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DIVERSITY OF SOIL FAUNA AT THREE LEVELS OF TREE DIVERSITY IN TROPICAL RAIN FOREST AREA SUPER WET PADANG, INDONESIA

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ABSTRACT

Tropical rainforest as Magabiodiversity in the world plays an important role in maintaining balance of the ecosystem. Bukit Pinang-Pinang located at foot of Mount Gadut region is one example of tropical rainforest in West Sumatra which have high rainfall ± 6500 mm / year with no real dry season, so it is classified as a super wet tropical rainforest. This research aims to assess the diversity of soil fauna at the three levels of diversity of tropical rain forest tree plot Pinang-Pinang. The study was conducted for 3 months (January to March 2017). The method of research is purposive random sampling, where to get a sample of soil fauna used method of hand sorting and pitfall trap. Identification of soil fauna is done by using a key determinant in insect identification book and soil fauna Donald J Borror (United States) and JF Lewerance (Australia). Research results obtained indicate areas with high levels of diversity of trees that have a low faunal diversity index is 2,172 and vice versa regions with low levels of diversity of trees that have a high faunal diversity index is 3.510. As for areas with medium tree diversity index 2,793. It showed a negative correlation between the diversity of trees with a diversity of soil fauna in Super Wet of tropical rainforest plot Pinang-Pinang, Padang, West Sumatra, Indonesia.

Keywords: Tropical rainforest, Magabiodiversity, Soil fauna, Padang, Indonesia

I. INTRODUCTION

This Tropical rain forests are one of the world's megabiodiversities that plays an important role in maintaining ecosystem balance. Tropical rain forests have highly productive forest ecosystems and have high levels of biodiversity. This area lies around the equator between 23^{o}LU to 23^{o}LS. In general, climatic conditions in tropical rain forest areas are relatively stable with a uniform distribution of rainfall throughout the year. Configuration of land in this region is dominated by varying topography with varying levels of slopes [1].

Tropical rainforest in Indonesia grows along Bukit Barisan Sumatera and Kalimantan. In Sumatra, one of them is located in the town of Padang West Sumatra, Bukit Pinang-Pinang which is located in the foot of Gadut Mountain. The tropical rain forest area of Pinang-Pinang is a forest area with high rainfall that is ± 6500 mm / year without a real dry season, so categorized as super wet tropical rain forest Located at an altitude of 460-550 m above sea level up to 1500 dpl, this area is often used as a forest ecological research area. The area is completely covered with tree-level vegetation and its spread varies from hill to peak [2].

Pinang-Pinang has a complex ecosystem, because it is very rich in plant species, accompanied by high levels of diversity and nutrient uptake. [3] states that in the width of 1 ha of Pinang-Pinang plots, there are 231 identified species and 241 unidentified plant names, in the form of complex forest communities. The diversity of plant species in tropical rainforests is very high, where the structure and community of these plants are influenced by nutrient factors both in soil and in plants. Variations of soil nutrients affect plant productivity [4].

Furthermore, [5] have found a pattern of relationship between soil nutrient variation and the variation of plant species. The higher the diversity of plant species, the greater the nutrient variation. Where variability of soil characteristics and high soil fertility rates have a tendency to decrease the diversity of tree species in the region[4].

Soil organism is one indicator of soil quality. Information on the diversity of deep soil organisms and their pean in maintaining the sustainability of the soil ecosystems in the plots of Gadut pinang has not been done, whereas in this case soil organisms, both macroorganisms and microorganisms give a big role in the function of biodiversity in the forest. Of which, about half of the litter drops are lost each year on the forest floor, in other words this macroganal group feeds on the litter which is further described by microorganism groups [4].

The diversity of trees in the forest has its own role in maintaining the ecosystem balance. [6] states that in tropical rainforests plots of Pinang-Pinang West Sumatra there is a uniqueness, where in areas with high levels of tree diversity have low nutrient soil, whereas in areas with low levels of diversity have soil with nutrient content high. [7] added that in Pinang-Pinang plot there is dominance of hyperakumulator plant which is able to absorb nutrients in high amount.

Exploring the quantity of soil organisms at the three levels of tropical rainforest tree diversity of the Pinang-Pinang plots, it will show how the ecological qualities of tropical

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rainforest soils are super wet at high, medium and low biodiversity levels so it can be expressed how appropriate theories to describe the relationship of soil quality to The diversity of tropical rainforest tree species super wet plots of Pinang-Pinang [27].

II. MATERIALS AND METHODS

A. Time and Place of Research

This research was conducted in Pinang-Pinang plot of tropical rain forest area super wet Ulu Gadut, Padang, West Sumatera. This research was conducted from December 2016 - March 2017 at Pinang-Pinang plot, in Bioecology Insect laboratory of Plant Disease Pest (HPT), Laboratory of Chemistry and Soil Physics, Department of Soil Science Faculty of Agriculture Andalas University.

B. Tools and Material

The tools used in the research are as follows, stationery, alcohol 70%, alcohol 96%, identification Book, petry cup, cement belt, plastic cup, measuring cup, GPS Garmin, plastic bag, camera, label, observation sheet, microscope, Machetes, pH meters, tweezers, plastics, prophylin glycol, pot collection tubes, sample rings, soil samples and litter, chopsticks, markers, raffia ropes, tension ball, scales and mica disk covers.

C. Sampling Point

Observation station was determined by three locations based on the diversity level of the plot area of Pinang-Pinang plot. Determination of research location is done by using purposive random sampling method. Determination of observation stations is based on the level of tree diversity. In this case grouped into three categories namely the level of diversity tinngi, medium and low. At each station the sampling point was determined as many as 6 sampling sites in the area of Plant root rhizosphere, which were then installed trap pitfal trap at each point of the location. Sampling of litter and soil is done in the same location. To facilitate the identification of research sites based on the level of tree diversity, a map of the level of tropical rainforest plots of Pinang-Pinang plots was made based on tree identification data conducted by [8]. The formula used in determining the criteria high, medium and low, is to use the average value and standard deviation..

D. Sampling Method

Abiotic factors of soil were measured directly around the sampling area where for pH and soil volume parameters using pH and soil weight gauge, soil temperature using soil temperature, total N-content using kjeldahl method and C-Organic soil using Walkey and Black method. Whole ground samples were taken ± 100 grams in the field using a sample ring then taken to the laboratory for analysis of BV (Volume

Weight). while the disturbed soil samples were taken using soil drill for 100 gram soil.

E. Identification of Soil Fauna

The sample of the acquired soil fauna is then identified. The sample identification was conducted at the Insect Bioecology Laboratory, Department of Plant Pests and Diseases, Faculty of Agriculture, Andalas University using identification keys using [10] and Bold System site: Taxonomy Browser. Identification The soil fauna is done macroscopically and microscopically (with Stereo microscopy). The observed part is drawn or photographed. Based on the morphological characteristics obtained then determined to the family level.

F. Identification of Soil Fauna

Analysis of community structure using the Important Value Index (INP), is diversity using the Shannon Wienner Index, dominance and evenness calculated by mathematical equations.

III. RESULT AND DISCUSSION

A. General Condition of Research Sites

Forest area Ulu Gadut is one of the tropical rain forest area located in the ranks of Bukit Barisan, Padang of West Sumatra. The area is located ± 17 km to the East from the city of Padang, West Sumatra, with an altitude of 490-595 dpl or located at 0°55'LS, 100°30'LU. In Ulu Gadut area there are observation plots of forest vegetation such as Pinang-Pinang plot.

Similar to other forest areas in Indonesia, Ulu Gadut forest area is also not free from various disturbances and threats such as illegal logging, forest encroachment and destruction of land for cultivation and agriculture. Increasing accessibility and economic development around the Ulu Gadut area as one of the central industrial, mining, agricultural, farming and settlement areas of West Sumatra, especially the city of Padang in the past few years has made a serious threat to the forest area of Ulu Gadut. Therefore research related to natural forest disaster mitigation is needed to anticipate the impact of land use change to the environment around Ulu Gadut area.

Pinang-Pinang is an observation plot for various studies of soil ecology and forests made by Japanese ecologists [11]. This location is precisely located in the Koto Baru area, Pauh sub-district, which is geographically located at coordinates 100°29'40 "and 100°30'20" BT and between 0°54'55 "and 0°54'45" LS. This plot is located at the top of the hill with a peak that is partially narrow and partly relative area that is located at an altitude of 460-550 m above sea level. This area has a wet tropical monsoon climate (rainy season) with an average annual temperature of 27°C (relative temperature difference <2 ° C between rainy and dry seasons). The relative humidity of each month is 73-80% with average annual moisture is 77%.

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B. Abiotic Factors

The existence of soil fauna in a habitat is strongly influenced by the condition of the habitat. Soil fauna will be abundant in habitats capable of providing factors that can support the life of soil fauna such as food availability, optimal temperature, and the presence or absence of natural enemies. Several parameters that may affect the existence of soil fauna in the study sites can be seen in Table 1.

TABLE I: ABIOTIC FACTORS

Parameter	Mikro habitat		
	High	Middle	Low
Nitrogen (%)	0.45%	0.44%	0.40%
Carbon (%)	5.22%	4.74%	4.87%
C/N	14.58	11.25	9.08
Average temperature (°C)	27°C	27°C	27°C
Thick litter	3,48 cm	3,36 cm	3,56 cm
pH	4.85	5.02	4.94
BV	0.72	0.63	0.71
KA	61%	70%	56%

Table 1. : pH (acidity level), BV (weight of soil volume), KA (water content), High, middle and low (Diversity of tree).

Table 1 illustrates various physical and chemical factors that influence the existence and diversity of soil fauna. Average nitrogen content analysis results show that areas with high tree diversity have higher values of 0.45% compared to areas with moderate diversity of 0.44% and areas with low levels of tree diversity of 0.40%. Like wise with carbon values, where in areas with high levels of tree diversity have a higher carbon value of 5.22% compared with areas with medium and low biodiversity levels ie 4.74% and 4.87%. This is due to the many contributions of organic materials from the environment that allows the process of decomposition in the soil surface resulting in the amount of supply of nutrients that enter. The organic material is derived from stalks, stems, leaves, fruits, flowers from a plant and tree species in the environment. The higher the abundance of trees in a region will be the more litter produced and resulted in more nutrient supply into the soil. According [12] litter plants that fall to the soil surface will decompose by a group of soil organisms, which then described as soil nutrients.

Furthermore, for the average temperature and thickness of the soil litter is relatively the same for each study site. Even so with soil pH that indicates that the location of the research on three levels of diversity of plot trees Pinang-Pinang tropical rain forest super-wet is acidic. According to [13] said that organic matter falling above ground can increase soil pH although the increase is still in acid category. The soil acidity level resulting from the giving of organic matter depends on the maturity level of the organic material given the expiration limit of the organic material and soil type. If the addition of immature organic matter will cause the slow process of soil pH increase due to organic matter still not well decomposed and still releasing organic acids.

The weight of soil volume shows a relatively similar value where in areas with high tree diversity 0.72, areas with moderate diversity 0.63 and areas with low biodiversity 0.71. According to [14] the moisture content in the soil is stored in the pores of the soil, bound to the solids of the soil and becomes a component of the mineral material. Groundwater levels are expressed as a percentage of the volume of water to the volume of soil. Two functions that are interconnected with the provision of water for the plant that is obtaining water in the soil and drainage of water stored on the roots of the plant.

C. Abudance of Soil Fauna

Abundance of soil fauna refers to the total number of soil fauna individuals found in the study sites ie in areas with high levels of tree diversity, areas with moderate levels of tree diversity and areas with low levels of tree diversity. To illustrate the results obtained from both plots, the average value of the abundance of existing arthropods of soil is used. From table 2 below it can be seen that the highest number of individual fauna that is obtained is in daearah with low biodiversity level of 283, then for areas with medium diversity level is 243 and the number of individuals in areas with high levels of tree diversity is 215. This Indicates that the diversity of trees does not significantly affect the total individual fauna of the soil, where in areas with high tree density have fewer individual fauana taah compared with areas with moderate and low tree diversity. According [15] said that the existence of soil fauna in a habitat is very dependent on environmental conditions. Vegetation diversity as the main food source provider is the dominant environmental factor that determines the structure and composition of the soil fauna. In addition, abiotic environmental factors such as temperature, pH, soil water levels, and climate above the soil are also very influential on the life of the soil fauna.

In addition, in the Pinang-Pinang plot according to [4] in areas with high levels of tree diversity have a low soil fertility rate and vice versa areas with low levels of tree diversity actually have higher soil fertility. Soil nutrients are the main source of

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nutrients of soil and plant organisms. Furthermore, [5] have found a pattern of relationship between soil nutrient variation and the variation of plant species. The higher the diversity of plant species, the greater the nutrient variation. Where variability of soil characteristics and high soil fertility rates have a tendency to decrease the diversity of tree species in the region.

TABLE 2: ABUDANCE OF SOIL FAUNA

No	Filum	Kelas	Ordo	Family	Biodiversity Level of Tree			Count
					High	Middle	Low	
1	Arthropoda	Insecta	Blattaria	Blattidae		6	16	22
2	Arthropoda	Insecta	Blattaria	Cryptocercidae			2	2
3	Arthropoda	Insecta	Blattaria	Blaberidae		1	2	3
4	Arthropoda	Insecta	Coleoptera	Latridiidae	3	3	4	10
5	Arthropoda	Insecta	Coleoptera	Carabidae	2	9	8	19
6	Arthropoda	Insecta	Coleoptera	Tetratomidae		3	3	6
7	Arthropoda	Insecta	Coleoptera	Sphindidae		2	7	9
8	Arthropoda	Insecta	Coleoptera	Phalacridae	4	2		6
9	Arthropoda	Insecta	Coleoptera	Ochodaeidae		1	3	4
10	Arthropoda	Insecta	Coleoptera	Pleocomidae			3	3
11	Arthropoda	Insecta	Coleoptera	Artematopodidae		1		1
12	Arthropoda	Insecta	Coleoptera	Curculionoidae	2			2
13	Arthropoda	Insecta	Coleoptera	Hylobiinae	3	1		4
14	Arthropoda	Insecta	Coleoptera	Lar.Tenebronidae		2		2
15	Arthropoda	Insecta	Coleoptera	Lar. Carabidae		2	1	3
16	Arthropoda	Insecta	Coleoptera	Lar. Lycidae		1	1	2
17	Arthropoda	Insecta	Coleoptera	Lar. Elateridae			1	1
18	Arthropoda	Insecta	Coleoptera	Cryptophagidae	3	8	1	12
19	Arthropoda	Insecta	Coleoptera	Scarabaeidae	2	5	2	9
20	Arthropoda	Insecta	Coleoptera	Staphylinidae	2			2
21	Arthropoda	Insecta	Diptera	Sciaridae		4	2	6
22	Arthropoda	Insecta	Diptera	Phoridae		15	12	27
23	Arthropoda	Insecta	Diptera	Ceratopogonidae		6	2	8
24	Arthropoda	Insecta	Diptera	Sciomyzoidae	3			3
25	Arthropoda	Insecta	Diptera	Heleomyzidae		1	4	5
26	Arthropoda	Insecta	Diptera	Lonchoteridae			5	5

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27	Arthropoda	Insecta	Diptera	Agromyzidae	2			2
28	Arthropoda	Insecta	Diptera	Milichidae	1			1
29	Arthropoda	Insecta	Diptera	Piophilidae			1	1
30	Arthropoda	Insecta	Diptera	Xylomidae		1	2	3
31	Arthropoda	Insecta	Dermaptera	Carcinophoridae	2	5	4	11
32	Arthropoda	Insecta	Hemiptera	Anthocoridae		1		1
33	Arthropoda	Insecta	Hemiptera	Delphacidae		2		2
34	Arthropoda	Insecta	Hemiptera	Nabidae	2		1	3
35	Arthropoda	Insecta	Hymenoptera	Myrmicinae	10	5	12	27
36	Arthropoda	Insecta	Hymenoptera	Formicidae	112	89	43	244
37	Arthropoda	Insecta	Hymenoptera	Torymidae			3	3
38	Arthropoda	Insecta	Hymenoptera	Diapriidae			5	5
39	Arthropoda	Insecta	Hymenoptera	Lar. Eulophidae		3	1	4
40	Arthropoda	Insecta	Lepidoptera	Lar. Pyralidae		1		1
41	Arthropoda	Insecta	Lepidoptera	Lar.Erebidae	2	4	2	8
42	Arthropoda	Insecta	Orthoptera	Prophalangopsida e		5	9	14
43	Arthropoda	Insecta	Orthoptera	Gryllacrididae	4	2	8	14
44	Arthropoda	Insecta	Orthoptera	Grylidae	14	9	14	37
45	Arthropoda	Insecta	Phasmida	Diapheromeridae			2	2
46	Arthropoda	Insecta	Thysanoptera	Aelothripidae		8	9	17
47	Arthropoda	Insecta	Tricophtera	Brachycentridae	2		2	4
48	Arthropoda	Insecta	Tricophtera	Psychomilidae	2	1	3	6
49	Arthropoda	Arachnida	Araneae	Gnaphosidae	10	6		16
50	Arthropoda	Arachnida	Araneae	Therophosidae		2		2
51	Arthropoda	Arachnida	Araneae	Prodidomidae	2			2
52	Arthropoda	Arachnida	Araneae	Zoropsidae			2	2
53	Arthropoda	Arachnida	Araneae	Diplostyla	3		5	8
54	Arthropoda	Arachnida	Araneae	Loxoscelidae	1	1		2
55	Arthropoda	Arachnida	Acari	Macrochelidae	3			3
56	Arthropoda	Diplopoda	Polydesmida	Xystodesmidae	2		4	6
57	Arthropoda	Diplopoda	Glomerida	Glomeridae	1		4	5
58	Arthropoda	Diplopoda	Spirosstreptida	Spirosstreptidae	2	1	5	8
59	Arthropoda	Entognath a	Collembola	Hypogasturidae	6	3	5	14
60	Arthropoda	Entognath	Collembola	Isotomidae	8	2	14	24

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		a						
61	Arthropoda	Entognatha	Collembola	Entomobryidae		2	5	7
62	Arthropoda	Entognatha	Diplura	Japygidae		3	14	17
63	Arthropoda	Entognatha	Diplura	Anajapygidae		4	8	12
64	Arthropoda	Chilopoda	Scutigeromorpha	Scutigeromorpha			1	1
65	Arthropoda	Chilopoda	Geophilomorpha	Geophilidae		1	3	4
66	Arthropoda	Malacostraca	Isopoda	Oniscidae			1	1
67	Arthropoda	Malacostraca	Decapoda	Portunidae			2	2
68	Mollusca	Gastropoda	Stylomatophora	Achatinidae			1	1
69	Annelida	Oligochaeta	Megadrilacea	Acanthodrilidae			5	5
70	Chordata	Mammalia	Rodentia	Muridae			4	4
Total					215	234	283	732

Table 2: High, middle and low (Diversity of tree).

In addition [7] also indicated that the occurrence of such conditions in Pinang-Pinang is also inseparable from the dominance of the hyperacumulator plant group that is more prevalent in areas with high levels of tree diversity.

The observation of soil fauna at three levels of tree diversity within Pinang-Pinang plot, super wet tropical rain forest, indicates that individuals from the Formicidae family are the most common fauna in observations using pitfall trap traps of 244 individuals. This is because the group of formicidee is often in groups running above the soil surface, so the Formicidae group is often and commonly found in pitfall trap traps. According [16] states that specimens that can be caught with this trap are ants, spring tails, flies, ground bees, bees, small parasites and spider groups. A dominant species in an area indicates that the area is an adequate and appropriate source of nutrition for the species. In addition, according to [17] this is due to the formicidae group having a high abundance. The population abundance of this group is caused because these insects live in colony so that they are better able to survive. The dominance of this group in the soil fauna community is due to the high mobility and ability to colonize within the habitat. Some species in the formicidae group may change their diet when food source availability is limited [18]. Habitat /

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nest of this group can be found in soil, litter and trees. This is what causes the formicidae group to have a fairly wide spread. Different morphologies and sizes of formicidal groups also support the ability to colonize the various microhabitats [19].

D. Diversity of Soil Fauna in Pinang-Pinang

The diversity of tropical rain forest fauna plots Pinang-Pinang illustrates how variations of organisms that live and thrive in the plot. It also illustrates the complexity of soil ecosystems in the process of biogeochemical cycles and food chains. The diversity of soil fauna is illustrated by a diversity index that unites species richness and evenness in one value [20]. The Diversity index used in data analysis is the Shannon - Winner Diversity index (H '). This index has two properties that make this index widely used for species diversity, (1) H '= 0 if only if there is one species in the sample, (2) H' is maximum only the moment (total number of species in the community / S) of all species Represented by the same number of individuals, which is the perfect distribution of abundance [20]. For index data of diversity, evenness and dominance can be seen in table 3.

TABLE 3: DIVERSITY OF SOIL FAUNA

Diversity	Diversity Rate of Tree in Tropical Rainforest Plot Pinang-Pinang		
	DTKP. High	DTKP. Midle	DTKP. Low
Σ Kelas	4	5	9
Σ Ordo	14	16	24
Σ Family	30	43	53
Σ Individu	215	234	283
Diversuty Index	2.17	2.79	3.51
Evenness	0.51	0.66	0.83
Dominance	0.29	0.16	0.05

From the data table 3 it can be seen that the number of individual faunal soils in various levels of taxonomy indicates that areas with high levels of tree diversity have a lower number that is for the number of class 4, the number of Order 14, the number of families 30 and the number of individuals 215 compared with regions with The level of diversity of medium trees with the number of class 5, order 16, family 43 and the number of individuals 243. In the region, the highest number or in other words found many groups of soil diverse organisms that is in areas with low levels of tree diversity that is the number of classes 9, Order 24, family 53 and individual 283. The data above show that the diversity of soil fauna in areas with low levels of tree diversity is higher than areas with high levels of tree

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diversity. In this case, the number of soil fauna at several levels of taxonomy shows a correlation that is opposite to the diversity of trees. According [21] that the soil fauna has an important role in providing environmental services to the ecosystem. Environmental services provided by a small part contributed to creating a balance of ecosystems. Ecosystem balance is also formed from the interaction between the fauna of the land itself both beneficial and disadvantageous. The resulting interactions will affect the abundance and diversity of the soil fauna.

The diversity of soil arthropods based on the Shannon Weaner Index in the tropical super-wet tropical rainforest plots of Pinang-Pinang shows that areas with high levels of tree diversity have an indigenous fauna diversity index of 2.17, areas with moderate levels of biodiversity have an index of 2.79 soil faunal diversity and area with level Low tree diversity has a diversity index of soil fauna of 3.51. According to [15] the diversity of soil fauna shows a high correlation with soil organic matter content. [22] revealed the low value of diversity index (Diversity) is most likely influenced by environmental factors of soil abiotic.

The equity of the soil fauna shows how the distribution of soil fauna groups in an ecosystem. From Table 3, it was shown that areas with high levels of tree diversity showed a lower level of evenness of the soil fauna 0.51 compared to areas with low tree biodiversity 0.66 and areas with high tree diversity 0.83. In areas with low levels of tree diversity, and currently have a high soil fauna distribution in the ecosystem, which indicates that the level of diversity of the soil fauna of the area is also high. In contrast, in areas with high levels of tree diversity, the level of evenness is lower than the others. This proves that the diversity of trees does not significantly affect the evenness of the soil fauna. According to [23] said that the evenness of soil fauna species in the forest structure is determined by the source of nutrients available to the soil fauna.

The highest dominant value is at the high level of tree diversity is 0.29, while the area with the level of diversity of medium trees has a value of 0.16 and areas with low levels of biodiversity 0.05. This shows different values with the previous parameters of the diversity index and the evenness index. Dominance shows the number of individuals of a dominant species in an ecosystem. This means that in the presence of dominant species in an environment there will be interaction between species. According to [24] in a community or ecosystem there are limiting factors in the form of limited resources, both in the form of food and living place. In the community and ecosystem interaction occurs between members of the population. Interactions between these species include competition and predation.

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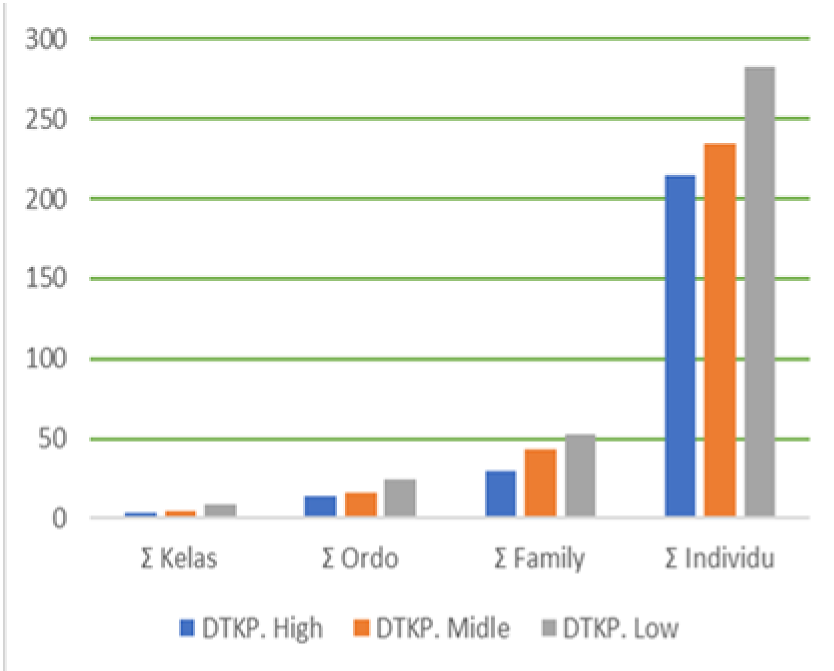

Fig. 1: DTKP (Diversity of Tree: High, Middle and Low area)

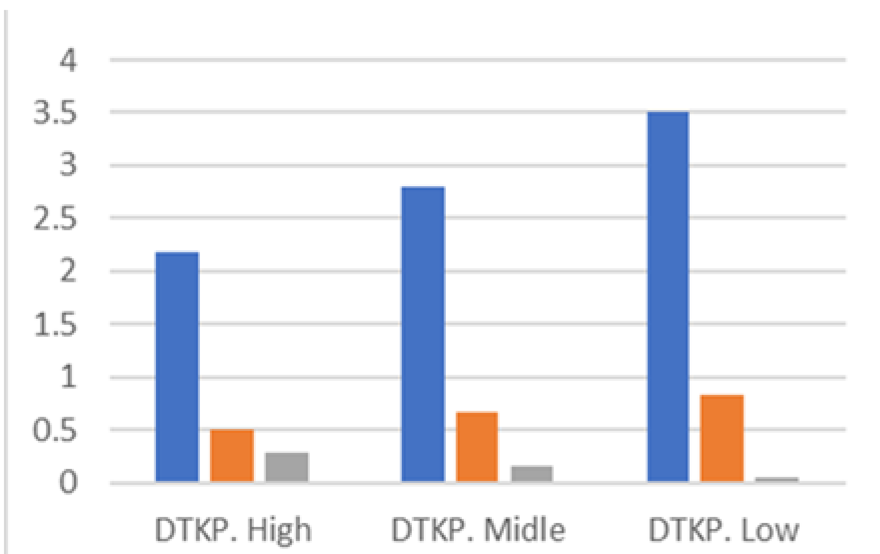

Fig. 2: Graph of diversity of soil fauna on three levels of diversity of plots of Pinang-Pinang trees

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E. Relation of Soil Fauna Diversity with N and C-Organic in Soil

Soil fauna requires soil nutrient as one source of nutrition in order to maintain ecosystem sustainability.Each soil fauna requires different nutrients according to their individual needs. The capacity and diversity of available nutrients will bring about diverse soil fauna. Nutrients N and C are important nutrients in the formation of proteins and carbohydrates and other organic compounds required by soil fauna. Nutrients have cycles that also need attention to maintain the balance of the ecosystem. Diversity of fauna can be used as bioindicator of nutrient availability in soil. This is because macrofauna has an important role in improving the processes in the soil.

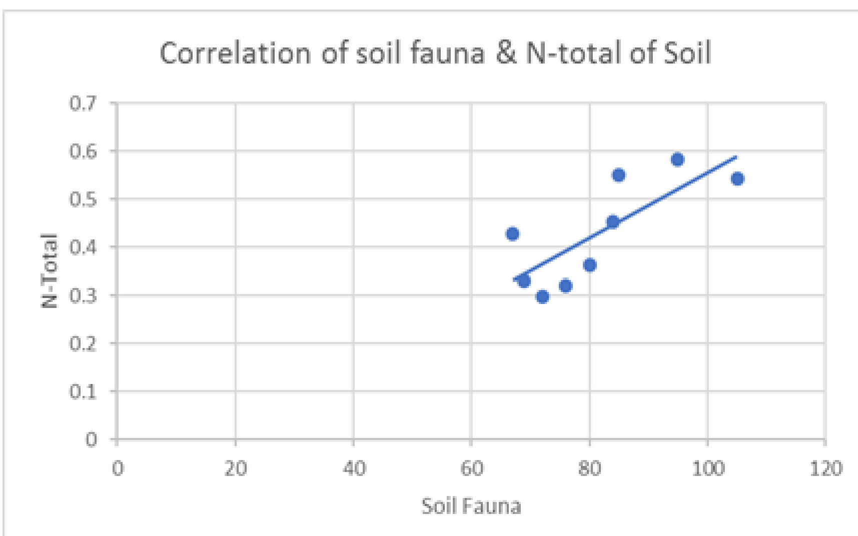

Fig. 3: Relation N-Total with Soil fauna in Pinang-Pinang plot

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From the graph above it can be seen that the number of soil fauna shows a positive correlation to N-total, where as the number of soil fauna increases then N-total content increases. The direction of this positive correlation indicates that the diversity of soil fauna in tropical rain forest super wet plots of Pinang-Pinang is inseparable from the influence of N-total. According to [28] that The active faunal diversity of the fauna does not indicate a significant relationship with nutrient availability parameters. Conversely, there is a real relationship between fauana diversity in soils with some properties of land such as N-total. The absence of correlation between fauna diversity active on the soil surface with soil nutrient availability parameter is suspected because the active fauna is the native fauna (natrics) but the fauna is a moment to search for food source (fauna exotics). Fauna that can affect the physical properties of the soil are: ants, termites, crickets and earthworms.

The N-total correlation graph with the number of individuals above shows a strong correlation, wherein N elements in the soil are desperately needed as a source of nutrients for growing and developing soil fauna. According to [13] the soil fauna relies on organic matter as a source of energy and food and shelter. Otherwise the soil organic matter availability in the soil also depends on the soil fauna.

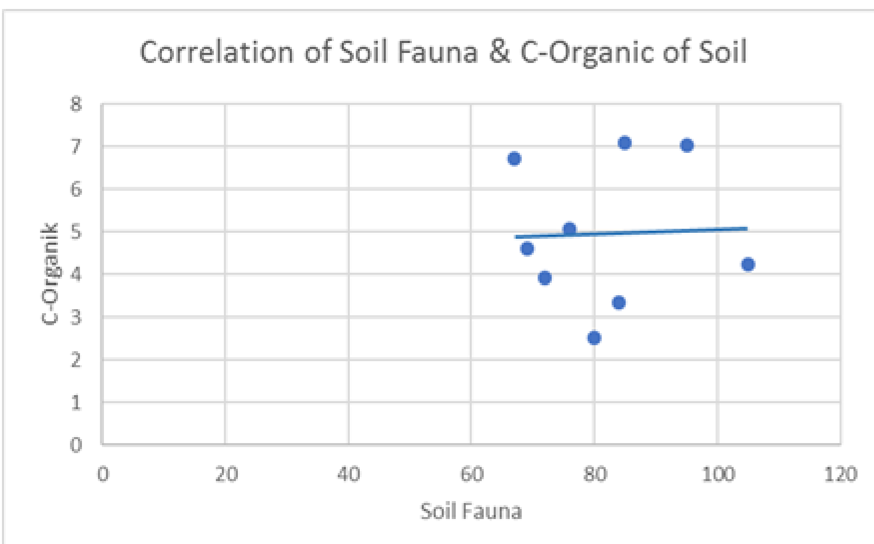

Fig. 4: Relation C-Org with Soil fauna in Pinang-Pinang plot

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From the graph above can be seen that the soil fauna has a positive correlation to the C-organic content. This can be seen from the linear direction of increasing graphics. One of the soil dwelling organisms that plays an enormous role in improving soil fertility is the soil fauna. The process of decomposition in the soil will not be able to run quickly if not supported by fauna activities. Fauna of soil has an important role in the decomposition of soil organic matter in the provision of nutrients. Fauna will degrade the dead vegetable substance, then the material will be removed in the form of impurities [29].

Although the above data shows that C-organic does not significantly affect the number of individual fauna, where the correlation value is weaker and the graphic direction is not so high. According to [25] that carbon is an essential component of plant and soil organic matter that determines the degree of decomposition. The higher the value of these variables the slower the decomposition process. besides that many carbon soils are released into the air in the form of CO2 and further absorbed plants through stomata for photosynthesis process. in the forest will be more C Organic is needed and stored in the tree than in the soil.

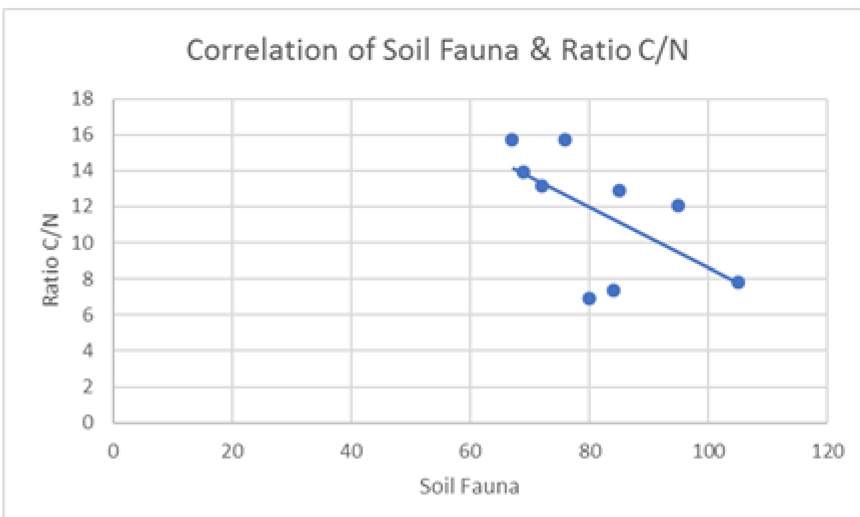

Fig. 5: Relation C-Org with Soil fauna in Pinang-Pinang plot

For C / N ratio comparison, the relationship or correlation is not so strong with the abundance of individual fauna. In addition, the negative sign shows that the correlation between the ratio of C / N to the number of individual fauna of the land is not unidirectional but opposite direction. The C / N ratio is a good indicator of the quality of plant organic matter which is a source of nutrients and energy for soil macrofauna. With the magnitude of the C / N ratio means the amount of N that is decomposed is less so is the opposite, so the macrofauna of the soil will prefer the organic material of the plant with a small C / N ratio [25]

IV. CONCLUSIONS

Plot Pinang-Pinang, Padang West Sumatra has a high level of diversity of soil fauna, where in areas with high levels of tree diversity there are number of individual soil fauna, soil diversity index and soil fauna diversity that is lower than the area with the level of diversity of medium trees and low. Thus, dominance in areas with high levels of tree diversity has a higher value than in areas with moderate and low tree diversity. The Formicidae group is the most common soil faunal group in the tropical rainforest plot of Pinang-Pinang, Padang, West Sumatra, Indonesia.

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