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

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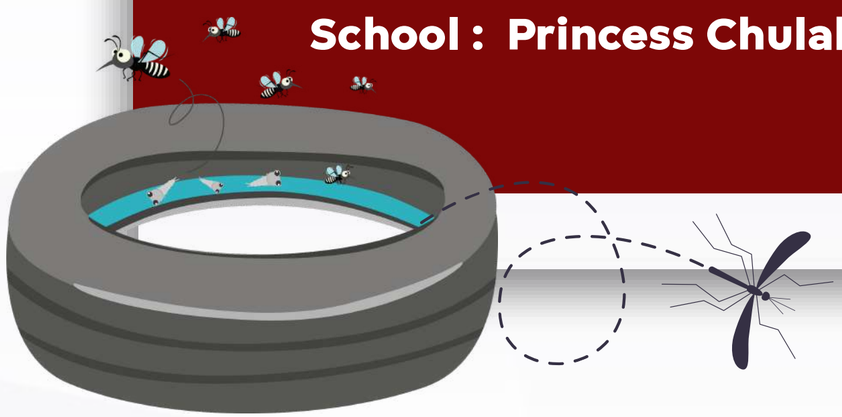
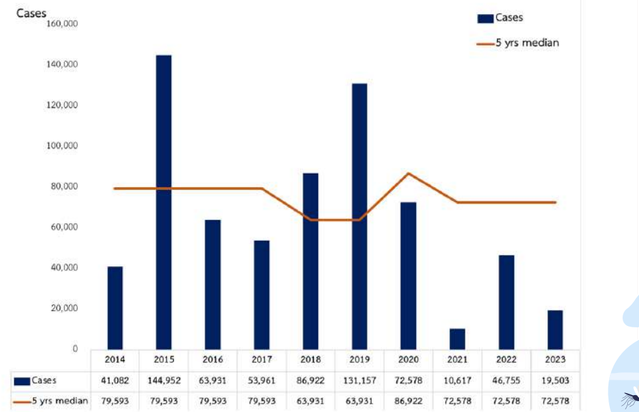
School : Princess Chulabhorn Science High School Trang



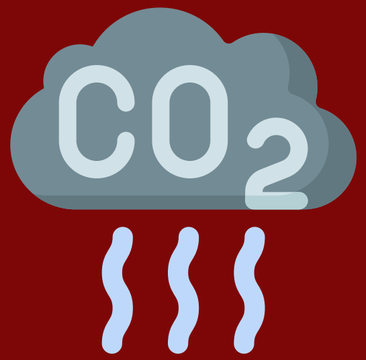
INTRODUCTION

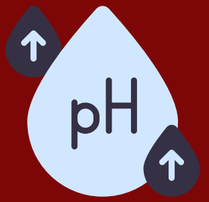
Dengue cases and 5-years Median in Thailand,2014 – 2023



	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
Cases	41,082	144,952	63,931	53,961	86,922	131,157	72,578	10,617	46,755	19,503
5 yrs median	79,593	79,593	79,593	79,593	63,931	63,931	86,922	72,578	72,578	72,578

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

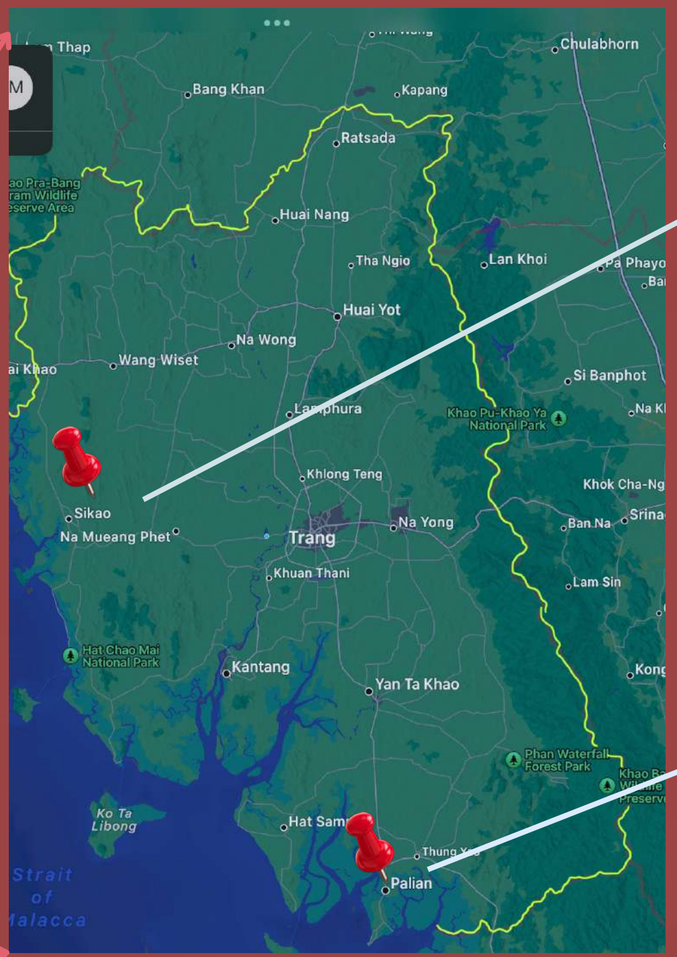
- Observe the breeding site
- Classify the types of larvae found
- Size of *Aedes aegypti*

2nd section : Experimentation

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

1st section :

Study site



DATE 7/12/23

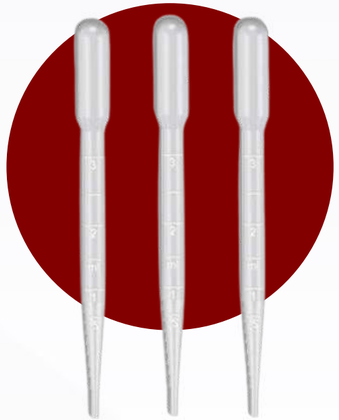
DATE 21/11/23

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

1st section :

Material

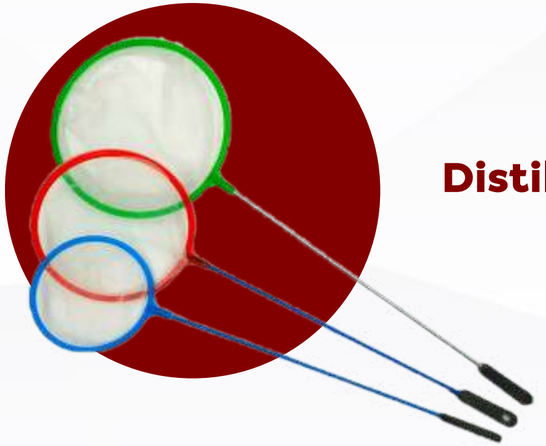
HI98103
Checker
pH Tester



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

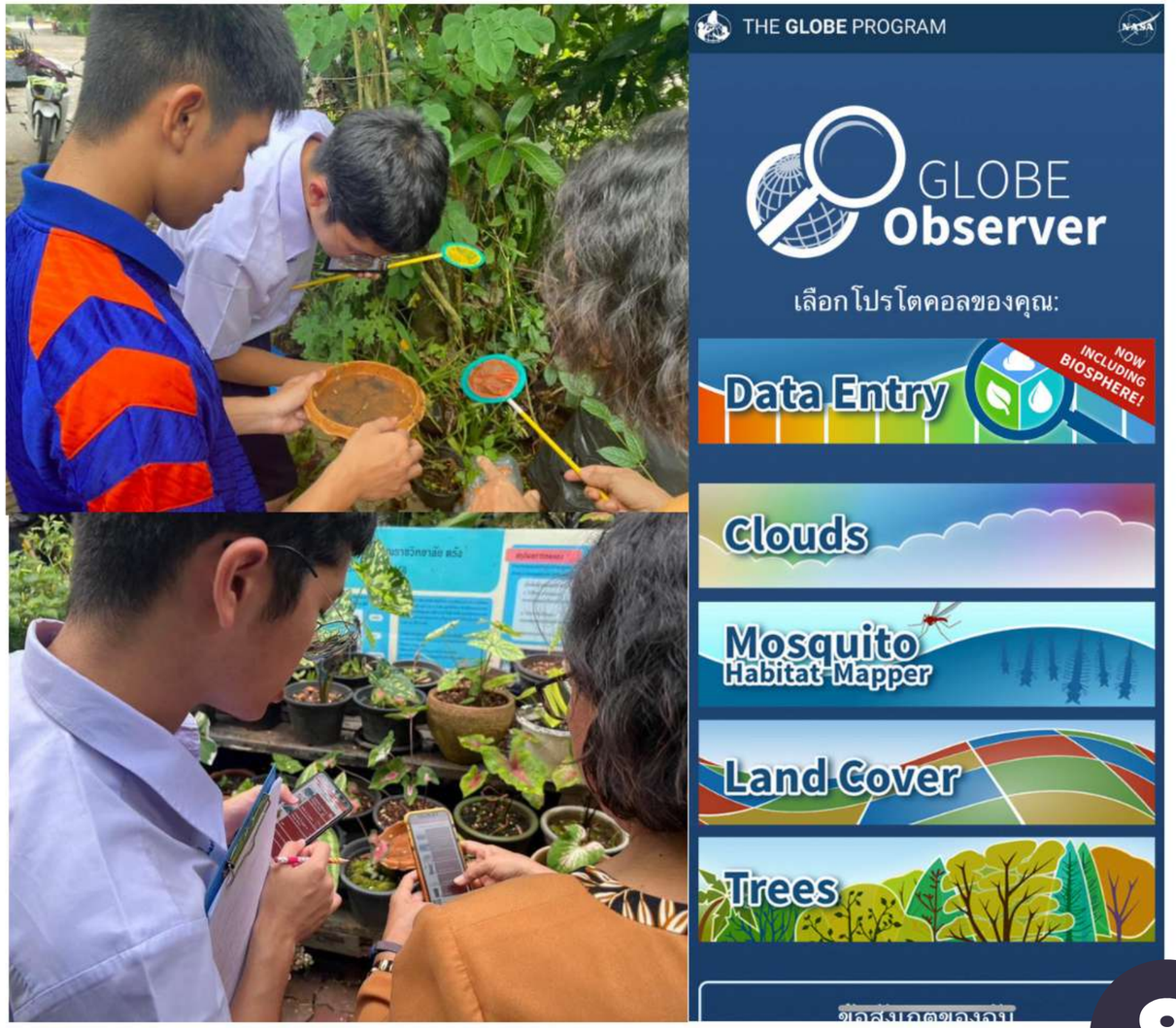
Measure and record the pH of water found by HI98103 pH Tester

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:	47NNJ764952

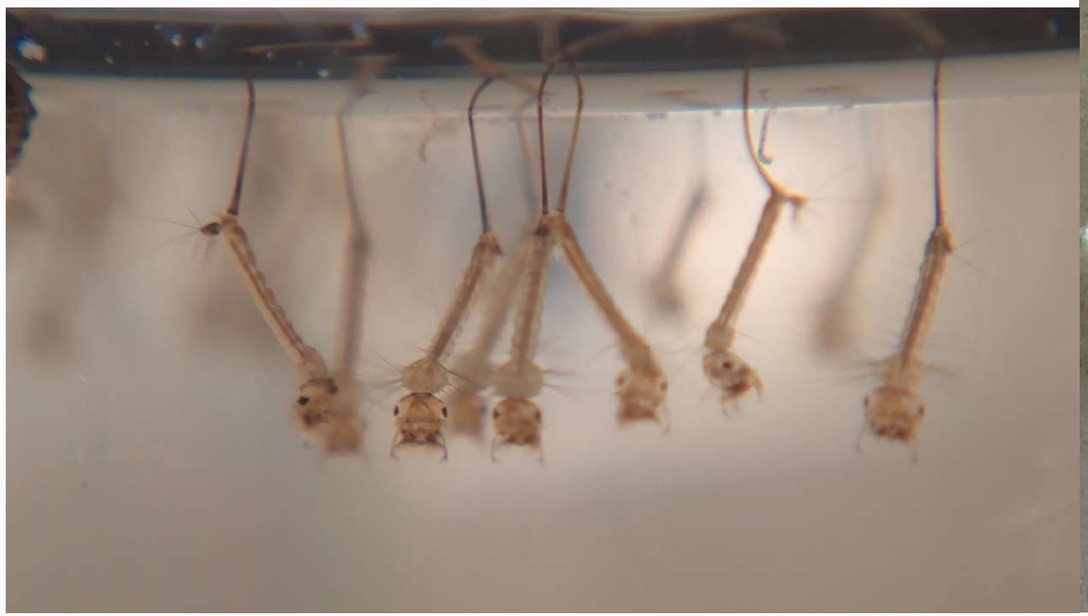
Mosquito Habitat Mapper

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

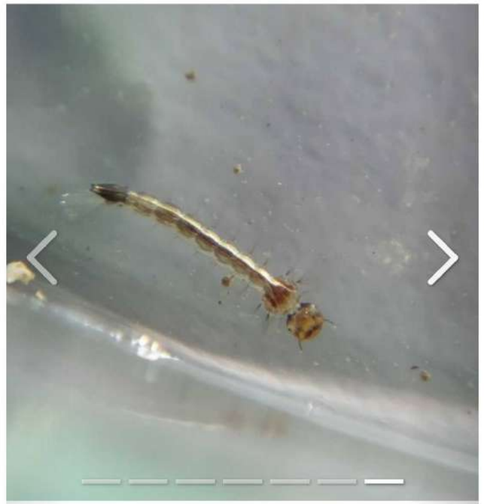


1st section :

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:	47NN[illegible]

1st section :

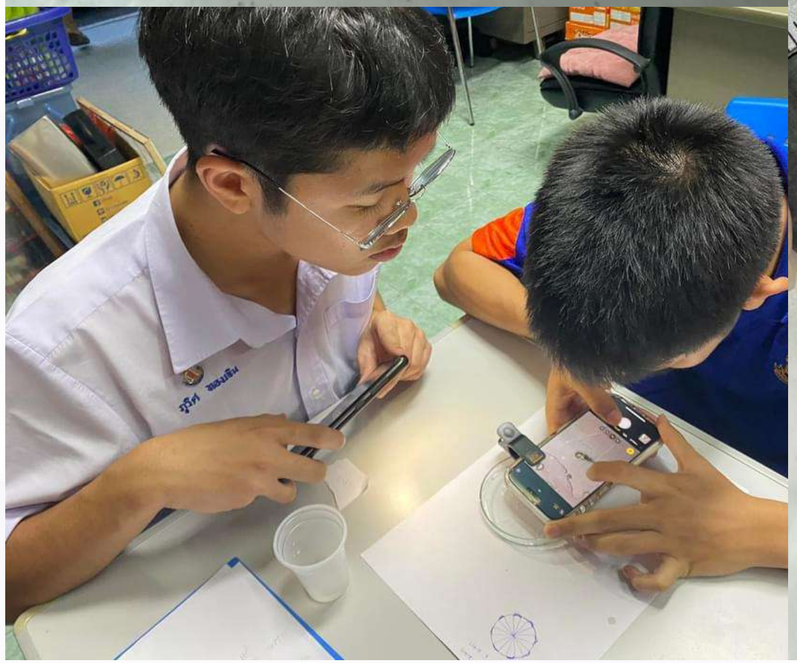
Method

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 lenght of mosquito (mm) in different pH of water

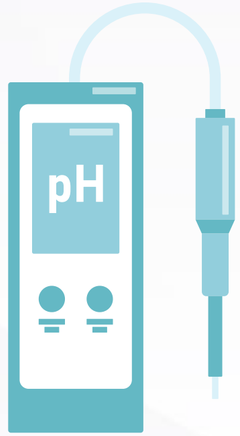
Study Site	pH of water	Body length of mosquito (mm)					Average (mm)
C12	5.7	2.12	1.61	1.71	1.69		1.78
P4	6.3	1.97	2.42				2.2
C11	7	1.8	3.48	1.98	1.32	2.3	2.18
K1	8	2.79	2.57	2.4	2.48	1.83	2.41
C14	9.2	2.04	1.47				1.76

2nd section

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

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

Adjust pH water use CH_3COOH and CaO

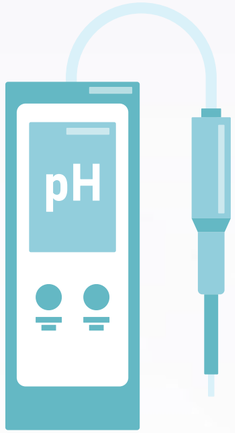


Check pH

Raising mosquito eggs

2nd section

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



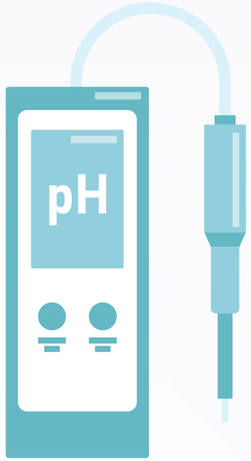
Check pH

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

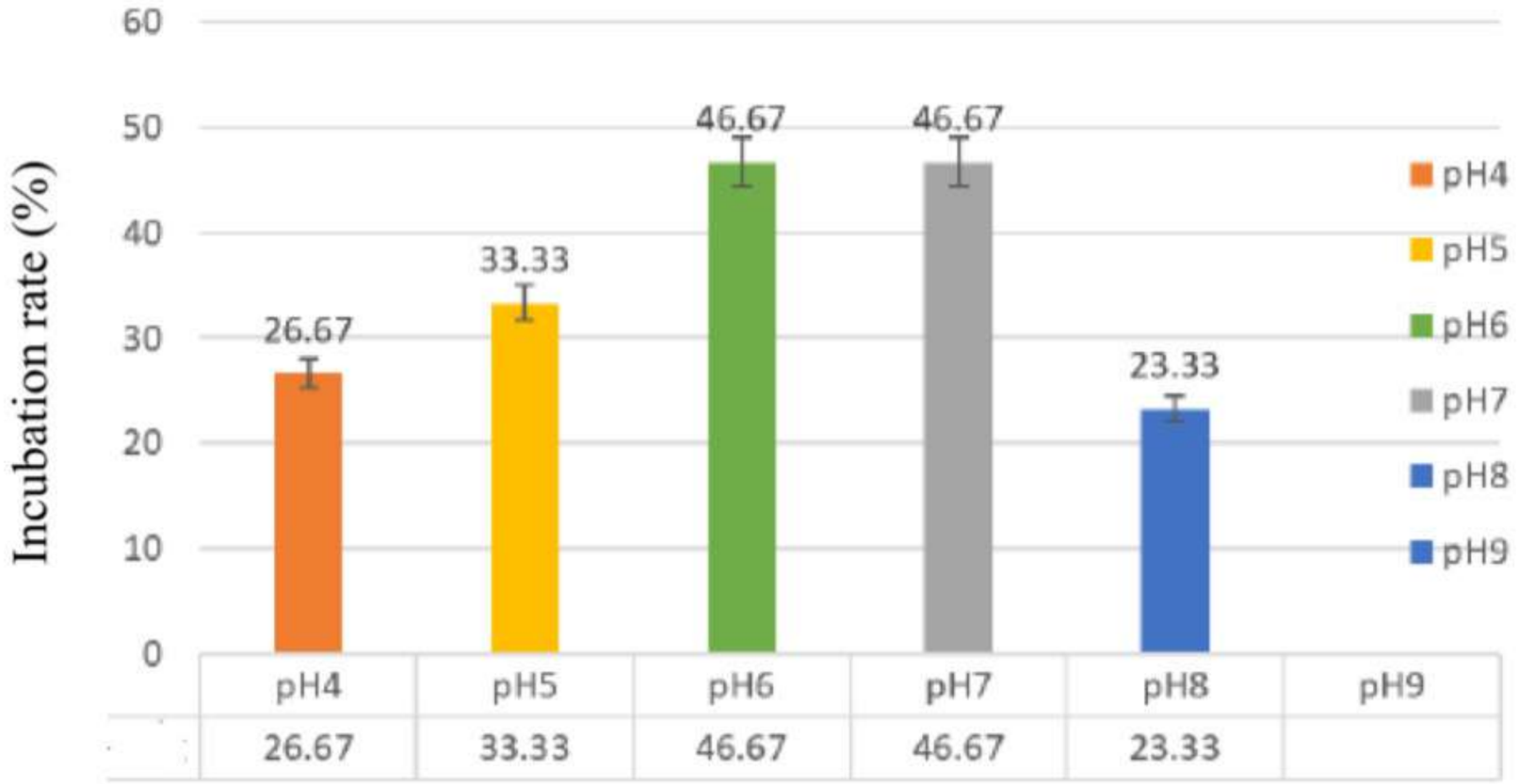
Measuring the size of the larvae Pupa Adults with Vernier Caliper

Hatching rate and survival rate

2nd section

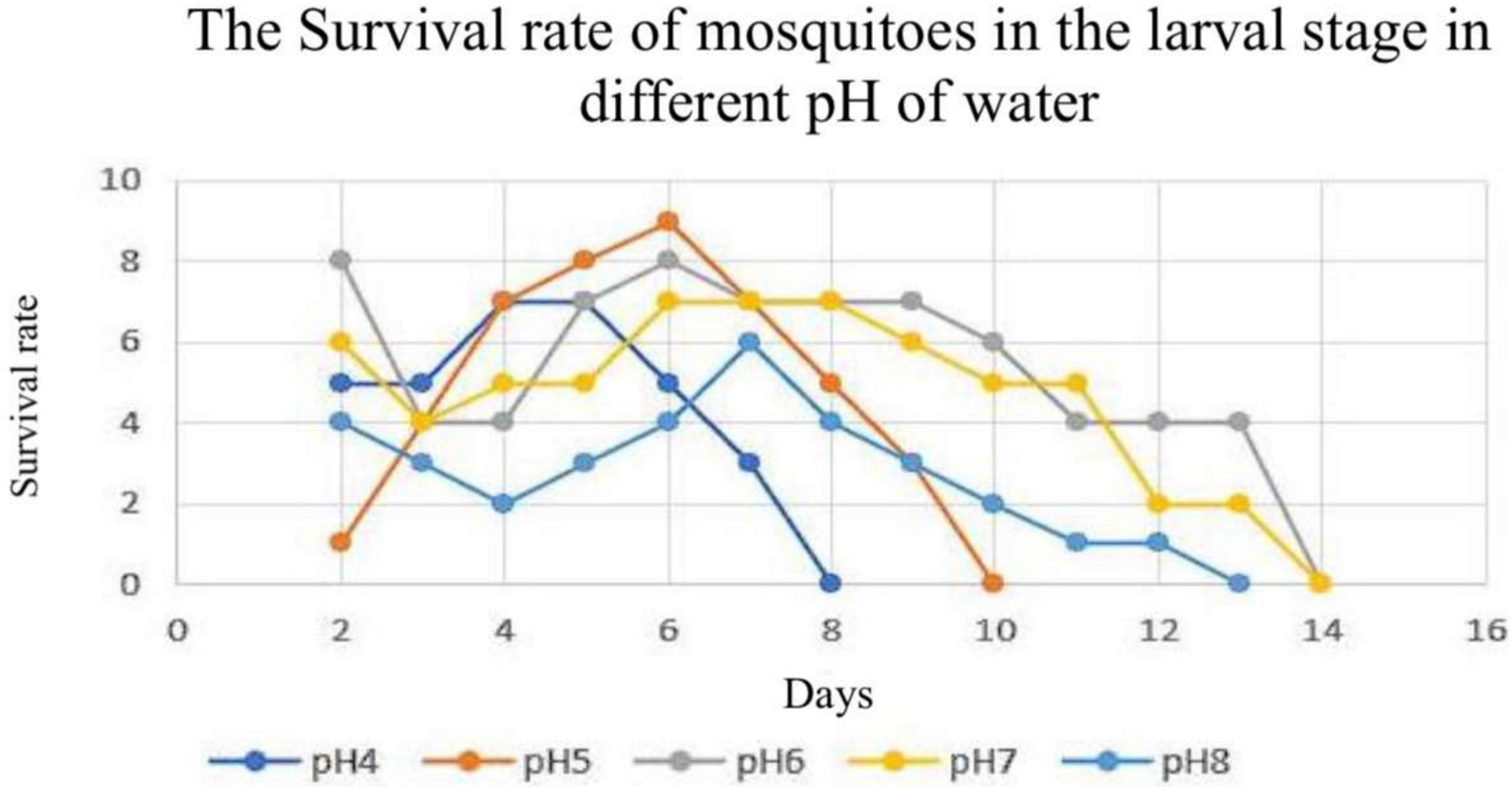
Result

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



2nd section

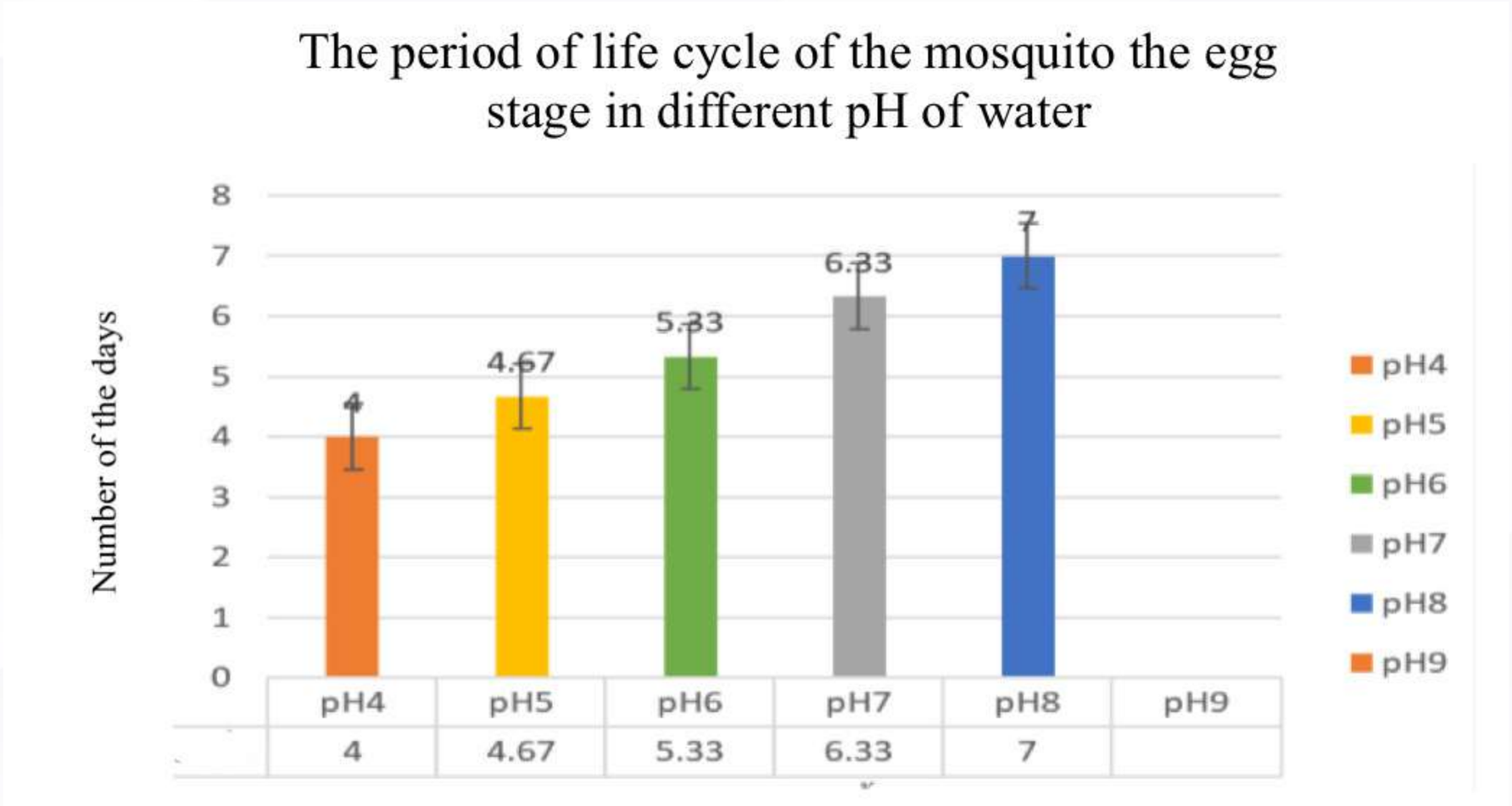
Result



Life Cycle

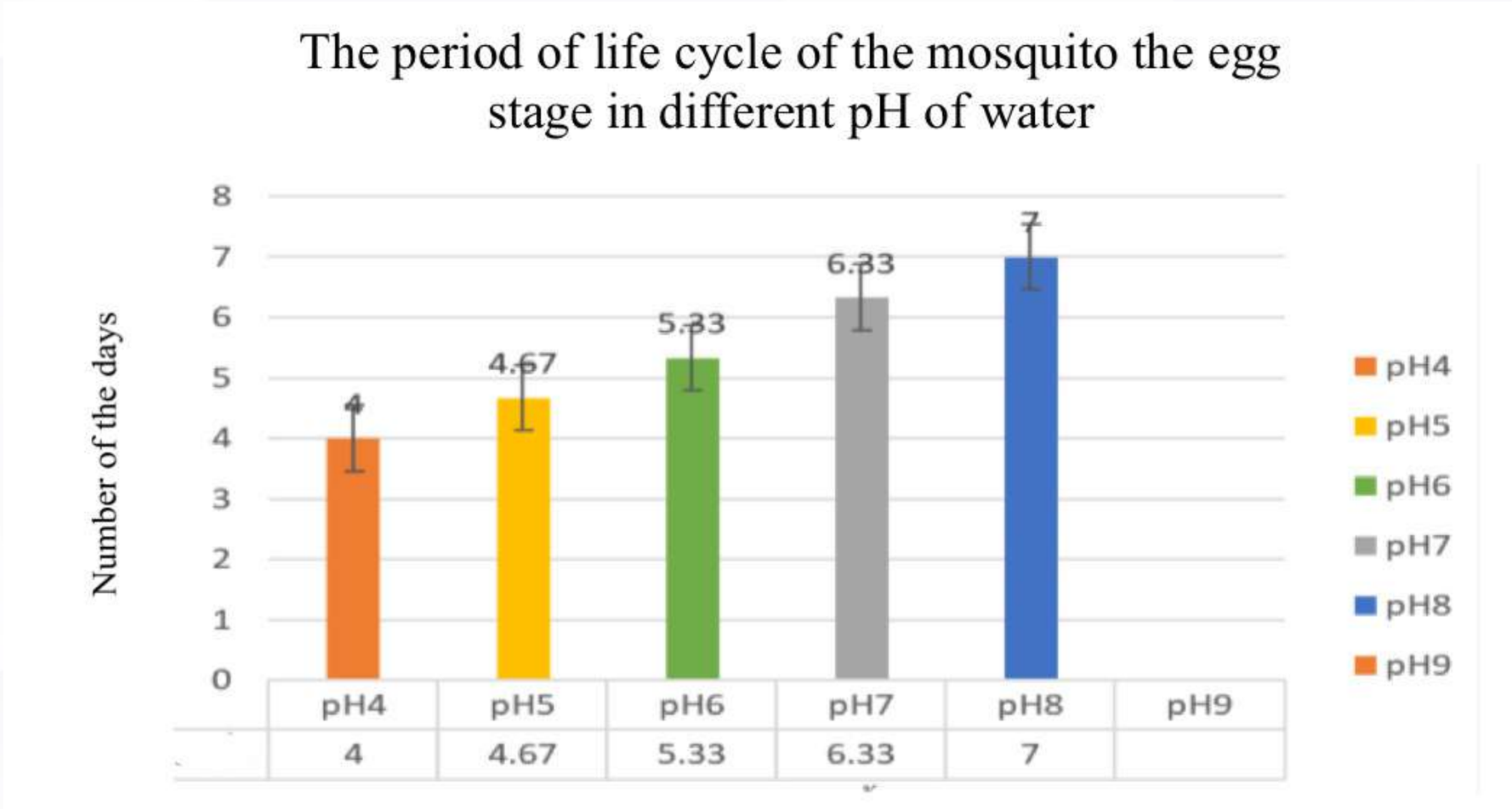
2nd section

Result



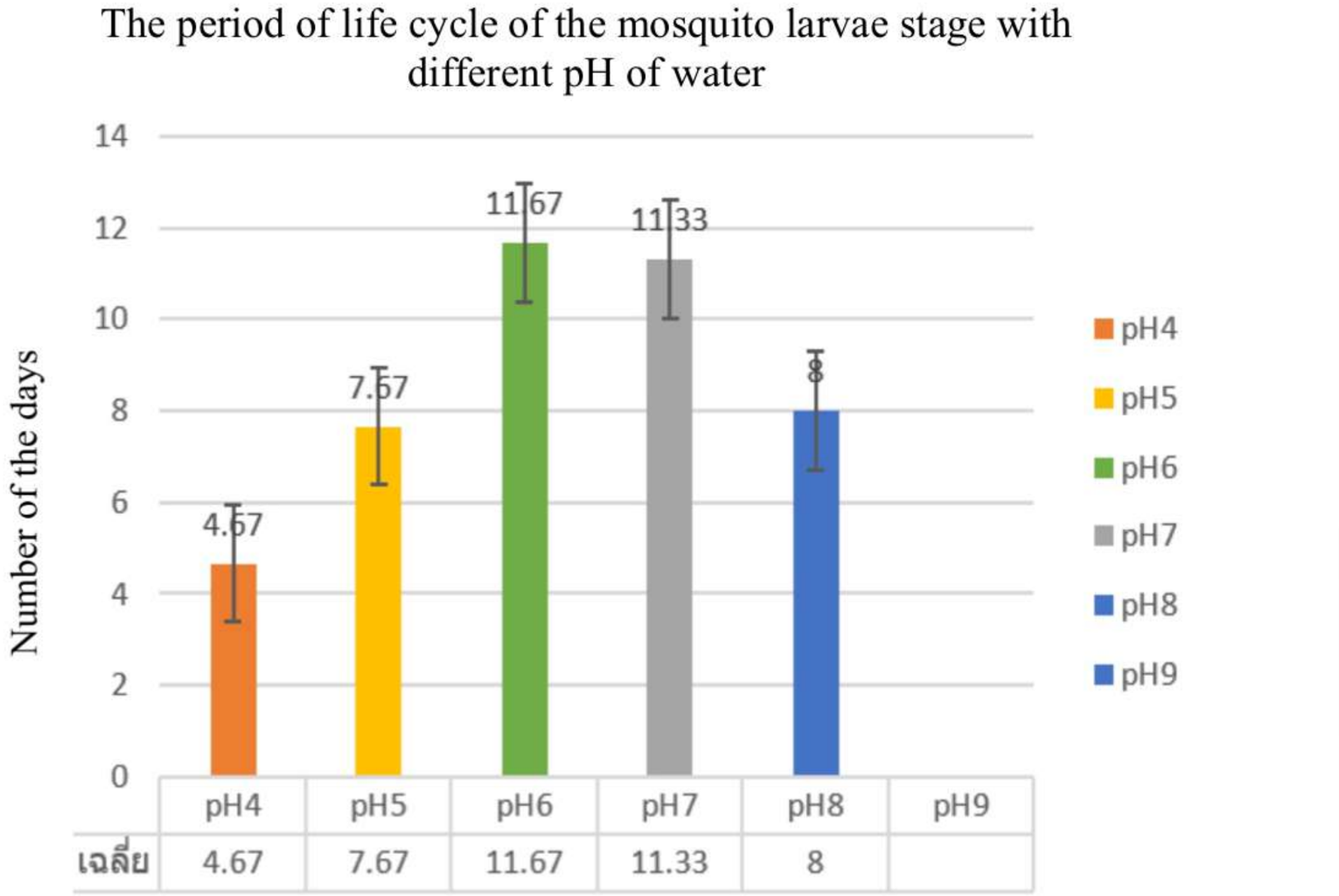
2nd section

Result



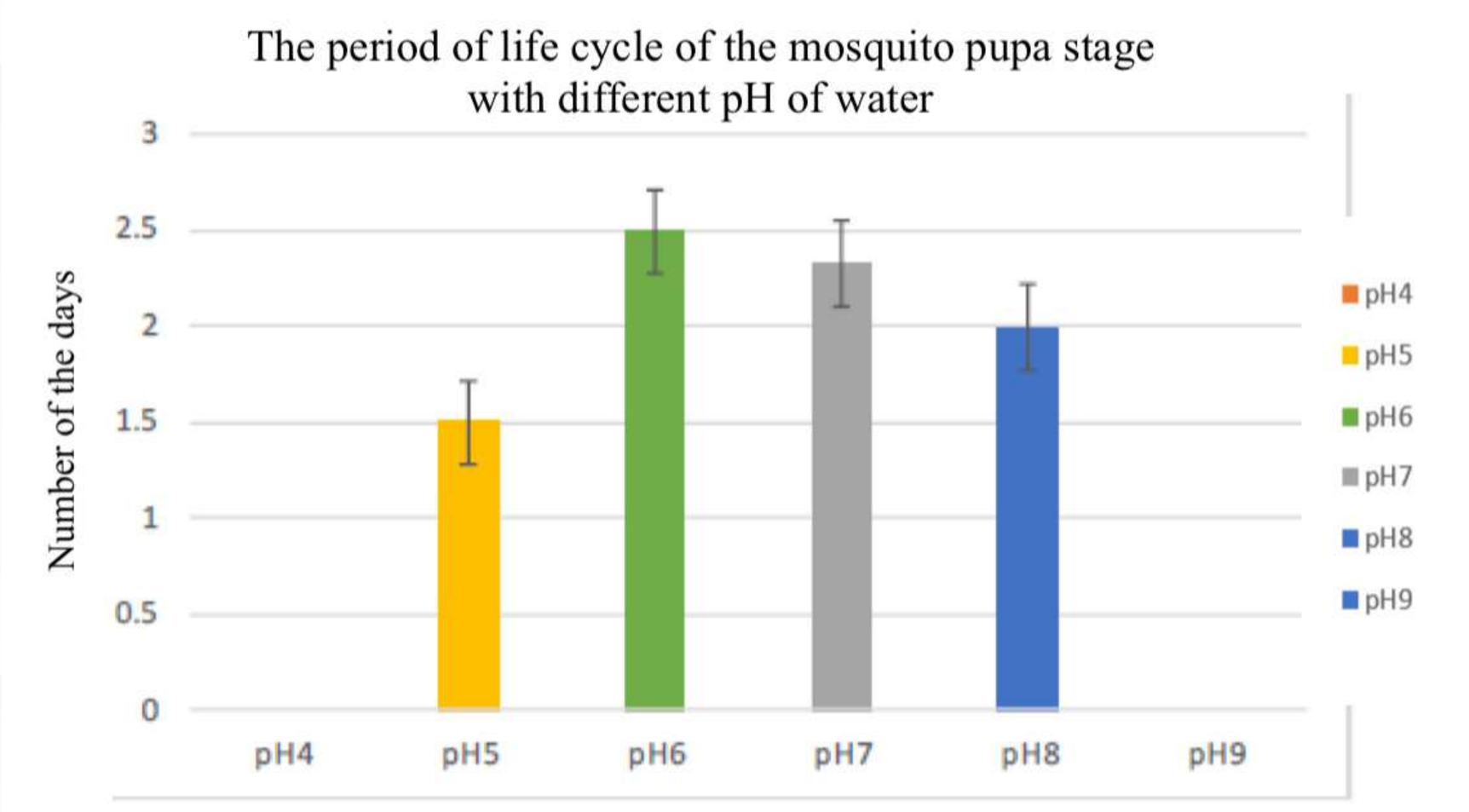
2nd section

Result



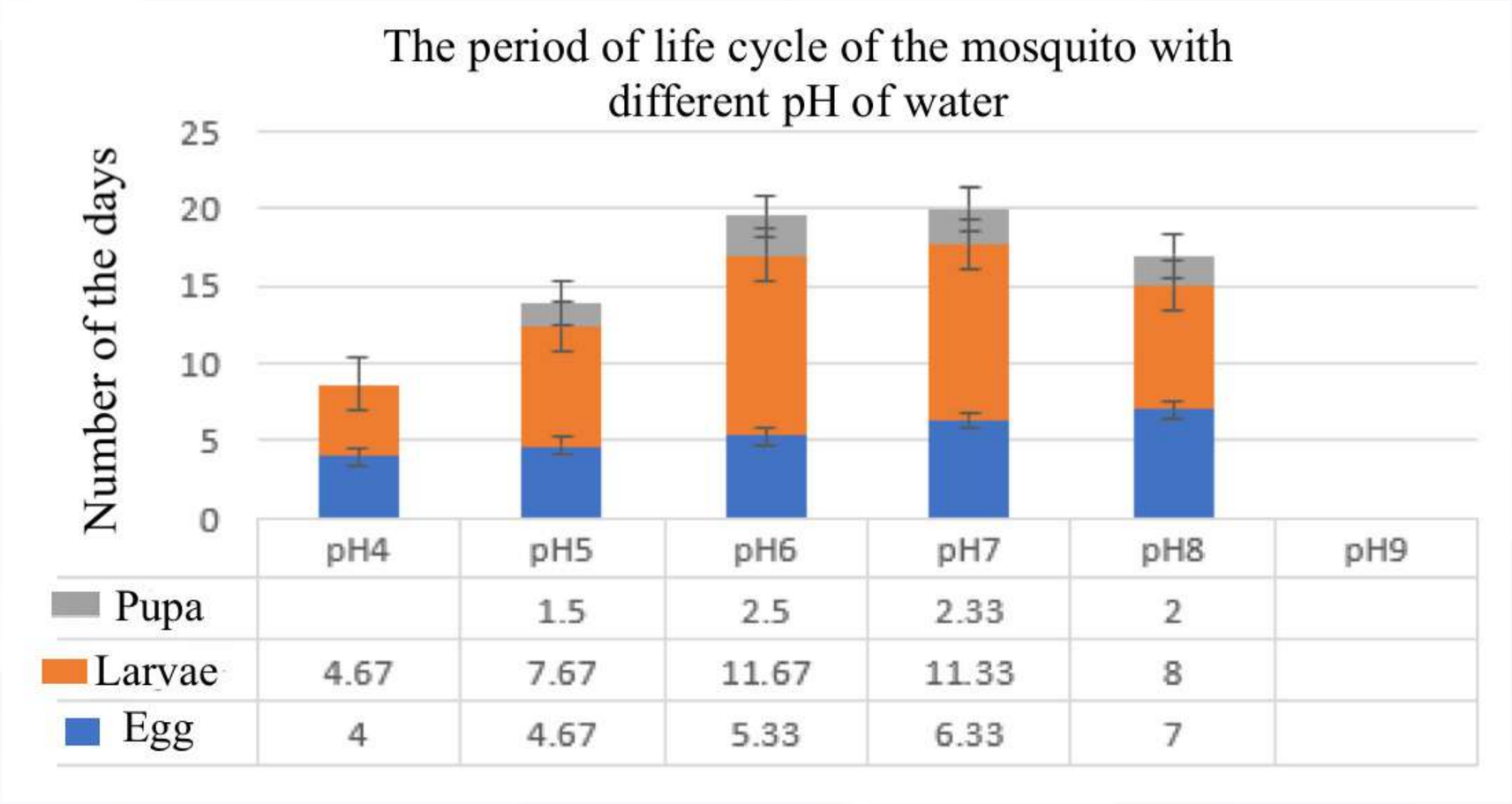
2nd section

Result



2nd section

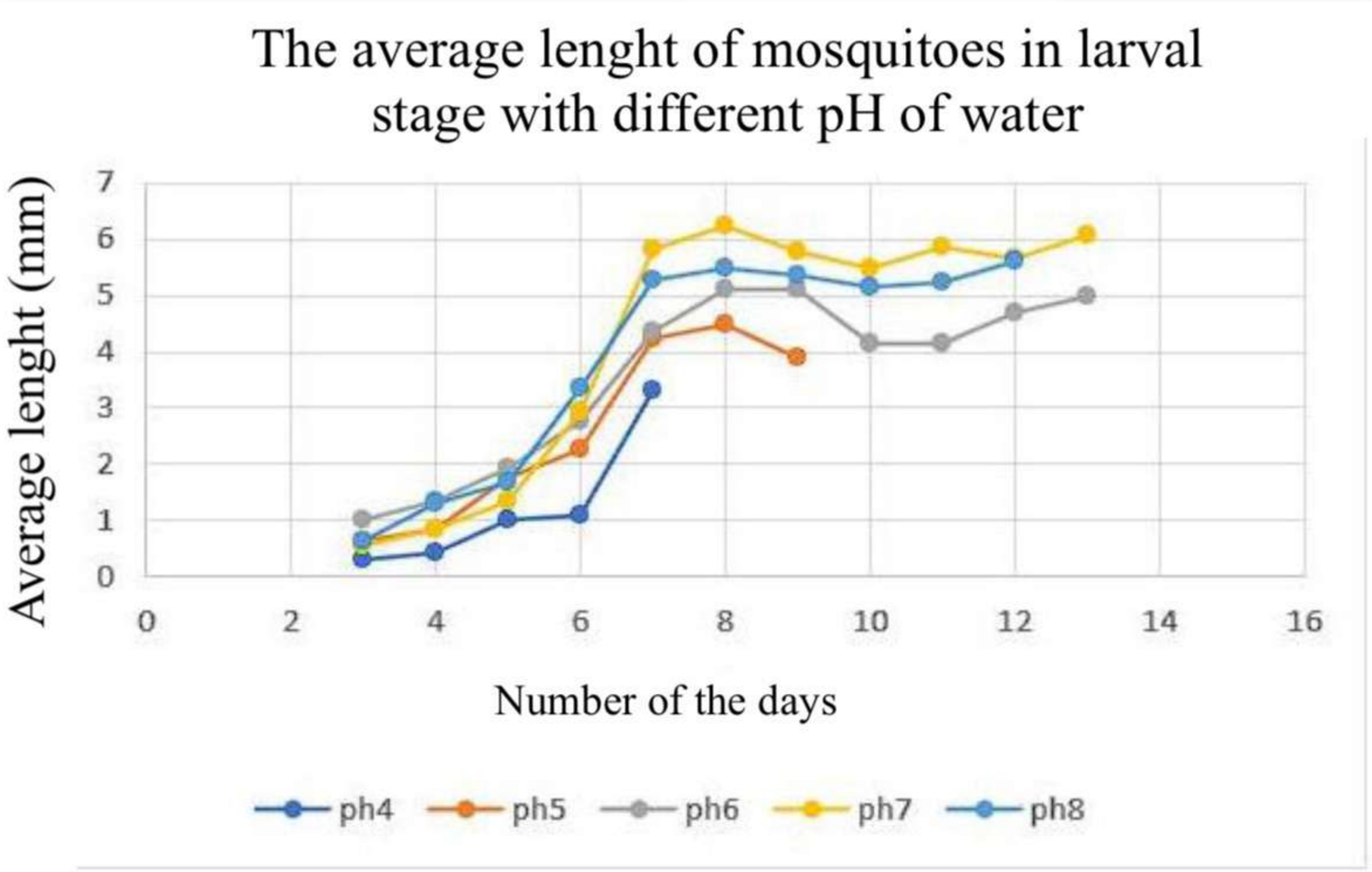
Result



Size of mosquitoes

2nd section

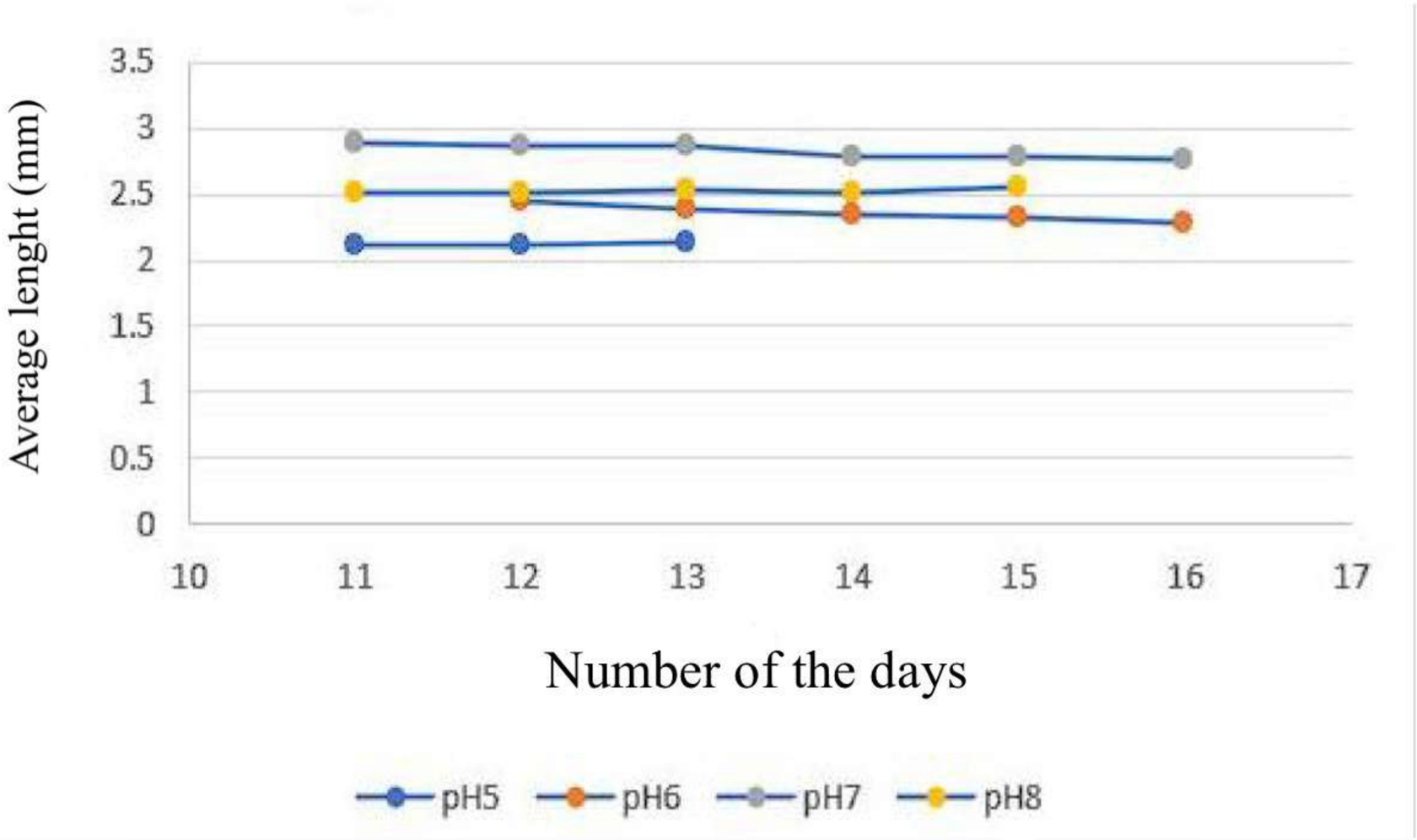
Result



2nd section

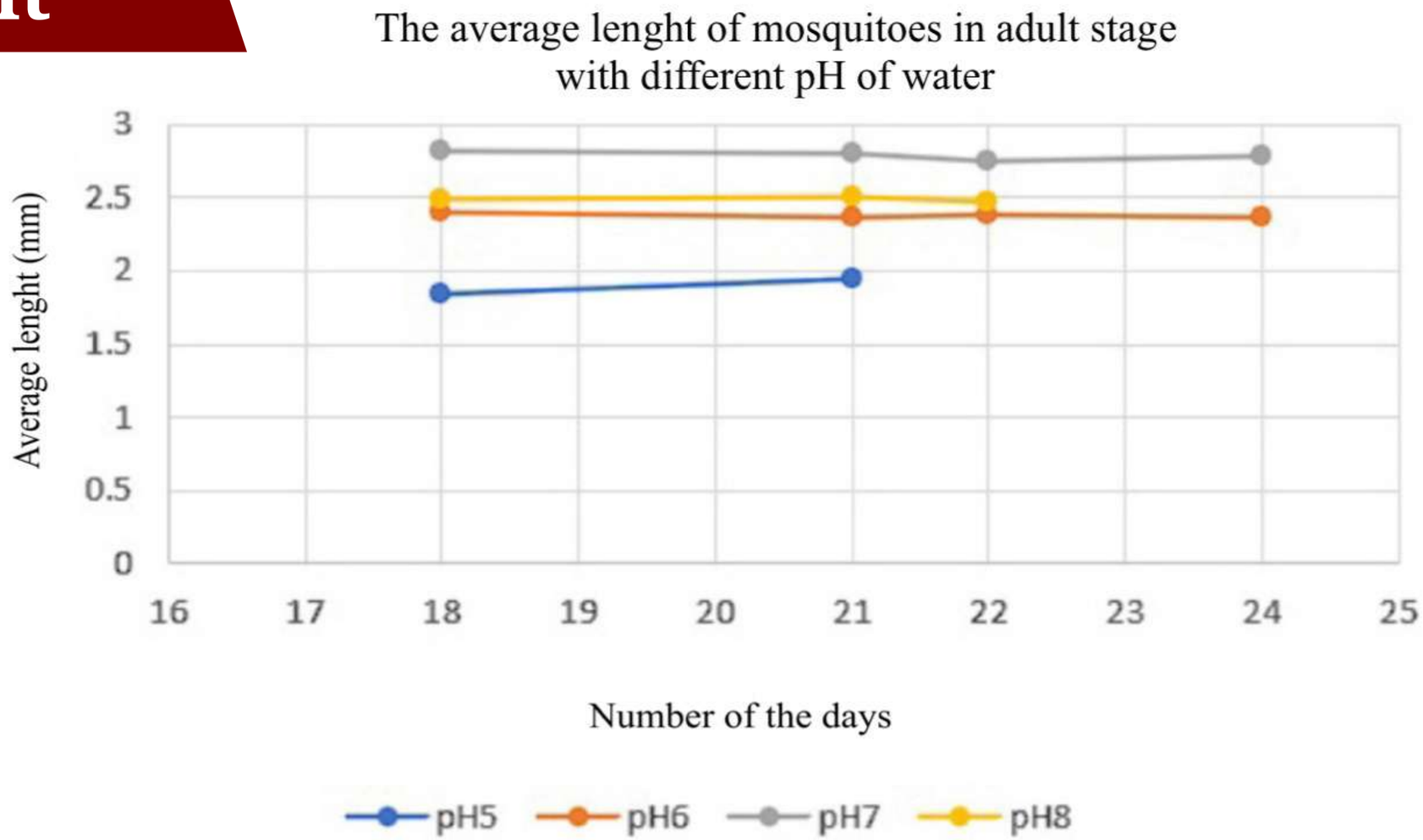
Result

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



2nd section

Result



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