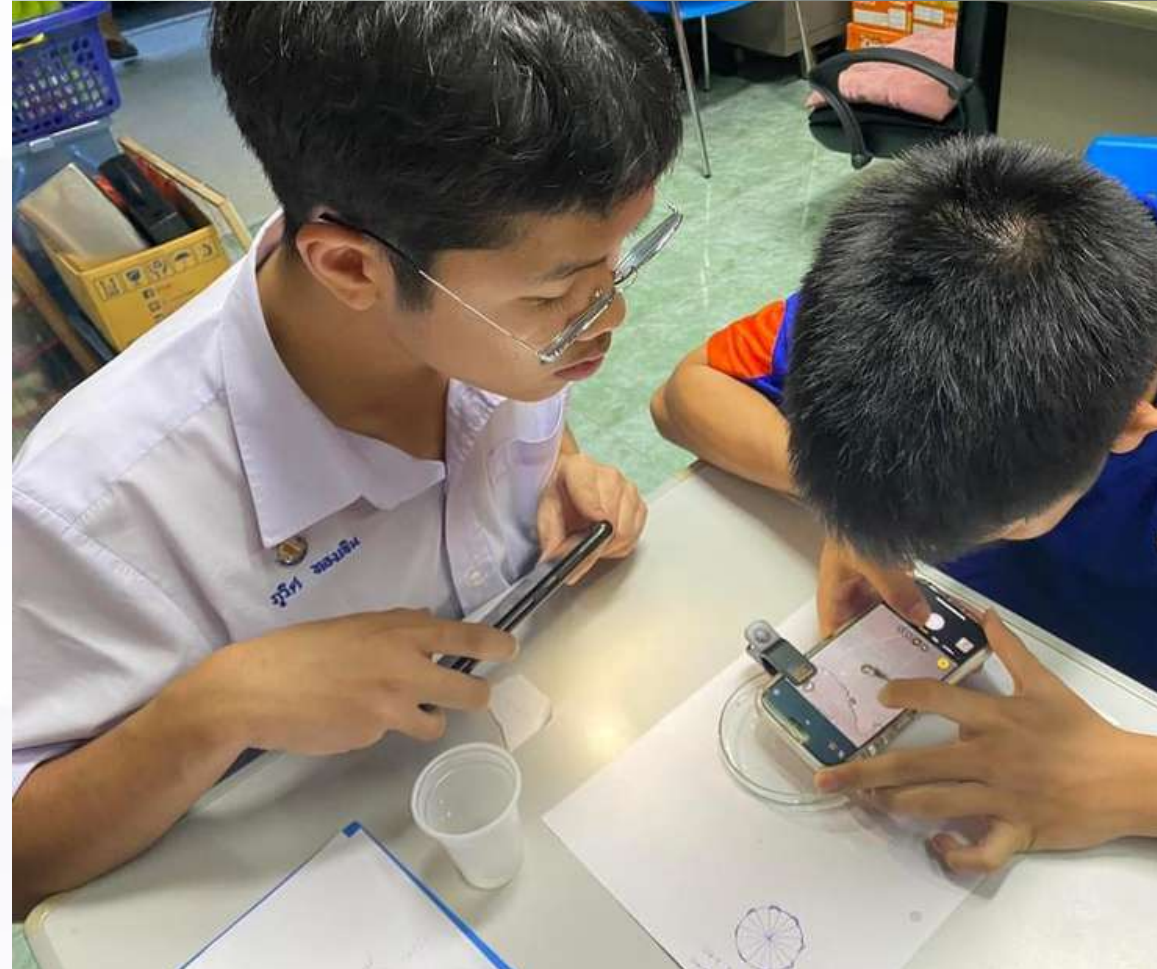


**Pour the water samples into container to breed mosquito larvae until they grow into adult mosquitoes**

# 1st section :

## Method

**Measure the body length of mosquito by using vernier calliper  
Then Analyze the data**



# 1st section :

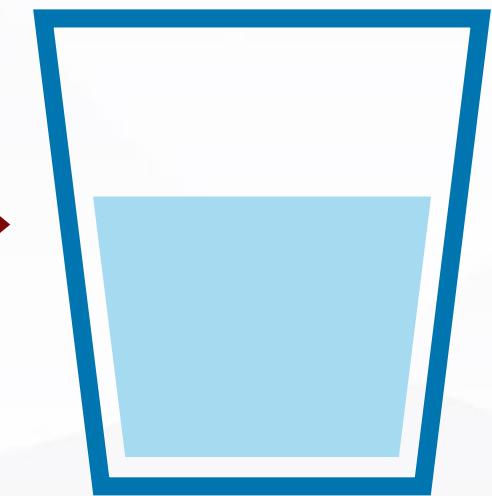
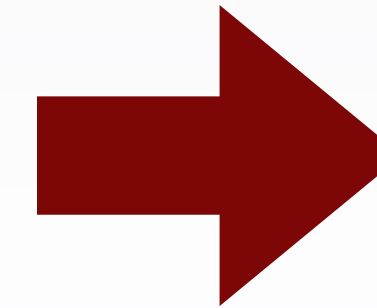
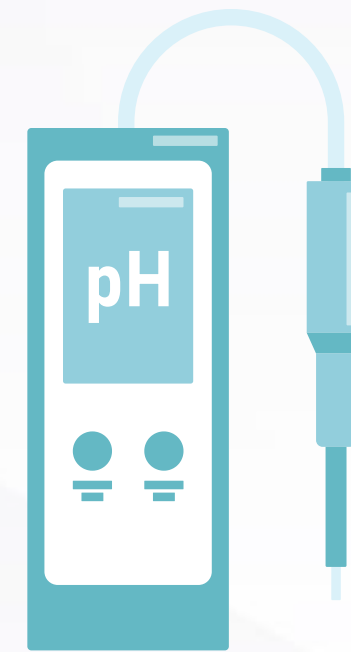
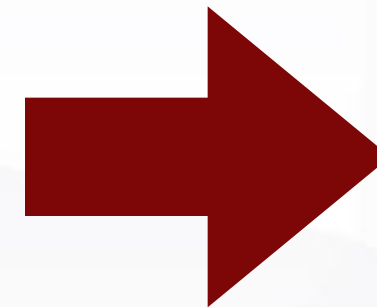
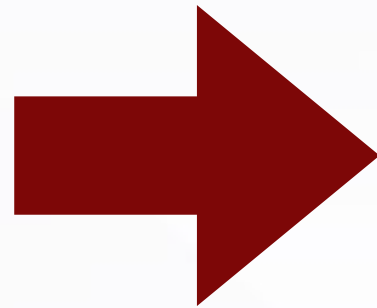
## Analysis

**Table : shows the body length of mosquito (mm) in different pH of water**

Study Site	pH of water	Body length of mosquito (mm)					Average (mm)
C12	5.7	2.12	1.61	1.71	1.69		1.78
P4	6.3	1.97	2.42				2.2
C11	7	1.8	3.48	1.98	1.32	2.3	2.18
K1	8	2.79	2.57	2.4	2.48	1.83	2.41
C14	9.2	2.04	1.47				1.76

# 2nd section

## Study of the pH of water that affects the hatching rate of *Aedes* mosquito



x10

pH4-9, do 3 sets of pH per experiment.

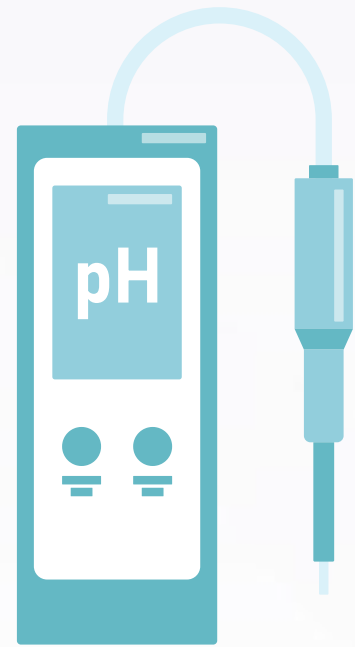
Adjust pH water use  $\text{CH}_3\text{COOH}$  and  $\text{CaO}$

Check pH

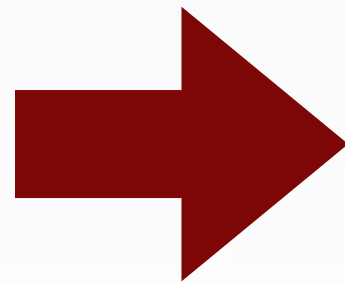
Raising mosquito eggs

# 2nd section

## Study of the water pH affects the *Aedes ssp.* life cycle



Check pH



Count the number of larvae pupa and adults

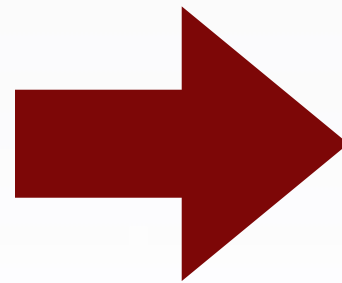
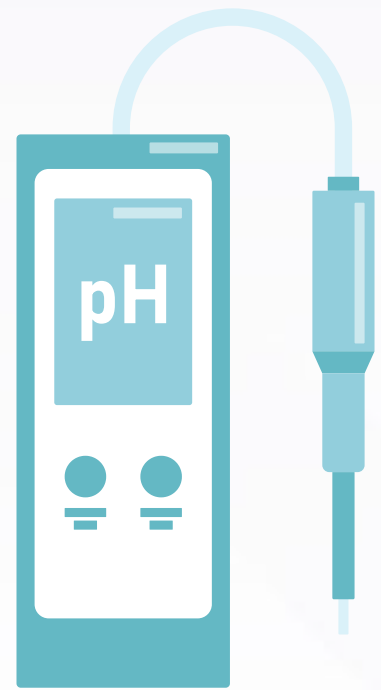


Record survival and death results of mosquitoes at all stages



# 2nd section

## Study of the water pH 4-9 affect the *Aedes ssp.* size



Check pH

Measuring the size of the larvae Pupa Adults with Vernier Caliper

**2nd section**

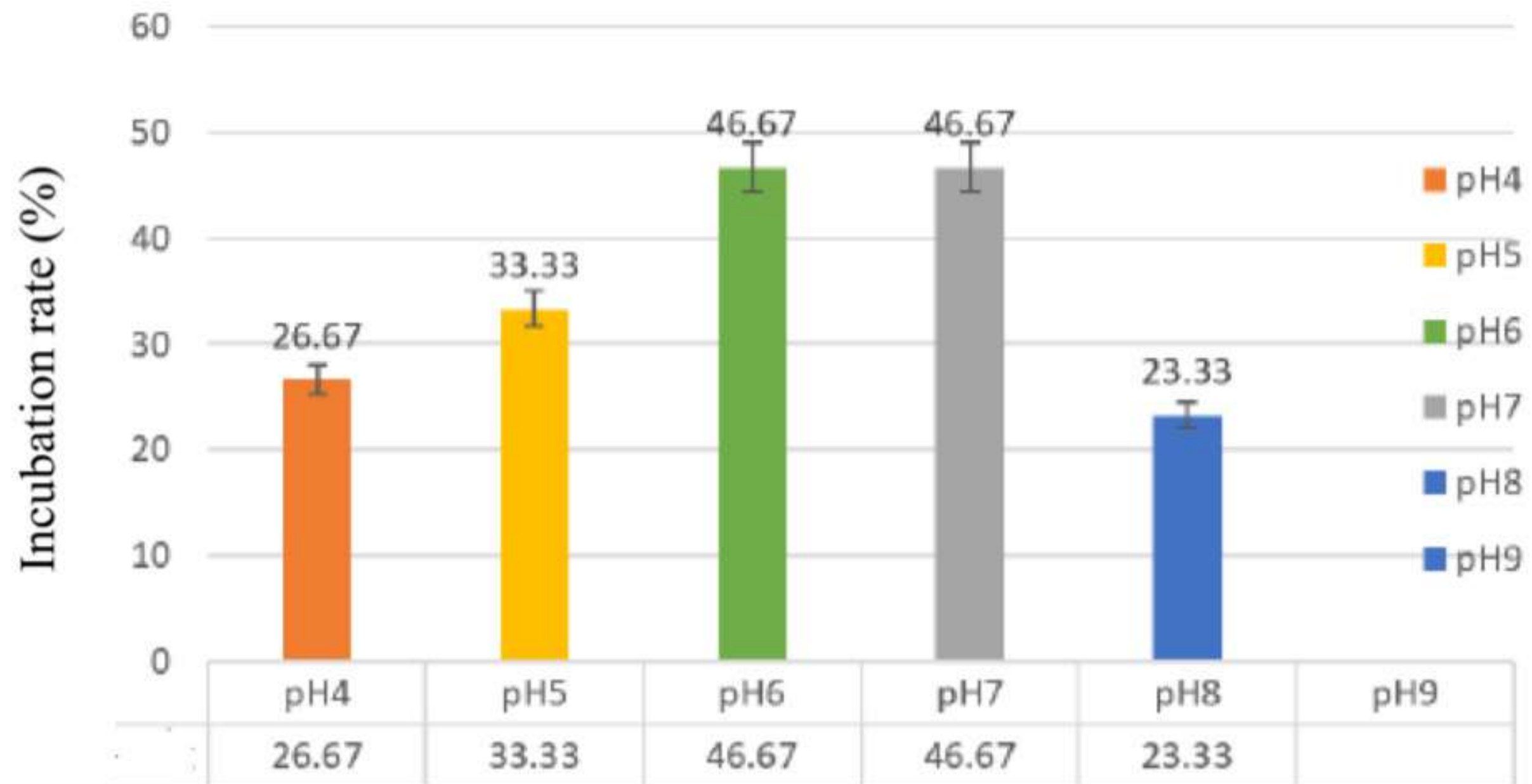
**Result**

# **Hatching rate and survival rate**

# 2nd section

## Result

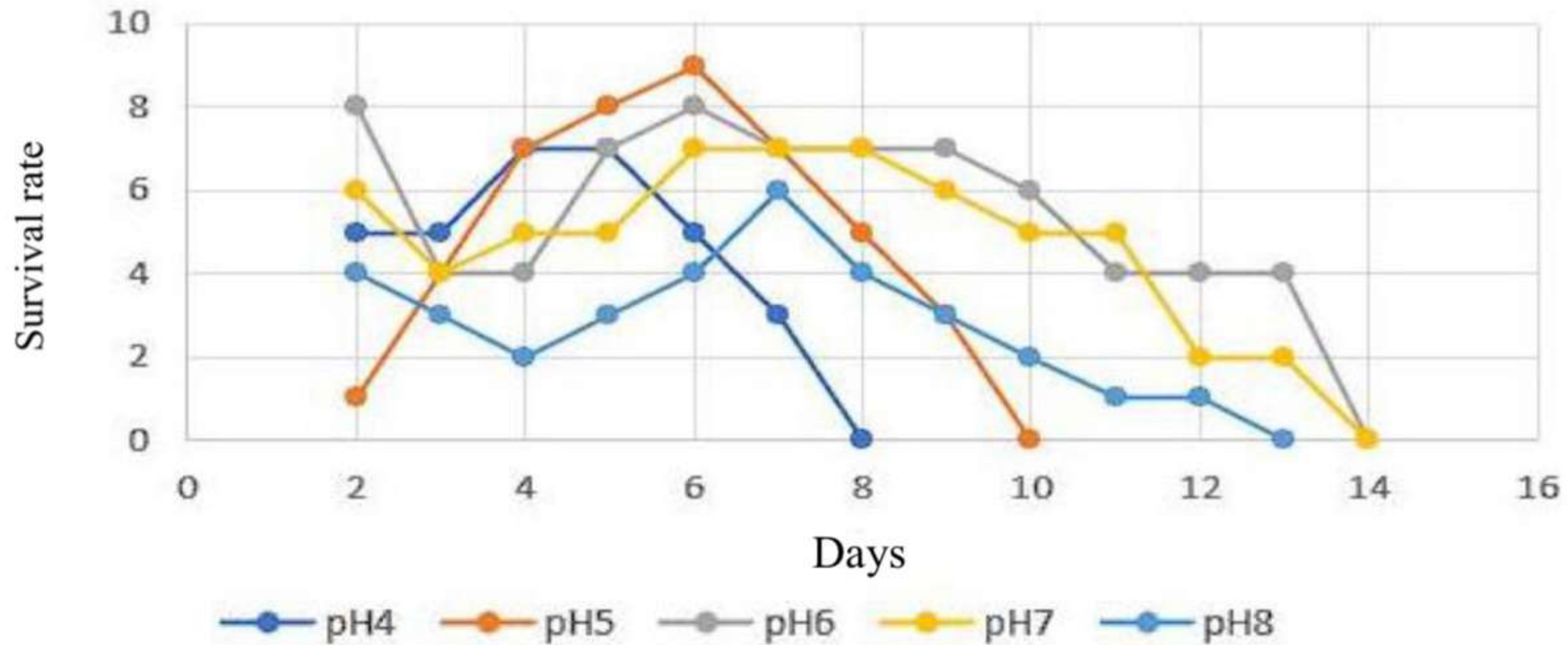
Incubation rate of Aedes mosquito egg in water with different of pH value



# 2nd section

## Result

The Survival rate of mosquitoes in the larval stage in different pH of water



**2nd section**

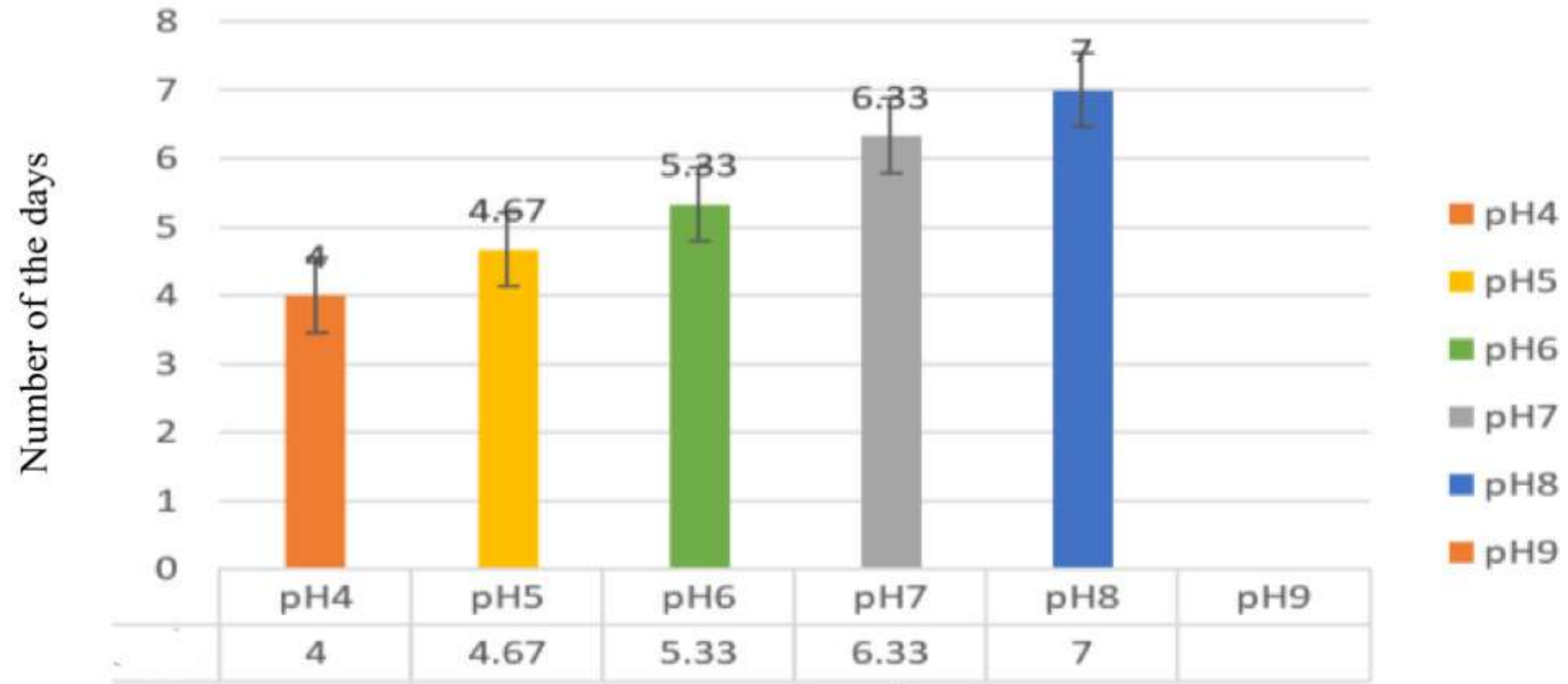
**Result**

# **Life Cycle**

# 2nd section

## Result

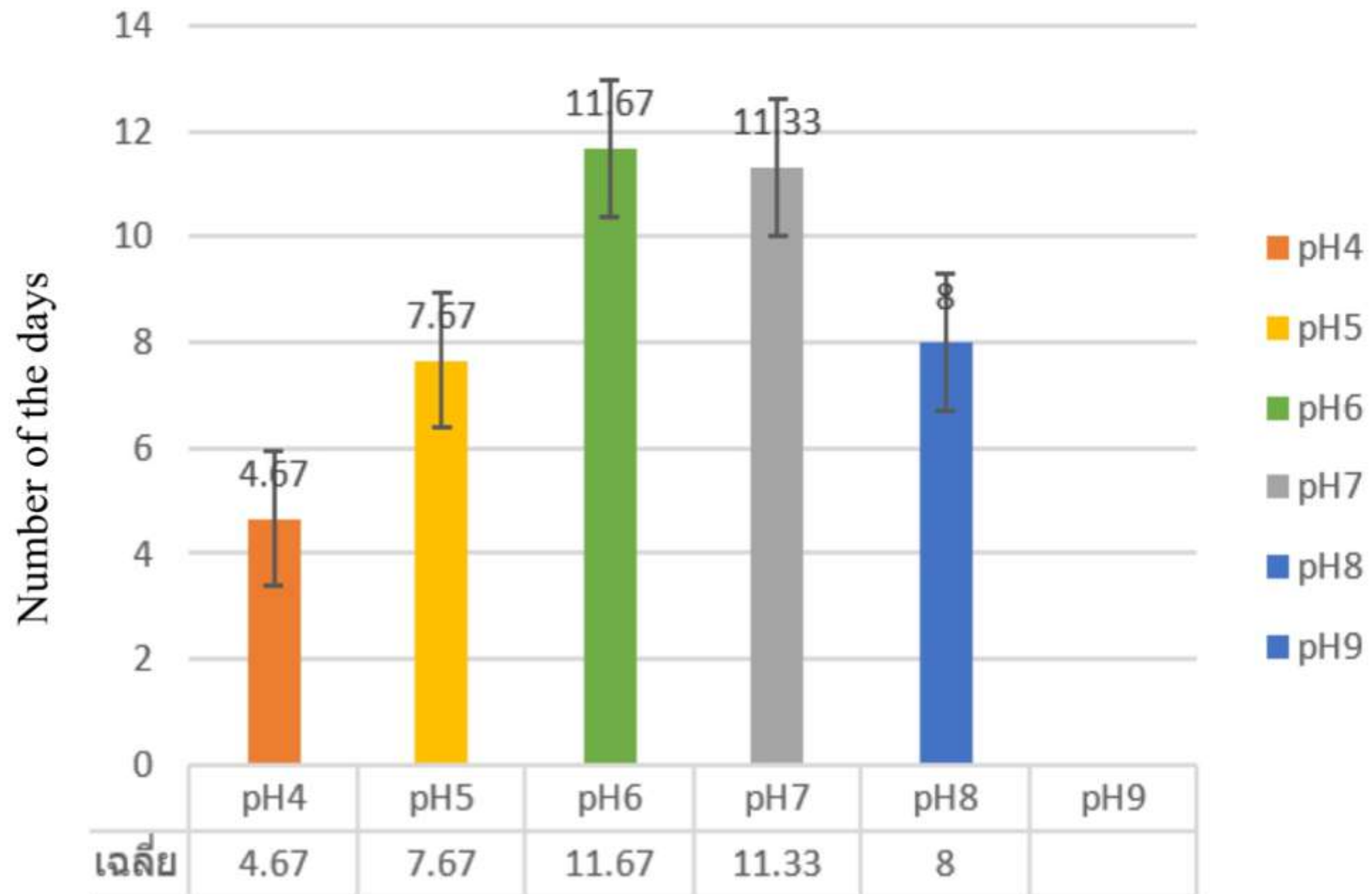
The period of life cycle of the mosquito the egg stage in different pH of water



# 2nd section

## Result

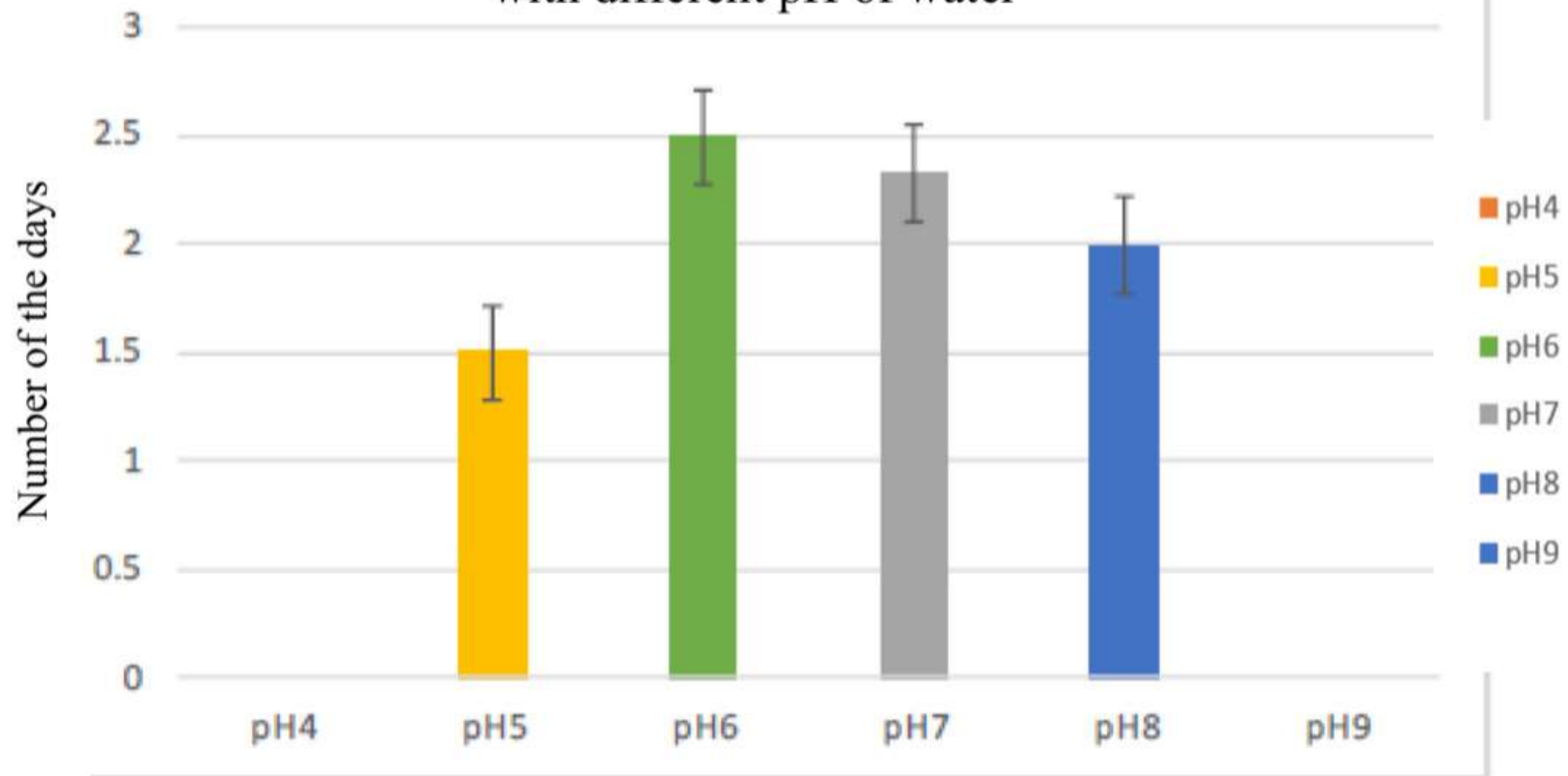
The period of life cycle of the mosquito larvae stage with different pH of water



# 2nd section

## Result

The period of life cycle of the mosquito pupa stage with different pH of water

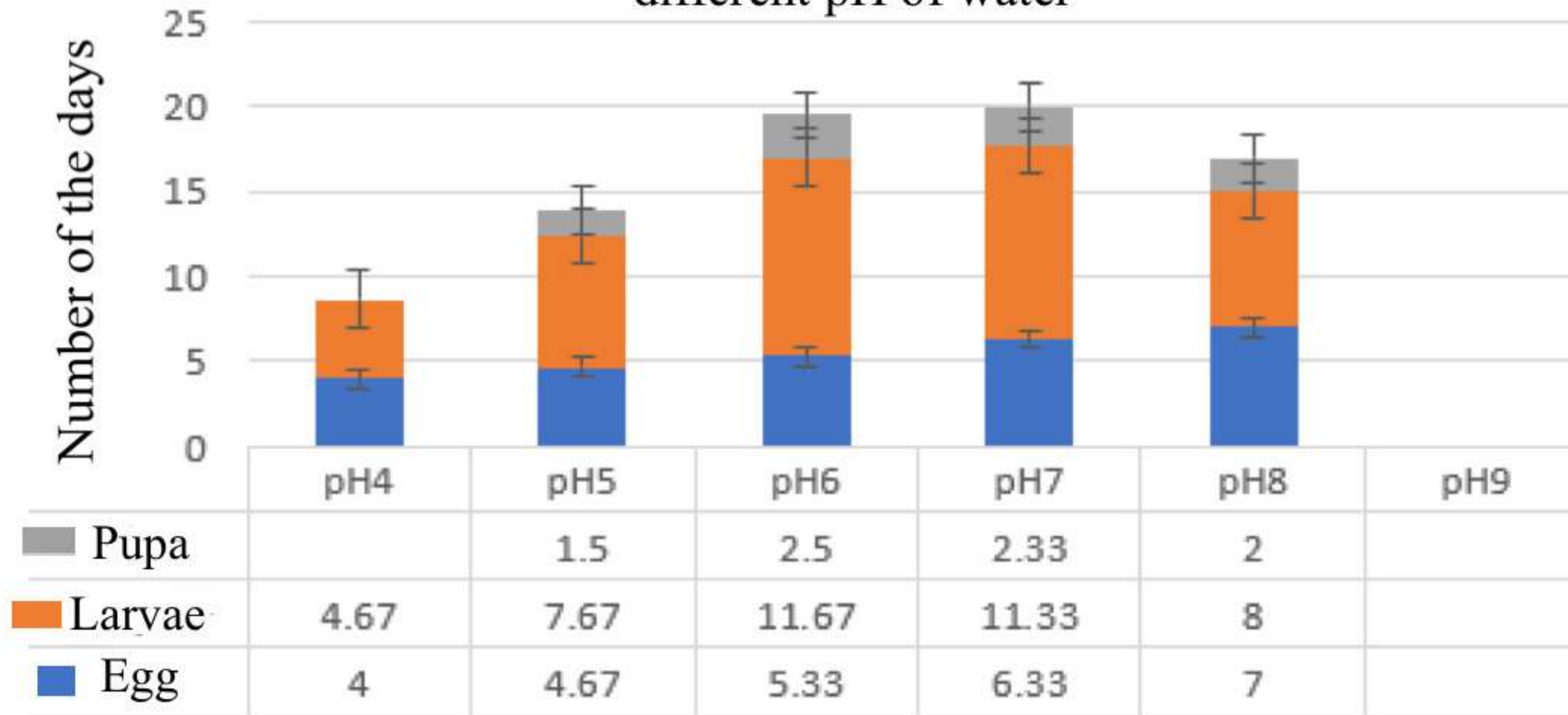




# 2nd section

## Result

The period of life cycle of the mosquito with different pH of water



**2nd section**

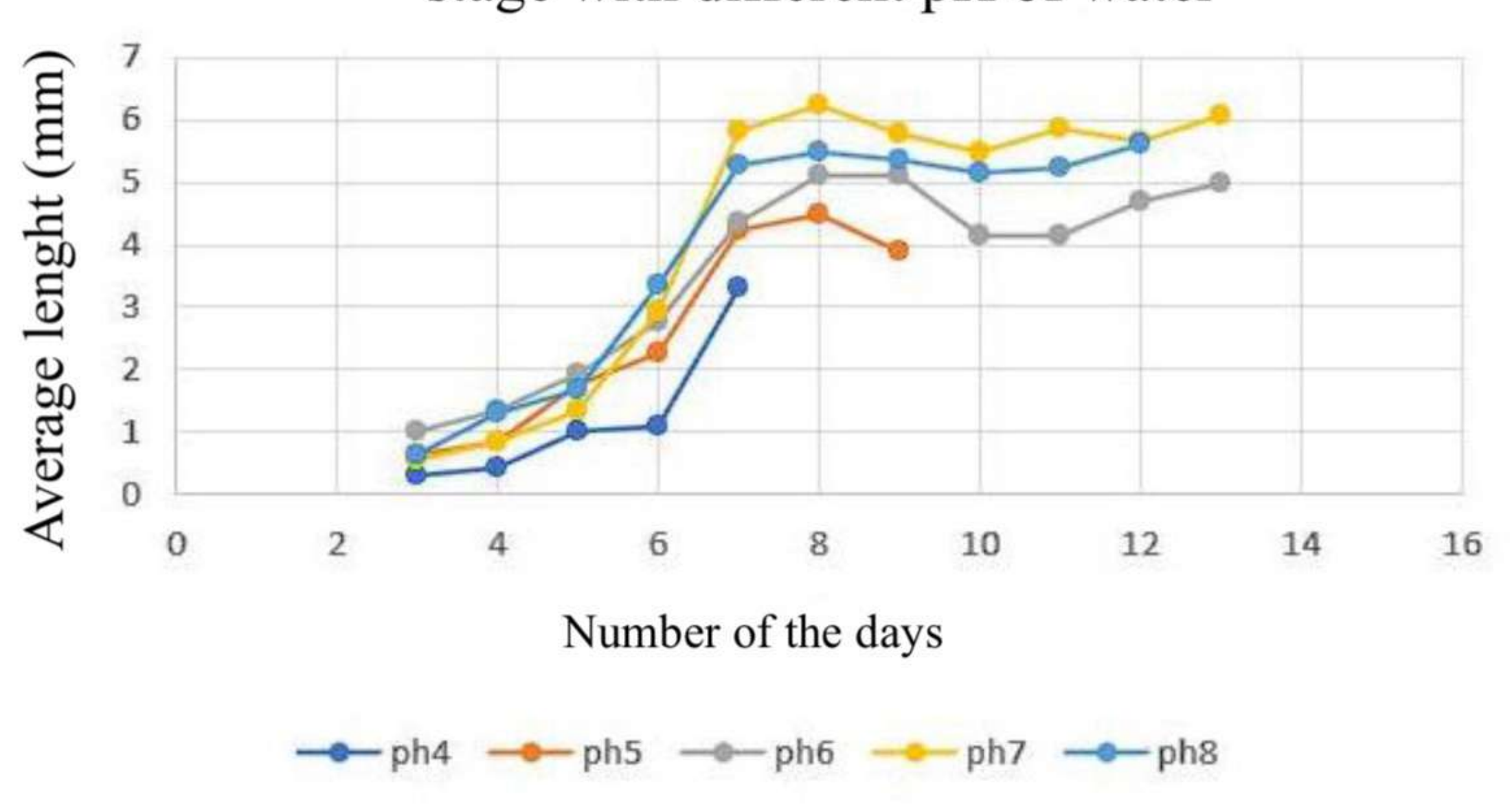
**Result**

# **Size of mosquitoes**

# 2nd section

## Result

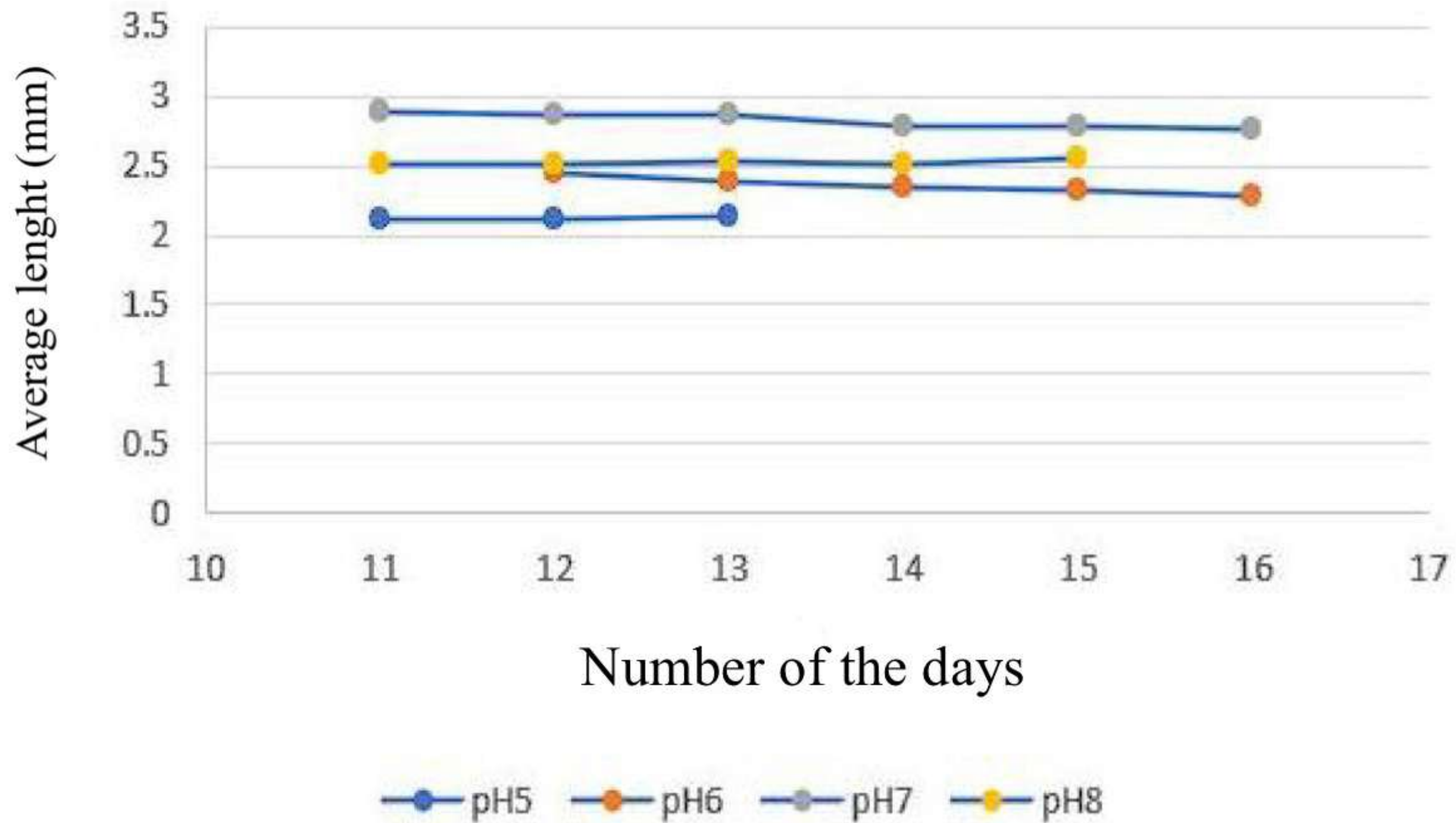
The average length of mosquitoes in larval stage with different pH of water



# 2nd section

## Result

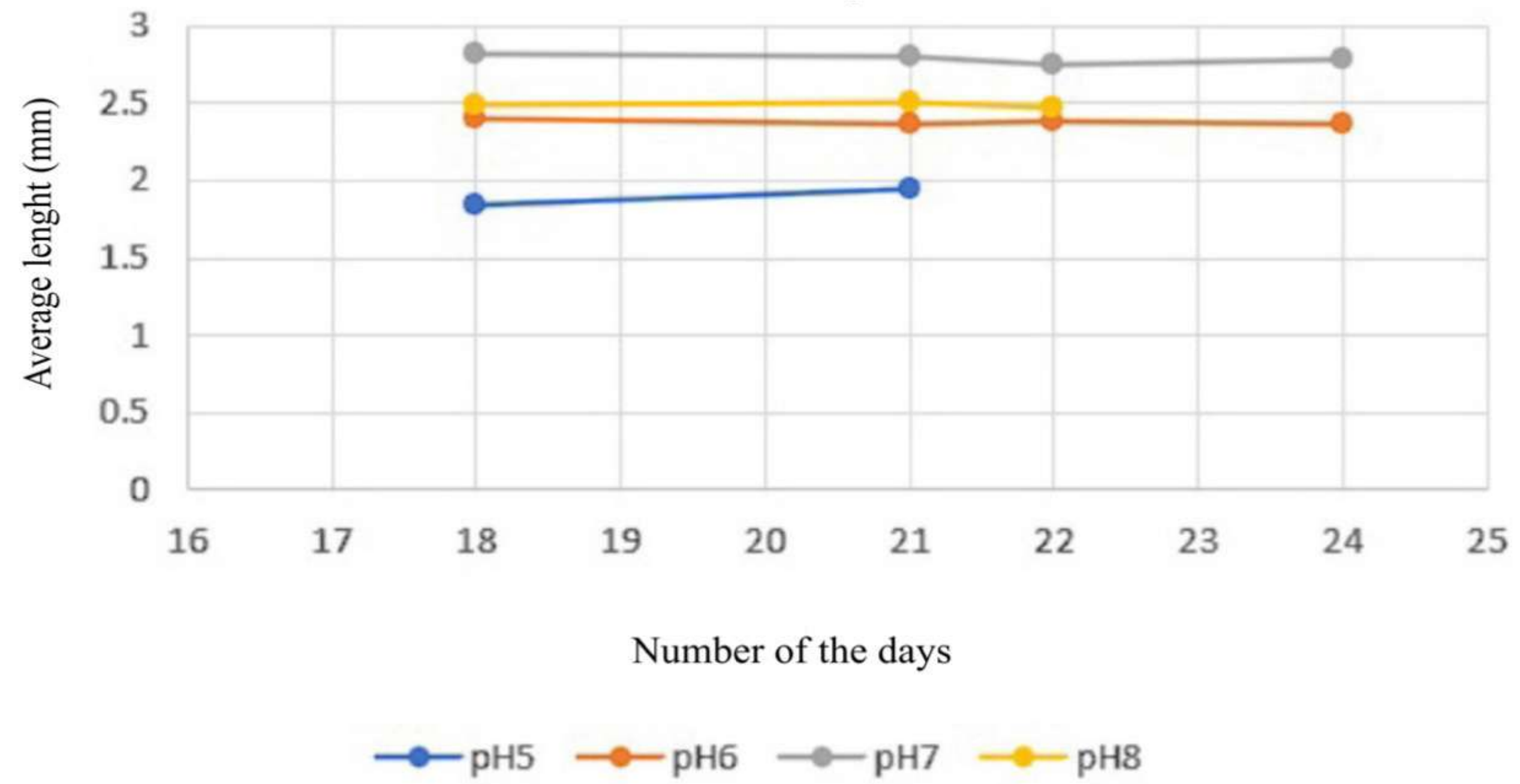
The average length of mosquitoes in pupa stage with different pH of water



# 2nd section

## Result

The average length of mosquitoes in adult stage with different pH of water



# Discussion

At pH4 of acidic water, Aedes larvae cannot grow, and at pH5, pH 6, pH 7 and pH8, Aedes larvae can grow into larvae and adults. Life cycle of The longest Aedes mosquitoes were at pH 7 and the shortest at pH 5. The results were consistent with the work of Clark, Flis, & Remold, 2004, which stated that the influence of pH resulted in a decrease in the percentage of larval growth in Periodic change of the pupa

Study of the pH value of water that affects Regarding the size of Aedes mosquitoes, it was found that In the pH5 and pH4 stages of larvae, the size of the larvae decreased respectively. At pH6, pH7 and pH8 the larvae size was not different and it was found that the pH of the water had a different effect on the size of the larvae. The significance level is 0.05. As for the size of the robber, pH5 has the lowest value, pH6 and pH8 have similar values, while pH7 has the greatest value. In a study of the pH of the water and the size of adult Aedes mosquitoes, it was found that at pH, pH5 had the lowest value. pH6 and pH8 had similar values, while pH7 had the highest value.

# Conclusion

The hatching rate of Aedes mosquitoes decreases when in water with a pH lower than 6 and at pH9 there is no mosquito egg hatching. At pH 6-8, the survival rate of Aedes mosquito larvae is 100%, but at pH 4, mosquito larvae cannot grow into pupa. The life cycle of Aedes mosquitoes in water with a pH lower than 5 cannot grow into adults. pH5 has a shorter life cycle than pH6, pH7, and pH8. The longest life cycle is pH7. The optimum pH for mosquito growth is pH6 and pH7. When mosquitoes grow in water with an acidic pH, the cycle speeds up. The size of mosquitoes that grow from an appropriate pH value is the largest, in this case pH 6 and 7. And in line with the size of mosquitoes that can be found in natural sources, when the pH of the water is reduced to acidic, it will make the mosquitoes smaller.

**THANK YOU**