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RESEARCH ARTICLE

TYPES AND ABUNDANCE OF MOSQUITOES IN KAHYAPU VILLAGE, ENGGANO ISLAND, NORTHEST BENGKULU

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ABSTRACT

Research has been carried out on the types and abundance of mosquitoes in Kahyapu Village, Enggano Island, Northeast Bengkulu in December 2018 - May 2019 with the goals to knowing the types and abundance of mosquitoes found in Kahyapu Village, Enggano Island, Northeast Bengkulu. The research location points were determined by purposive sampling and the mosquito collection at each other location point was determined using the Human Landing Collection method. The mosquitoes obtained were grouped by genus and species, the data obtained were analyzed descriptively. From the results of the study obtained 4 species of mosquitoes, namely *Aedes albopictus*, *Armigeres subalbatus*, *Culex fuscocephala* and *Culex quinquefasciatus*. Mosquito with high abundance are *Aedes albopictus*.

KEYWORDS

Abundance, Mosquito, Purposive Sampling, Human Landing Collection Method

1. INTRODUCTION

Mosquitoes from the sub-family Culicinae and family Culicidae (Nematocera: Diptera) are the main vectors or transmitters of arbovirus diseases. Mosquitoes have different active times to suck blood, some are diurnal, nocturnal and crepuscular. Diurnal mosquitoes are mosquitoes that are active from morning to evening, nocturnal mosquitoes are active mosquitoes at night, while crepuscular mosquitoes are mosquitoes that are active from early morning and late at night (Schowalter, 2011). Mosquitoes are cosmopolitan insects that are found from the polar regions to the tropics, at an altitude of 0 to 5000 m above sea level. Worldwide there are reported to be 3100 species from 34 genera. Some of them are mosquito genera that act as disease vectors such as *Anopheles*, *Culex*, *Aedes*, *Mansonia*, *Armigeres*. Mosquito groups that are mostly spread in Indonesia from the genus *Aedes*, *Culex*, *Mansonia* and *Anopheles* (Eldrige, 2008).

2. LITERATURE REVIEW

The spread of mosquitoes is influenced by several factors, including the type of topography of an area and environmental factors. Several environmental supporting factors that affect the extent of the mosquito's distribution are physical factors which include air temperature, water temperature, air humidity, wind speed and biological factors which include vegetation and predators. (Indonesian Ministry of Health, 2011).

The spread of mosquitoes in Indonesia is very wide. This is because Indonesia is an archipelagic country that has a heterogeneous tropical climate so that it is vulnerable to the impacts of regional climate change, which causes a very wide spread of mosquitoes. One of the areas in Indonesia that has cases of diseases caused by mosquitoes is Enggano

Island, Northeast Bengkulu. Based on data from the health profile of Northeast Bengkulu, throughout 2014 there were more than 1000 cases of vector-borne diseases, with a total of 27 people who were positive for dengue fever and 2117 people were positive for malaria (Bengkulu Health Office, 2015).

Several studies on mosquitoes have been conducted, including report 27 species of mosquitoes found around the Maluk beach and at the Benatte port, Sumbawa Regency, West Nusa Tenggara Province (Soekirno, 2006). Hasmiwati and Nurhayati reported that 5 species of mosquitoes were found around Kenagarian Village, Lima Puluh Kota Regency (Hasmiwati and Nurhayati, 2009). A group researchers reported 14 species were found around the pig pens of North Sumatra Province (Hadi et al., 2011). Ayulandari reported as many as 7 species found in different topography in Bengkulu Province (Ayulandari, 2016).

Until now, there is no information about the types of mosquitoes found around Kahyapu Village, Enggano Island, Northeast Bengkulu, therefore it is necessary to conduct research on the types and abundance of mosquitoes in Kahyapu Village, Enggano Island, Northeast Bengkulu. The purpose of this study was to determine the type and abundance of mosquitoes found in Kahyapu Village, Enggano Island, Northeast Bengkulu.

3. METHODOLOGY

This research was carried out in December 2018 - May 2019. The collection of mosquitoes was carried out in Kahyapu Village, Enggano Island, Northeast Bengkulu. The samples found were identified in the Laboratory of Animal Physiology, Basic Science, Faculty of Mathematics and Natural Sciences, Bengkulu University. To determine the location of

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mosquito research, purposive sampling is done, namely by determining places that meet the requirements for mosquito life such as puddles of water, resting places such as grass and livestock cages, in addition to the existence of food sources for mosquitoes such as animal blood and also human blood. and the presence of flower nectar as a food source for male mosquitoes. From the results of the survey, three research locations were determined, namely community plantations, around settlements and inside residential areas. Mosquito catching done using the Human Landing Collection method or baiting people (Probandus), by leaving the body parts of the probandus (legs and hands) exposed, then the mosquitoes that land are caught using an aspirator. The captured mosquitoes were pinned and identified at the UNIB Animal Physiology Laboratory. The mosquitoes obtained were grouped by genus and type, then the results of mosquito identification were presented in the form of a table of mosquito species and a table of qualitative abundance of mosquito species.

4. RESULTS AND DISCUSSION

From the results of research conducted in Kahyapu Village, Enggano Island, Northeast Bengkulu, found 4 types of mosquitoes (Table 1) and a qualitative abundance of mosquito species found in the study site (Table 2).

Table 1: Types of Mosquitoes (Culicidae) caught in Kahyapu Village, Enggano District, North Bengkulu Regency

No	Species	Location point		
		1	2	3
1	<i>Aedes albopictus</i>	✓	✓	✓
2	<i>Armigeres subalbatus</i>	✓	✓	✓
3	<i>Culex fuscocephala</i>		✓	
4	<i>Culex quinquefasciatus</i>		✓	✓

Table 2: Qualitative abundance of mosquito species at several locations in Kahyapu Village, Enggano District, North Bengkulu Regency

Type	Mosquito Abundance		
	Location point 1	Location point 2	Location point 3
1. <i>Aedes albopictus</i>	+++	+	+
2. <i>Armigeres subalbatus</i>	+	+	+
3. <i>Culex fuscocephala</i>	-	+	-
4. <i>Culex quinquefasciatus</i>	-	++	+
Number of Types	+++	+	+

Location Point Description:

1. Location point 1 covers the plantation area of the population
2. Location point 2 is located around residential areas
3. Location point 3 is located in a densely populated residential area

In Table 1 the types of mosquitoes found are *Ae. albopictus*, *Ar. subalbatus*, *Cx. fuscocephala*, and *Cx. quinquefasciatus*. There were fewer types of mosquitoes found around Kahyapu Village, Enggano Island, Northeast Bengkulu compared to research conducted in the area around Maluk Beach and Benette Harbor, Sumbawa Regency (Soekirno, 2006). Meanwhile, in a study conducted around the pig pens of North Sumatra Province, 14 species from 4 genera of mosquitoes were found, consisting of the *Aedes*, *Anopheles*, *Culex* and *Mansonia* genus (Hadi et al., 2011). Then research conducted in Kenagarian Mungo, Lima Puluh Kota Regency found 5 species from 4 genera of mosquitoes consisting of the genera *Anopheles*, *Armigeres*, *Culex* and *Mansonia* (Hasmiwati and Nurhayati, 2009).

The differences in the types of mosquitoes found were thought to be due to differences in environmental factors at each research location. Among these environmental factors such as physical factors (temperature, humidity, intensity, wind speed and altitude), as well as the presence of mosquito breeding places, streams/puddles of water, abundant feed, suitable resting places for mosquitoes, and natural predators of mosquitoes in nature. According to WHO, that the presence of standing water in rice fields, swamps, ponds or ditches greatly affects the presence

of mosquitoes in the vicinity because this is related to the survival of mosquitoes (WHO, 2014).

In addition, the difference in sampling technique and also the time of capture at the time of the study also caused different types of mosquitoes to be caught. In the arrests carried out at 3 (three) locations around Kahyapu Village, using the Human Landing Collection (HLC) method with the distribution of mosquito catching times at 06.00-08.00, 15.00-17.00 and 18.00-21.00 WIB, 4 types of mosquitoes were caught. While in the research carried out catching mosquitoes around Maluk Beach using the same method (HLC) and the time of catching was carried out throughout the night (18.00-06.00 WIB), succeeded in catching more types of mosquitoes (Soekirno et al., 2006).

From the results of the study, point location 2 is the location of the presence of the most mosquitoes found, as many as 4 species (Table 2). This is presumably because around location point 2 there is a lot of water flowing from the coastal estuary, as well as the presence of aquatic plants that protect eggs and larvae in nature such as *Oryza sativa* and *Cyperus rotundus*. In addition, at location 2 there are several cattle pens owned by residents with a total of about 15 cows released around the cage. The presence of cows around the pens and houses is suspected to have caused many types of mosquitoes to be found at point location 2 because the mosquitoes suck and perch around the cattle pens, as well as the presence of puddles around the cages and animal faeces as a breeding ground for mosquitoes and as a place for mosquitoes to rest. This is in line with the research results of who reported that cattle pens were the location where the most types of mosquitoes were found (Hadi et al., 2011). In his research conducted around the pig pens in North Sumatra Province, he found 14 types of mosquitoes.

Mosquito *Ae. albopictus* was the species found at each study site (Table 2). This is presumably because the mosquito *Ae. albopictus* is a mosquito that has a good survival ability at each research location. The existence of supporting factors such as the presence of abundant food sources (human blood, livestock and flower nectar), the presence of standing water as a breeding ground for both natural and artificial (drums and buckets), and the number of shady places either around the house or in the garden as a place to live. which is very suitable for mosquitoes to rest. This is in line with the research which reported that the behavior of *Ae. albopictus* generally rest and perch in the shade such as near trees and gardens (Boesri, 2011).

In Table 2, *Ae. albopictus* is a type of mosquito with a high abundance category found at location point 1. This is presumably because location point 1 is a suitable habitat for *Ae. albopictus* survive and reproduce. then there are supporting factors such as standing water, river flow, and the presence of mosquito breeding places around banana (*Musa sp*) and cocoa (*Theobroma cacao*) plantations. In addition, at location 1, based on information obtained from local garden farmers, the presence of animals such as pigs (*Sus scrofa*) and civets (*Paradoxurus hermaphroditus*) is the cause of many *Ae. albopictus*. According to research conducted around the pigs of North Sumatra Province stated that the blood of mammals such as pigs (*Sus scrofa*) is a source of food for mosquitoes (Hadi et al., 2011).

Culex quinquefasciatus mosquitoes are mosquitoes with moderate abundance category found at location point 2 (Table 2). This is because the location of catching mosquitoes in cattle pens affects the abundance of *Cx. quinquefasciatus*. In addition, it is suspected that the arrest at 15.00 – 17.00 WIB is a time of increased activity of the *Culex quinquefasciatus* mosquito sucking blood around the cattle pens. In line with the research of who reported that the *Culex quinquefasciatus* mosquito is an active mosquito that sucks blood from the afternoon to the evening (Sabir et al., 2017).

Mosquitoes with a low abundance category are *Ar. subalbatus* found at 3 (three) location points (Table 2). This is presumably because the time of catching at each research location is different from the time of increasing the activity of the *Armigeres subalbatus* mosquito, thus affecting the number of *Ar. subalbatus* found at the study site. As research by reported that the increased activity of *Ar. Subalbatus* sucking blood occurs in the early morning at 05.00 – 06.00 WIB and in the evening at 17.00 – 18.00 WIB (crepuscular) (Wahid and Tahir, 2004).

Culex fuscocephala mosquitoes were not found at location points 1 and 3 (Table 2), presumably because they were influenced by environmental factors that were not suitable for the habitat of *Culex fuscocephala* mosquitoes and the difference between the time of catching and the active time of *Culex fuscocephala* mosquitoes sucking blood causing mosquitoes to not be found at the location 1 and 3.

Culex fuscocephala mosquitoes are mosquitoes found in low abundance at location 2, it is suspected that *Culex fuscocephala* mosquitoes like habitats with fresh water and environments close to cattle pens and locations near rice fields. Meanwhile, in Kahyapu Village, Enggano Island, many puddles of water were found on the soil which tends to be brackish, because the village environment is surrounded by the sea and is the cause of *Culex fuscocephala* mosquitoes not interest this environment. In addition, at least the abundance of *Cx. fuscocephala* is thought to be due to the activity of the *Cx. Fuscocephala* sucking blood increases at midnight until dawn so that few are found at location 2. Based on the results of research conducted in several areas of Bengkulu Province similar results were obtained where mosquitoes of the type *Cx. fuscocephala* were found to be less than other types of *Culex* mosquitoes (Ayulandari, 2016).

5. CONCLUSION

From the research that has been conducted on the types of mosquitoes in Kahyapu Village, Enggano Island, Northest Bengkulu, it can be concluded that the mosquitoes obtained consisted of 4 species, namely *Aedes albopictus*, *Armigeres subalbatus*, *Culex quinquefasciatus*, and *Culex fuscocephala*. Mosquitoes with high abundance were *Aedes albopictus*, moderate abundance mosquitoes were *Culex quinquefasciatus*, and mosquitoes with low abundance were *Armigeres subalbatus* and *Culex fuscocephala*.

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