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Density of Different Dipteran Larvae Inhabiting Phytotelmata from Some Locations of West Sumatera, Indonesia

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Abstract Diptera is kinds of insect's ordo which has so many members and live in different breeding place, such as Phytotelmata's plants. Research about Phytotelmata is still rare. That is why this phenomenon is worth to be researched. The aim of this paper is to reveal the density of diptera of Dipteran in some locations of West Sumatera, Indonesia. The result shows that averages of density of dipteran larvae is based locations and kinds of Phytotelmata. The highest density is happened in Bukittinggi (0,60 individu/ml) which based on locations and the lowest is in Payakumbuh with (0,49 individu/ml) both for *Ae. Albopictus* larvae. Based on kinds of Phytotelmata, *Ae. Albopictus* larvae mostly lives in Pandanus (0,60 individu /ml) and the lowest is live in Bamboo (0,36 individu /ml).

Keywords: *phytotelmata, diptera larvae, density*

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1. Introduction

Phytotelmata is an aquatic habitation or water which is on part of plants [9]. This plant can be found in anywhere with different kinds, especially in humid or tropic area [6]. Types of Phytotelmata are; pitcher plant, tree holes, sepals, petals, fruit pit, pit root [9]. Puddle in plants can be used by many organisms to be their place for breeding, include dipteran larvae.

Previous research about phytotelmata and insects which live in it has been done by several researcher, those are; Some Determining Factors of Density of Dipteran Larvae Towards Phytotelmata [23], Fluctuation of Dipteran Larvae in Phytotelmata and Relation with Climate Variation in West Sumatera, Indonesia [22]; Compositions of Micro and Macro fauna in Bromeliad Leaves' arrangement in different habitat and seasons [12]; Tree Holes as Water and Land Invertebrates in New Zealand [2]; Water Insects which Lives in Phytotelmata [6]. Information about Diptera which lives in Phytotelmata in neighborhood still limit. Therefore, this research is appear to know density of dipteran larvae and kinds of Phytotelmata in some locations of West Sumatera, Indonesia.

2. Materials and Methods

This research was held in three locations in West Sumatera, those are; Padang, Bukittinggi, and Payakumbuh. Sample was taken by using straw. Water that has been inhale from Phytotelmata later be measured to know the volume, and then inserted into bottles. The bottles should be labelled according to locations code, kind and types of Phtotelmata, and date of inhaling the water. Sample that has been inhales, was purified from trash that might be taken when the water was inhales. Death Larvae is put on 70% alcohol to be identification, and larvae which still alive is let to grow to ensure the identification.The identification is based on *Buku Kunci Identifikasi* by Health Department, Republic of Indonesia, 1989 and Phua, *et al*., [16,17]. Formulation to find larvae density, according to Micahel [13] is number of individual's larvae types is divided by number of Phytotelmata's water volume.

$$(K) = \frac{\text{Number of Individual's larvae}}{\text{Phytotelmata's water volume}(\text{ml})}$$

Grouping determination is based on the number of differences of density of dipteran larvae in three locations and four kinds of Phytotelmata. This concept can be formulated by using *Euclidian Distance* [3].

$$D = \left[\sum_{i}^{n} (x1 \quad x2)^2 \right]^{1/2} -$$

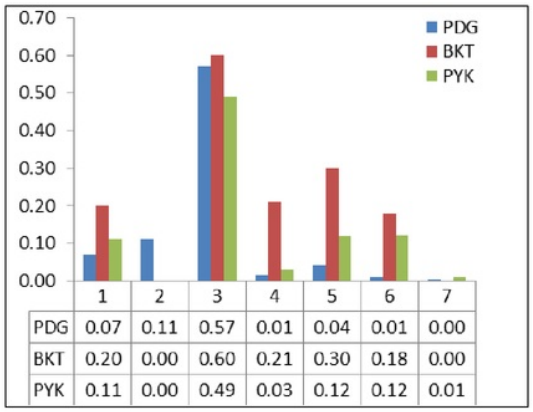
D = Euclidean Distance
x_1 & x_2 = Measurement for n larvae density

After group is determined, next steps is doing cluster analysis and reconstructed in dendogram form by using *Paleontological Statistic* computation's program (Past) versi 2.10 [7].

3. Result

Dipteran Larvae Density's Average in Phytotelmata Based on Locations

Statistical Analysis results of Dipteran Larvae Density's Average in Phytotelmata Based on Locations as seen in Figure 1.



	1	2	3	4	5	6	7
PDG	0.07	0.11	0.57	0.01	0.04	0.01	0.00
BKT	0.20	0.00	0.60	0.21	0.30	0.18	0.00
PYK	0.11	0.00	0.49	0.03	0.12	0.12	0.01

Figure 1. Averages of Dipteran Larvae Based on Locations

1. Chironomus sp.; 2.. *Ae. aegypti*; 3.. *Ae. albopictus*; 4. *Ar.subalbatus*; 5.*Cx. tritaeniorhynchus*; 6.*Tipula* sp.; 7. *Psychoda* sp, PDG= Padang, BKT= Bukittinggi,PYK=Payakumbuh

The averages of Dipteran Larvae Density in Padang range between 0,01 – 0,57 individu/ml, in Bukittinggi 0,18 – 0,60 individu/ml, and Payakumbuh 0,01– 0,49 individu/ml. There are six kinds of dipteran that found in Padang, five in Bukittinggi, and six in Payakumbuh.

Table 1. Differences of Dipteran Larvae density in Three Locations

	Padang	Bukittinggi	Payakumbuh
Padang	-		
Bukittinggi	0,408	-	
Payakumbuh	0,198	0, 298	-

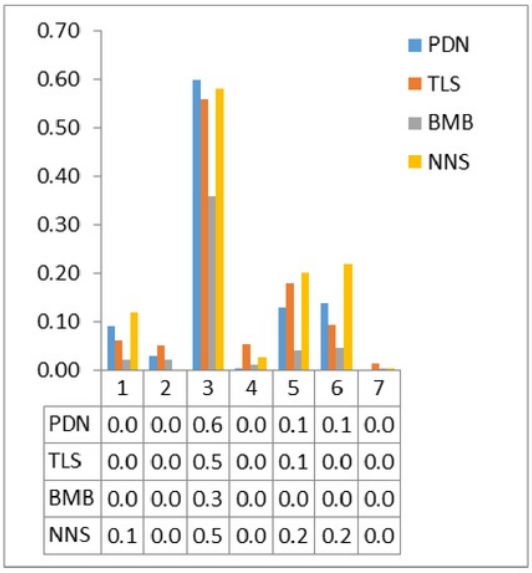
The lowest number of larvae diversity is between Padang and Payakumbuh, which is 0,198. For accurate information, Figure 2 show the locations.

Figure 2. Locations of Dipteran Larvae Sample in Phytotelmata in West Sumatera (1. Padang, 2. Bukittinggi, 3. Payakumbuh)

(Source: http://www kheisha florist.com ; http:// www.Petacitra. Blogspot.com)

Dipteran Larvae Density's Average in Phytotelmata Based on Kinds of Phytotelmata.

Statistical analysis result of Dipteran Larvae Density's average based on kinds of Pyhtotelmata is present in Figure 3. The average ranged is different one another. In Pandanus, the average is ranged between 0.03-0.60 individu/ml, In Taro ranged between 0.01-0.56 individu/ml, Bamboo 0.02 -0.36 individu/ml, and in Pineapple ranged between 0.03 – 0.58 individu/ml.



	1	2	3	4	5	6	7
PDN	0.0	0.0	0.6	0.0	0.1	0.1	0.0
TLS	0.0	0.0	0.5	0.0	0.1	0.0	0.0
BMB	0.0	0.0	0.3	0.0	0.0	0.0	0.0
NNS	0.1	0.0	0.5	0.0	0.2	0.2	0.0

Figure 3. The Averages of Dipteran Larvae Density in hytotelmata based on the Kinds

Chironomus sp, 2. *Ae. aegypti*, 3. *Ae. albopictus*,4. *Ar. subalbatus*, 5. *Cx. tritaeniorhynchus*, 6.*Tipula* sp. 7. *Psychoda* sp, PDN=Pandanus, TLS = Taro, BMB = Bamboo, NNS = Pineapple

Table 2. Differences of Dipteran Larvae Density on Fourth Kinds of Phytotelmata

	Pandanus	Taro	Bamboo	Pineapple
Pandanus	-			
Taro	0,102	-		
Bamboo	0,281	0,256	-	
Pineapple	0,123	0,156	0,337	-

Table 2 shows that differences in Dipteran Larvae Density between Pandanus and Bamboo is 0,281. It means that the density in Pandanus and Bamboo is higher than Pandanus and Taro, which is only 0, 102. Meanwhile, the density of Diptena Larvae which lives in Bamboo and Pineapple get the highest index number, which is 0,337. Then, followed by Dipteran Larvae which lives in Pandanus and Pineapple 0,123, Taro and Bamboo 0,256, and then Taro and Pineapple 0,156.

The form of Kinds of Phytotelmata that the Researcher took is present in Figure 4.

Results of Anlysis in Grouping averages Dipteran Larvae Density which lives in fourth of Phytotelmata reconstructed in Dendogram below here (Figure 5).

Figure 4. Kinds and Types of Phytotelmata's Sample in Endemic Area of Dengue Hemorrhagic Fever (DHF) in West Sumatera

A. *Pandanus amaryllifolius* ; B. *Colocasia esculenta*; C. *Ananas commosus*;D *Bambusa vulgaris*; Puddle in Phytotelmata (➡)

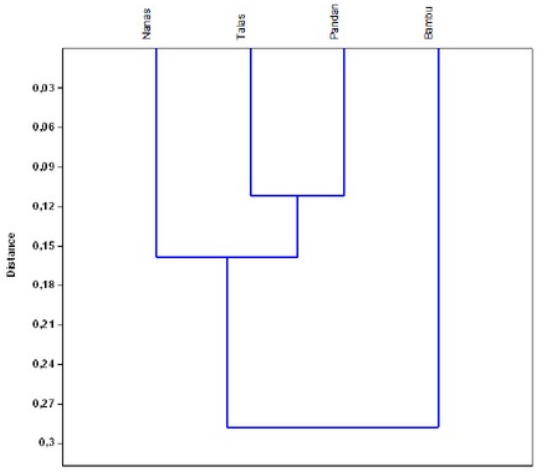


Figure 5. Dendogram's of Dipteran Larvae Density's Grouping based on Kinds of Phytotelmata

This Dendogram shows that Dipteran Larvae Density's grouping based on kinds of Phytotelmata divided in two groups: 1. Pineapple, Taro, and Pandanus, 2. Bamboo.

4. Discussions

The Highest averages of Density of Dipteran Larvae number based on locations is in Bukittinggi with *Ae. albopictus*; 0,60 individu/ml. 0,57 individu/ml in Padang, and 0,49 individu/ml in Payakumbuh (Figure 1). It caused by *Ae. albopictus* larave's breeding place which likes to lives in outside or outdoor and full of plants. The presence of plants that has puddle makes larvae come and be their breeding places [1,21].

Characteristics of *Ae.albopictus* which like sto live around neighborhood is because they can have blood supply from their host, Human [8]. Moreover, *Ae. albopictus* is one of many kinds of mosquitoes that can easily to adaptation in new environment, even in the extreme too [1,24]. This proved by the research that has been done and shows that in three different locations, the number of *Ae.albopictus* always higher than any others Dipteran. *Culex* is one of many kinds of mosquitoes that also can live in Phytotelmata. It proved by previous researcher that found *Culex pipiens* and *Culex nebulosus* lives and breed in Phytotelmata. [11,18].

Table 1 presenting differences of Dipteran Larave Density based on Locations (Padang, Bukittinggi, Payakumbuh). Differences between Padang and Bukittinggi is higher density 0,408 than Padang and Payakumbuh 0,198. It caused by environmental conditions and number of breeding places in this three locations is different.

The averages of Dipetran Larvae density based on Kinds of Phytotelmata (Pandanus, Taro, Bamboo, and Pineapple) is seen on Figure 3. The highest density is happened on Pandanus with *Ae. albopictus* larvae 0,60 individu/ml, Taro 0,56 individu/ml, Bamboo 0,36 individu/ml, and Pinapple 0,58. The density of *Ae. albopictus* is caused by the locations is suit with them, so they can breeding and can supply their needs too. *Ae.albopictus* also called as *Nyamuk Kebon* (Kebon is like plantation in West culture) [21].

Types of larvae which also get a high number of density in Phytotelmata is *Cx. tritaeniorhynchus* that is 0,13 in Pandanus, 0,18 individu/ ml in Taro; 0,04 individu/ ml in Bamboo; and 0,20 individu/ ml in Pineapple. The density is caused by breeding place is suits for them and Culex is types of mosquitoes which likes to lives in bushes and plats.

The differences of dipteran larvae density based on kinds of Phytotelmata is presented in Table 2. The range of density is 0,102-0,337, those are: Pandanus and Taro 0,102, Pandanus and Bamboo 0,281, Pandanus and Pineapple 0,123, Taro and Bamboo 0,256, Taro and Pineapple 0,156, and Bamboo and Pineapple 0,337. From these kinds of Phytotelmata, the highest density of Dipteran larvae is happened between Bamboo and Pineapple 0,337, and the lowest is between Pandanus and Taro 0,102.

The analysis results is visualized in Dendogram (Figure 5) which described relation between density of Diperan Larave in Pandanus and Taro which include in one group, whether Bamboo and Pineapple, there is no any closeness and be the reason to not in one group. It happened because the morphology of leaves petal in Pandanus and Taro have same ability to accommodates puddles, which means that it is also influencing to accommodates the density of larvae. Paradise [14] researched tree holes in Phytotelmata in Pennsylvania. There are some things that can influencing community structure and density of insects which lives in Pyhtotelmata, those are: size and Phytotelmata's habitat.

Some researchers report that composition and community structure which lives in Phytotelmata determined by Phytotelmata's variations, like capacity of age, and available source in Phytotelmata itself [10,19,20]. Alongside, another factors is Physics and Chemical factors, like pH, temperature, and Chemical contains in Phytotelmata's puddle [23].

5. Conclusions

From the discussion, it can be conclude that:

1. There is four family and seven kinds of larvae that found in Phytotelmata, those are: famili

Chironomidae (*Chironomus* sp.); famili Culicidae (*Ae. aegypti., Ae. albopictus., Cx. tritaeniorhynchus., Ar.subalbatus*); famili Tipulidae (*Tipula* sp.); dan famili Psychodidae (*Psychoda* sp.)

2. *Ae. albopictus* larvae is the highest averages of Dipteran larvae density is happened in Bukittinggi 0,60 individu/ml, and the lowest is in Payakumbuh 0,49 individu /ml. The biggest differences of density averages is happened between Padang and Bukitinggi (0,408) and the smallest is in Padang and Payakumbuh (0,198).
3. The highest averages of Dipteran Larvae density based on kinds of Phytotelmata is *Ae.albopictus* which lives in Pandanus 0,60 individu /ml, and the lowest is larvae which lives in Bamboo 0,36 individu /ml. The biggest differences of dipteran larvae is larvae which lives between Bamboo and Pineapple (0,337) and the smallest is in Pandanus and Taro (0,102).
4. There are two groups in Dipteran grouping, those are: Dipteran which lives in Pineapple, Taro, and Pandanus' Phytotelmata, and larvae that lives in Bamboo's Phytotelmata.

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