Research title : A study of species and number of mosquito larvae in Na Yong and Palian districts, Trang province.

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Abstract

The objective of this research was to study the types and numbers of mosquito larvae in Na Yong and Palian districts, by collecting mosquito larvae data in randomized areas in Na Yong and Palian districts to find mosquito breeding sites, measuring water quality of breeding sites, classifying the species, counting and studying the larvae index of Aedes mosquitoes.

From the study, it was found that Na Yong District has 4 types of mosquito larvae : *Aedes albopictus, Aedes aegypti*, *Culex* spp. and *Toxorhynchites* spp. By the way, Palian District has 2 types of mosquito larvae: *Aedes albopictus* and *Aedes aegypti*. The mosquito larva breeding sites were found in 7 areas in Na Yong District, such as coconut shells, rubber trays, broken plastic containers, tires, water tanks, water pipes (mortar) and waste bins. There are also 4 areas in Palian district, such as water buckets, water tanks, coconut shells and tires. Water quality in various habitats of mosquito larva in Na Yong and Palian district has no significant difference in pH. The average surface water temperature of the mosquito larva habitat in Palian was higher than Na Yong district, while the water temperature of mosquito larval habitats in Na Yong was higher than Palian district. In Palian, the *Aedes albopictus* and *Aedes aegypti* larval HI and CI values were higher than in Na Yong district, while BI values in Na Yong were higher than in Palian district.

Keywords: mosquito larvae survey, mosquito breeding site, water quality.

Introduction

Mosquitoes are very important insects in public health problem. The mosquitoes are small insects that can be found all over the world, found mainly in tropical and warm regions(Usawadee Thavora/et. al, 2016). Mosquitoes are a type of blood-sucking insects. In addition to causing itchy wounds when it sucks blood, it can also be a carrier of many diseases to humans. Some diseases cause death Examples of mosquito-borne diseases such as Malaria, Dengue, Encephalitis, Zika Fever, Chikungunya, Lymphatic Filariasis. (Boonterm Sangdit, 2017). At present, there are about 4,000 species of mosquitoes around the world, while in Thailand, there are about 450 species of mosquitoes, divided into 3 major groups: Toxorhynchitinae, Anophelinae and Culicinae(Usawadee Thavora/et. al, 2016). But the mosquitoes that are medically important and common in Thailand are: Aedes mosquitoes, annoying mosquitoes, tiger mosquitoes and Anopheles mosquitoes(Damrongphan Thongwat, 2017) , which mosquitoes have a rapid reproduction rate. It is expected that the morbidity rate from Aedes mosquito-borne dengue fever in the country may increase (Department of Disease Control, 2021). And at present, there is no drug or vaccine that can be directly used to treat it (Bangkok Hospital Trat, 2019) . The south is in the tropics. It is a good breeding sites for mosquitoes, so there is a risk of dengue fever. Therefore, the research authors are interested in studying and comparing mosquito breeding sites in different areas, namely mosquito larvae in the community area of Na Yong and Palian district to compare the water quality of mosquito breeding sites. Type and number of mosquitoes in each source.

Research objectives

To study the types of mosquito larvae, water quality of mosquito larvae breeding sites found in different areas, as well as studying the mosquito larvae index of both areas.

Research questions

1) Are there any differences between the types and numbers of mosquito larvae in Na Yong and Palian districts?

2) Is there any difference in water quality in the breeding sites where mosquito larvae are found in Na Yong District and Palian District?

3) Is there a risk of dengue fever in the area of Na Yong and Palian?

Research hypothesis

1) Types and number of mosquito larvae in Na Yong and Palian districts are different.

2) The water quality in the breeding grounds where each species of mosquito larvae were found in Na Yong and Palian districts was different.

3) In the area of Na Yong and Palian, there are different risks of developing dengue fever.

Materials and methods

Materials

Measuring tool

1) Thermometer

2) pH meter

Equipment

1) Strainer with a mesh size of 0.55 mm.
2) Water dipper
3) Water tank
4) Clear plastic bags
5) Rubber band
6) Small transparent box
7) Permanent pen
8) Dropper
9) Slide glass
10) Microscope
11) CU SMARTLENS

Chemical

1) 70% Ethyl Alcohol

Research methods

1) Survey mosquito larva breeding sites in Na Yong and Palian districts.

2) Take a picture of the container/water source, measure water quality in all containers, both found and without mosquito larvae. And collect samples of every container of mosquito larvae found for further study at the Wichienmatu School Laboratory.

3) Study types and number of mosquito larvae samples obtained by washing with clean water.

4) Count the number of mosquito larvae collected in each water source using a dropper and taking notes.

5) Soak the mosquito larvae in 70% ethyl alcohol for further study and to maintain the condition of mosquito larvae.

6) Bring the mosquito larvae in 70% ethyl alcohol, distinguish the types of mosquitoes by using a microscope and CU SMARTLENS, observing the characteristics of the comb teeth and breathing tube of the mosquito larvae to identify the species and take notes.

7) Import mosquito larvae data into the GLOBE observer program.

Water quality sampling

Collect water samples in the study area and measure water quality, such as the pH, water surface temperature and water temperature in every container found in every survey location.

Data analysis

Data were analyzed by comparing the number of mosquito larvae of each species between Na Yong and Palian districts and the comparison of differences in water quality in mosquito breeding sites between Na Yong and Palian districts.

The descriptive statistics are frequency, percentage, mean and standard deviation.

Calculate the abundance index of mosquito larvae as follows:

1. House Index (HI) or Premise Index is the percentage of houses or places where mosquito larvae are found.

2. Container Index (CI) or Receptacle Index is the percentage of water tanks where Aedes mosquito larvae are found.

3. Breteau Index (BI) is the percentage of the number of packages where Aedes larvae were found in a specific location.

Then, these three values of House Index (HI), Container Index (CI) and Breteau Index (BI) were taken into account to study the risk of dengue epidemic.

Research results

From the study of mosquito larva breeding sites, it was found that there are 7 sources in Na Yong District, such as coconut shells, rubber trays, broken plastic containers, tires, water tanks, water pipes (mortar), and waste bins. In Palian district, there are 4 sources, namely water tanks, large water tanks, shells and tires.

Number of mosquito larvae of each species found in Na Yong and Palian districts.

From the study, it was found that the most common *Aedes albopictus* larvae were found in the area of Na Yong District, followed by *Culex* larvae, *Aedes aegypti* and *Toxorhynchites* spp. In Palian district while *Aedes aegypti* and *Aedes albopictus* larvae were found the most in Palian district.

Water quality of breeding sites where each species of mosquito larvae were found : pH values and habitats of larvae in Na Yong and Palian districts.

From the study, water quality in various habitats of mosquito larvae in Na Yong and Palian districts, it was found that the pH of the habitats of the *Aedes albopictus* larvae, the *Aedes aegypti* , *Culex* spp. and *Toxorhynchites* spp. in the area Na Yong and Palian District were not significantly different from each other.

Surface water temperature in various habitats of mosquito larvae in Na Yong and in Palian district.

From the study, it was found that the surface water temperature habitat of the *Aedes aegypti* larvae, *Aedes albopictus* , *Culex* spp. and *Toxorhynchites* spp.Palian was higher than in Na Yong District and the sub-surface temperature of mosquito larvae habitat in Na Yong was higher than in Palian District.

The study also shows the found and unfound mosquito larvae in various habitats in Na Yong and Palian District where the water temperature has similar values.

Aedes mosquito larvae index

From the results of the study, *Aedes albopictus* and *Aedes aegypti* larvae were found in Palian district where the HI and CI values were higher than those in Na Yong district, where as the BI values were found in Na Yong that were higher than those in Palian district.

Table 1 : Index of *Aedes aegypti* larvae and *Aedes aegypti* larvae in Na Yong and Palian District.

	Aedes albopictus		*Aedes aegypti*	
	Na Yong district	Palian district	Na Yong district	Palian district
Number of residential houses surveyed	15	15	15	15
Number of houses where mosquito larvae were found	4	2	2	4
Number of breeding sites surveyed	46	25	46	25
Number of breeding sites where mosquito larvae are found	7	2	3	4
Mosquito larva index.				
HI (%)	26.67	13.33	13.33	26.67
CI (%)	15.22	8.00	4.35	16.00
BI(%)	46.67	13.33	20.00	26.67

Table 2 : Mosquito larvae index in Na Yong and Palian district area.

	Na Yong district	Palian district
Number of residential houses surveyed	15	15
Number of houses where mosquito larvae were found	5	6
Number of breeding sites surveyed	46	25
Number of breeding sites where mosquito larvae are found	10	6
Mosquito larva index.		
HI (%)	33.33	40.00
CI (%)	21.74	24.00
BI(%)	66.67	40

Table 3 : Water quality in mosquito breeding sites in Na Yong and Palian District.

Water quality indicators		A breeding ground for *Aedes albopictus* larvae (average)		A breeding ground for *Aedes aegypti* larvae (average)	
		Na Yong district	Palian district	Na Yong district	Palian district
Temperature	Water surface temperature(°C)	29.57	30.00	30.33	29.50
	Water temperature(°C)	27.71	28.50	28.67	28.00
pH value		7	7	7	7

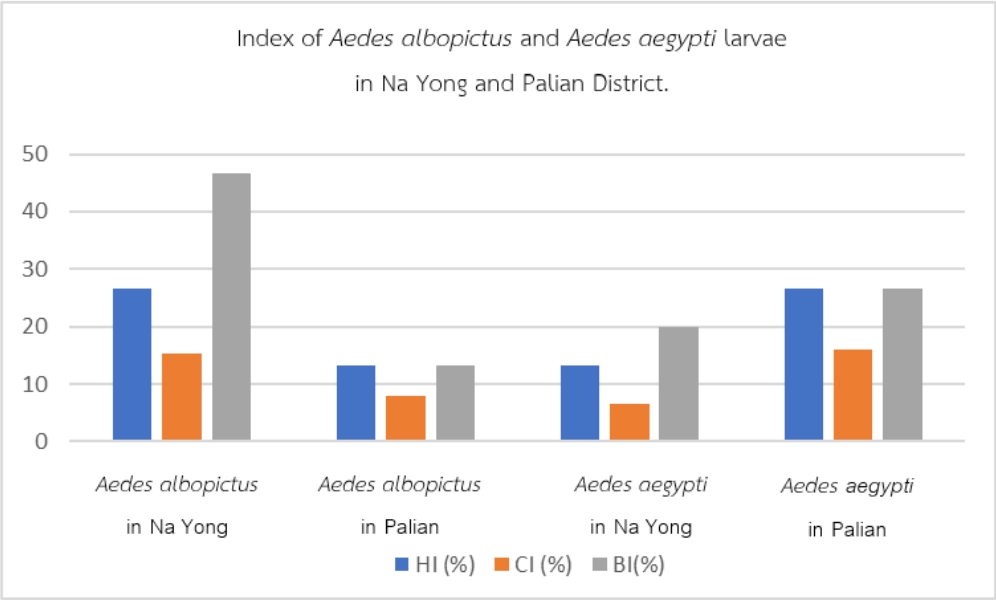

Figure 1 : Index of *Aedes albopictus* and *Aedes aegypti* larvae in Na Yong and Palian District.

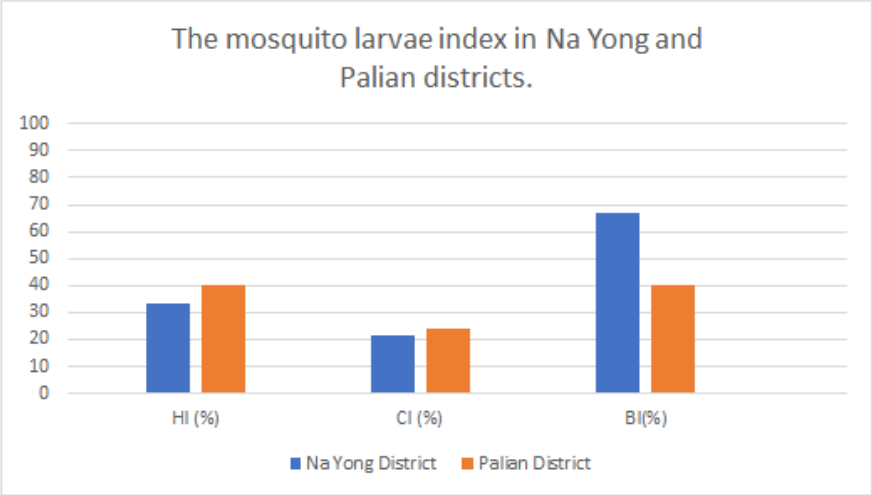

Figure 2 : The mosquito larvae index in Na Yong District and Palian District.

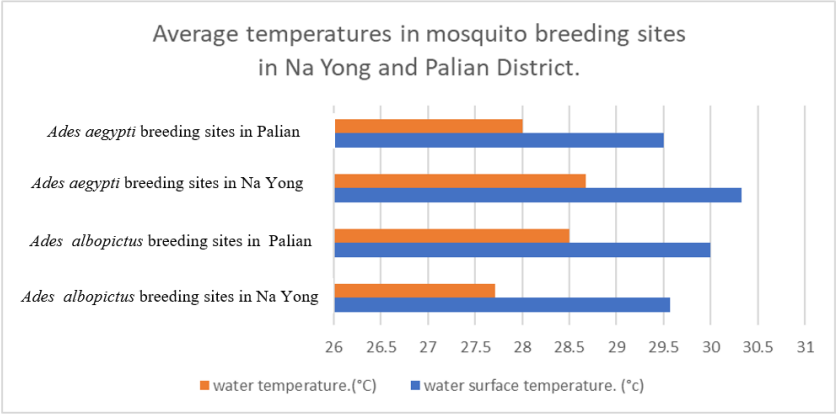

Figure 2 : Average temperatures in mosquito breeding sites in Na Yong and Palian District.

Conclusion

From the study, it was found that in the area of Na Yong District, 4 types of mosquito larvae were found, namely *Aedes albopictus* larvae, followed by *Culex* larvae , *Aedes aegypti* larvae and *Toxorhynchites* spp. , respectively. In Palian district, 2 types of mosquito larvae were found, namely the most common *Aedes aegypti* larvae, followed by the *Aedes albopictus* larvae , the mosquito larva breeding sites for mosquito larvae were found. In Na Yong District, there are 7 sources, namely, coconut shells, rubber trays, broken plastic containers , tires, water tanks, water pipes (mortar) and waste bins. In Palian District, there are 4 breeding sites for mosquito larvae, namely water buckets, large water tanks, coconut shells and tires. The pH water quality values according to various sources of mosquito larvae in Na Yong compared to Palian district, the pH values in Na Yong and Palian districts have no significant difference. The average surface water temperature of the mosquito larvae habitat in Palian was higher than in Na Yong district and water temperature of mosquito larvae habitats in Na Yong District was higher than that in Palian District. In Palian, the Aedes albopictus and Aedes aegypti larval HI and CI values were higher than in Na Yong district, while BI values in Na Yong were higher than in Palian district.

From the study of species and number of mosquito larvae in Na Yong and Palian district, it was found that, in Na Yong district, the most common *Aedes albopictus* larvae were found. In Palian district, the most common *Aedes aegypti* larvae were found, which is classified as a moderate risk level to cause dengue, yellow fever and possibly a carrier of the Zika virus. The communities of both areas have been identified as having problems spreading at some point.

Acknowledgments

This research study of the types and numbers of mosquito larvae in Na Yong and Palian districts, Trang province was successfully completed. The research team would like to thank Mrs. Kwanjai Karnchanasrimek, Miss Julaluk Tulyakul, the project advisor and all teachers who advise and supervise the research team in surveying mosquito larvae. Thank you Mr. Sunan Kaenin from the Trang Provincial Public Health Office Thank you to Mrs. Yupa Pornseth, Director of Wichienmatu School for research support and promotion. And thank you to all my friends for supporting us.

References

Usawadee Thavora,Apiwat Thawatsin,Universe Chompusorn, Patcharawan Sirisopha and Phayu Phakdeenuan. (2016). *Mosquitoes are worse than tigers*, 3-5. Retrieved from http://nih.dmsc.moph.go.th/login/filedata/Mosquitoes.pdf

Boonterm Saengdit. (2017). *Revive world mosquito day and mosquito-led disease control. Royal Thai Army Medicine, 70*(3), 181-182. Retrieved from http://www.rtamedj.pmk.ac.th/files/09%20%E0%B8%A7%E0%B8%B1%E0%B8%99%E0%B8%A2%E0%B8%B8%E0%B8%87%E0%B9%82%E0%B8%A5%E0%B8%81%20[%E0%B8%9A%E0%B8%97%E0%B8%84%E0%B8%A7%E0%B8%B2%E0%B8%A1%E0%B8%9F%E0%B8%B7%E0%B9%89%E0%B8%99%E0%B8%A7%E0%B8%B4%E0%B8%8A%E0%B8%B2].pdf

Bangkok Hospital Trat. (2019). *Know beforehand to prevent dengue fever*. Retrieved from https://www.bth.co.th/th/news-health-th/356-health-promotion-center-th-html/913-dengue-fever.html

Usawadee Thavora, Jitti Chansang, Wannapha Suwankerd, Universe Chompoosorn and Apiwat Thawatsin. (2001). *Biology, ecology and mosquito control in Thailand*, 44-48 Retrieved from http://webdb.dmsc.moph.go.th/ifc_nih/applications/files/Mosq%20Control_%20rp4%2Bcover.pdf

Worawut Charoensiri. (2014). Knowledge of mosquitoes. Retrieved from http://61.7.231.171/epidem/knowlage/mosq.pdf

Damrongphan Thongwat. (2017). Medically important mosquitoes and mosquitoes that are common in Thailand. Medically important mosquitoes of Thailand, 37. Retrieved from https://www.nupress.grad.nu.ac.th/wp-content/uploads/2018/01/demo-9786164260627.pdf