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Diversity and Evenness of Medicinal Plants in Bantarbolang Nature Reserve Block 19-21, Pemalang, Central Java

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Abstract

This study was conducted in Bantarbolang Nature Reserve located in Kebon Gede village, Bantarbolang sub-district, Pemalang Regency. Bantarbolang is one of the nature reserves that have the structure and composition of complex vegetation so that there is a diversity of plants that can grow in a conservation area, such as medicinal plants diversity. The objectives of this study were to know the various species of medicinal plants in the Bantarbolang nature reserve block 19-21 and to know the evenness of medicinal plants in the Bantarbolang Nature Reserve block 19-21. This study was conducted with survey methods and sampling using a systematic square plot. The variables observed consist of dependent variables i.e. the species of medicinal plant and independent variables include environmental factors i.e. temperature, light intensity, humidity, canopy cover, and soil pH. The parameters observed are the number of species and individual number of medicinal plants. The data were analyzed using the Important Value Index (IVI), Diversity Index (H'), Evenness Index (e) and Similarity Index (IS). The plant samples were made into voucher herbarium and stored in PUNS for future references. The results of the study showed that the diversity of medicinal plants in the Bantarbolang Nature Reserve Block 19-21 was high (H'≥0) with 48 species from the 33 families of medicinal plants. Evenness of medicinal plants in Bantarbolang nature reserve block 19-21 is low (e closer to 0). *Alocasia cucullata* is a dominant species of medicinal plants of a distance of 0-200 meters from the forest edge.

Keywords: *Bantarbolang nature reserve, diversity, medicinal plant*

INTRODUCTION

Undergrowth is a community of plants that compose stratification near the surface of the soil. Undergrowth has a height of < 4,5 m and a trunk diameter of about 2 cm. Undergrowth is generally in the form of grass, herbs, and shrubs. Types of undergrowth are an annual, biannual, or perennial plants with a solitary, clumped, upright creeping or climbing life form. Taxonomically, the undergrowth is generally a member of the Poaceae, Cyperaceae, Araceae, Asteraceae, and ferns. Undergrowth mostly found in open places, road edges, river cliffs, forest floors, agricultural land, and plantations (Suharti, 2015). The diversity of undergrowth found in a place is influenced by several factors, including altitude that affects rainfall and air temperature resulting in different place conditions, shade intensity, and soil pH (Hadi *et al*., 2016).

Ground cover plants besides have roles at nutrient cycles, increasing infiltration, reducing erosion, as a source of germplasm, animal feed, ,and forest animals, also has potential as a source of medicine. The role in the undergrowth nutrient cycle is used as an indicator of soil fertility and producing litter in increasing soil fertility, in reducing the erosion of the presence of undergrowth can withstand rainwater and surface runoff. Undergrowth as a source of medicine is no less important than the role of trees on it (Abdiyani, 2008). Medicinal plants at the undergrowth level are more diverse than other vegetation levels and the community uses more herbs at the undergrowth level (Deden & Gusti, 2012). Undergrowth can be used as ingredients of traditional medicine. Utilization of undergrowth as medicinal plants by the community for generations, and traditional communities living far from health services are the people who use it the most as traditional medicine for the treatment of various diseases (Hadi *et al*., 2016).

Undergrowth normally used as medicinal plants are the basic types of vegetation found under forest stands except tree saplings. Undergrowth includes grasses, herbs, shrubs, and ferns (Yuniawati, 2013). Parts of medicinal plants are grouped into 15 types, namely leaves, roots, bark, fruit, all parts, stems or wood, seeds, flowers, sap, leaf tops or buds, rhizomes, tubers, and branches or twigs. The part of the plant most often used by the community as medicine is leaves (Zuhud, 2015).

The nature reserve is a nature reserve area that has a special characteristic in its natural state. Special characteristic includes plants, animals and their ecosystems. Specific ecosystems in nature reserves

are protected and developed naturally. The construction of a nature reserve can be protected properly by the state in the form of flora and fauna (Marhaento & Lies, 2012). Bantarbolang Nature Reserve in Kebon Gede Village, Bantarbolang District, Pemalang Regency. The location of the Bantarbolang nature reserve is directly adjacent to the Pemalang highway, agricultural land, and residents' houses. This nature reserve is located at an altitude of 100 meters asl with a daily temperature between 26-28^{0}C, with a humidity of 77-85%. Various types of plants in the area of Bantarbolang Nature Reserve such as trees, orchids, and undergrowth are normally used as medicine. Data on medicinal plants in Bantabolang nature reserve still lacking and there is no research on the diversity and evenness of medicinal plants so that it is increasingly difficult to know the data of medicinal plants in Bantarbolang Nature Reserve (BKSDA Jateng, 2004).

Regarding the description above, the study problems are how is the diversity of medicinal plants in Bantarbolang Nature Reserve block 19-21, Pemalang, Central Java and how is the evenness of medicinal plants in Bantarbolang Nature Reserve block 19-21, Central Java. The study objectives in Bantarbolang Nature Reserve block 19-21, Pemalang, Central Java, are:

1. To know the various types of medicinal plants in Bantarbolang Nature Reserve block 19-21, Pemalang, Central Java.
2. To know the evenness of medicinal plants in Bantarbolang Nature Reserve block 19-21, Pemalang, Central Java.

The benefits of this study are expected to provide information to the public about the types of medicinal plants found in Bantarbolang Nature Reserve, Pemalang, Central Java, and can complete data on the utilization and evenness of medicinal plants to the community in Bantarbolang Nature Reserve, Pemalang, Central Java.

MATERIALS AND METHODS

The materials used in this research are medicinal plants in Bantarbolang Nature Reserve Block 19-21 and alcohol 70%. The tools used in this study are raffia rope, plastic bags, wooden peg, scissors, camera, knife, newspaper, masking tape, ivory paper, paper labels, altimeters, thermo-hygrometer, lux meter, soil tester, identification book, and stationary.

The research site is Bantarbolang Nature Reserve Block 19-21, Bantarbolang Nature Reserve, Pemalang, Central Java. Geographically, Bantarbolang Nature Reserve is located at the coordinate point of 7° 0’40,5” S - 7° 0’46,0” S and 109° 23’ 34” E - 109° 23’ 38,9” E. Bantarbolang Nature Reserve is in Kebon Gede Village, Bantarbolang District, Pemalang Regency, Central Java

The sampling method used in this study is transecting method with quadratic plot 2 x 2 m. The main transect is perpendicular to the forest boundary into the forest. The direction of the main transect starts from 0 m to 200 m. The distance between sub-transects is 50 m.

The environmental factors observed consisting of temperature, light intensity, humidity, canopy cover, and soil pH. The parameters observed are the number of species and the number of individual medicinal plants.

All species of undergrowth obtained during sampling are being identified. All undergrowth identified using Backer & Bakhuizen Van Den (1963) and all medicinal plants identified using the books from Sastrapradja (1978), Sudiarto *et al*. (1985), Tjitrosoepomo (1994), and Heyne (1987). The herbarium specimens then stored in Herbarium of Faculty of Biology Unsoed (PUNS) for future assessment.

Data on medicinal plants vegetation obtained from the Bantarbolang Nature Reserve Block 19-21 analyzed using Important Value Index (IVI), Diversity Index (H'), Evenness Index (e) and Similarity Index (IS). The Important value index is according to Mueller-Dombois & Ellenberg (1974) as follows:

$$IVI = RD + RF$$

Notes:

$$K = \frac{\text{Number of a species}}{\text{Total area sampled}}$$

$$RD = \frac{\text{Density of a species}}{\text{Total density of all species}} \times 100\%$$

$$F = \frac{\text{Area of plot in which a species occurs}}{\text{Total area sampled}}$$

$$RF = \frac{\text{Frequency of a species}}{\text{Total frequency of all species}} X\ 100\%$$

Shannon-Wiener diversity index can be used to compare various plant communities.

$$H' = -\sum_{i=1}^{s} pi \log pi$$

Notes:

$Pi = \frac{ni}{N}$

H’ : Shannon-Wiener diversity index
ni : The Number of individuals a species
N : The total number of individual of all species
S : The total number of species

The evenness index calculated according to Pielou (1969), as follows:

$$\mathbf{e} = \frac{H'}{LogS}$$

Notes:

e : Evenness index
H’ : Shannon-Wiener diversity index
S : The total number of species

The Similarity Index to determine the level of similarity undergrowth that will be compared according to Odum (1993).

$$IS = \frac{2W}{a+b} \; X \; 100 \; \%$$

Notes:
IS : Similarity index
W : The same number of species between community a and b
a : The Number of species at community a.
b : The Number of species at community b.

The community similarity index criteria ranging from 0-100%, grouped into 4 groups (Table 1) according to Suin (2002) as follows:

Table 1. Criteria for Similarity Index of Medicinal Plant Species.

Similarity Index (IS)	Interpretation of Evaluations
≤25%	Very Not Similar
25-50%	Not Similar
50-75%	Similar
≥75%	Very Similar

RESULTS AND DISCUSSION

The results of the study showed that 56 species of undergrowth from 38 families found on 25 plots in the Bantarbolang Nature Reserve block 19-21. Based on Table 2, there are 48 species of medicinal plants from 33 families. From these 48 species of medicinal plants found in Bantarbolang Nature Reserve block 19-21, there are 42 identified species and the 6 other species are still unidentified. The six species of medicinal plants are still unidentified because plants are still sterile and at the stage of seedling. As a part of flowers complement and decoration, sterile flowers are incapable of producing pollen. Therefore, it is tough to differentiate the mature and the seedling form of the same species. Besides, seedling is a young tissue where the cells are still actively dividing and generally very sensitive to abiotic and biotic stresses. Seedlings need some specific conditions such as optimal light intensity and shade (Balliu *et al*., 2017). The percentage of medicinal plants found as many as 85,71% from all undergrowth indicates that there are a lot of medicinal plants that grow in the Bantarbolang Nature Reserve block 19-21. Leaves, fruit, flower, seed, bark, root, tuber, and rhizome are the plant's parts that commonly used as medicinal materials. The species of medicinal plants and plant's parts used in the Bantarbolang Nature Reserve block 19-21 can be seen in Table 2.

Table 2. Medicinal Plant Species and Plant's Parts Used in Bantarbolang Nature Reserve Block 19-21

No	Family	No	Species	Local Name	Plant's Parts Used
1.	Acanthaceae	1.	*Justicia* sp. (Herb Linn.)	Gandarusa	Leaves
2.	Annonaceae	2.	*Annona montana* Macfad.	Sirsak hutan	Leaves
		3.	*Annona muricata* L.	Sirsak hutan	Leaves, bark, seed, and fruit
3.	Apocynaceae	4.	*Parameria barbata* Miq.	Kayu rapet	Leaves and bark
4.	Araceae	5.	*Alocasia cucullata* (Lour.) G.Don	Nampu hijau	Root
		6.	*Amorphophallus campanulatus (*Roxb.) Blume ex Decne.	Suweg	Tuber
		7.	*Pothos chinensis* (Raf.) Merr.	Pothos	Leaves
5.	Asteraceae	8.	*Synedrella nodiflora* L.	Jotang kuda	Leaves
6.	Blechnaceae	9.	*Stenochlaena palustris (*Burm. f) Bedd.	Paku udang	Leaves
7.	Caryophyllales	10	*Drymaria* sp.	Rumput Bento	Leaves
8.	Cleomaceae	11	*Cleome rutidosperma* DC.	Maman ungu	Leaves
9.	Commelinaceae	12	*Commelina diffusa* Burm. f.	Aur – aur	Leaves and stem
10.	Convolvulaceae	13.	*Merremia emarginata* (Burm. F.) Hallier f.	Pegagan hutan	Leaves and root
		14	*Merremia vitifolia* (Burm. F) Hallier f.	Mantangan	Leaves, stem, and root
		15	*Porana volubilis* Burm. f.	Widasari	Flower
11.	Costaceae	16	*Cheilocostus speciosus* (Koening) Sm.	Koening	Leaves
12.	Cucurbitaceae	17.	*Momordica charantia* L.	Pare	Leaves
13.	Dicksoniaceae	18	*Dicksonia blumei* (Kunze) Moore.	Paku kidang	Leaves
14.	Dioscoreaceae	19	*Dioscorea alata* L.	Uwi	Tuber

15.	Euphorbiaceae	20	*Phyllanthus niruri* L.	Meniran	Leaves, root, seed, and fruit
16.	Fabaceae	21	*Abrus precatorius* L.	Saga	Leaves, root, and seed
		22	*Albizia julibrissin* Durazz.	Mimosa	Bark and flower
17.	Garryaceae	23	*Aucuba japonica* Thunb.	Acuba jepang	Leaves
18	Hypoxidaceae	24	*Molineria capitulata* (Lour.) Herb.	Congkok	Leaves, flower, and root
19.	Lamiaceae	25	*Hyptis brevipes* Poit.	Daun pusar	Leaves, and flower
20.	Malvaceae	26	*Urena lobata* L.	Pulutan	Leaves, root, and bark
		27	*Malvaviscus arboreus* cav.	Pucuk cabe	Leaves and flower
21.	Marantaceae	28.	*Maranta arundinacea* L.	Garut	Rhizome
		29	*Maranta sp.*	Seddet	Rhizome
22.	Melastomataceae	30	*Melastoma polyanthum* Bl.	Senggani	Leaves
23.	Orcidaceae	31	*Liparis nervosa* (Thunb.) Lindl.	Anggrek	Leaves
24.	Pandanaceae	32	*Pandanus amaryllifolius* Roxb.	Pandan	Leaves
25.	Piperaceae	33	*Peperomia pellucida* L.	Tumpangan air	Leaves
		34	*Piper margiantum* Jacq.	Lada	Leaves
		35	*Piper nigrum* L.	Lada hitam	Leaves
		36	*Piper* sp.	Sirih	Leaves
26.	Polygonaceae	37	*Polygonum persicaria* L.	Lady's thumb	Leaves and rhizome
27.	Polypodiaceae	38	*Drynaria qurcifolia* (L.) J. Smith	Paku kepala tupai	Leaves and rhizome
		39.	*Neocheiropteris palmatopeda* (Baker) Christ	Baker	Leaves
28.	Primulaceae	40	*Cyclamen pseudibericum* Hildebr.	Begonia	Leaves
29.	Rubiaceae	41	*Ixora* sp.	Mampat	Leaves and root
30.	Smilacaceae	42	*Smilax celebica* Blume.	Canar	Root
		43.	*Smilax leucophylla* Blume var. *platyphylla* Merr.	Canar	Leaves and rhizome
		44	*Smilax* sp.	Ulu bringu	Root
		45	*Smilax tamnoides* L.	Bristly greenbrier	Leaves and stem
31.	Solanaceae	46	*Physalis minima* Linn.	Ciplukan	Leaves, root, and fruit
32.	Urticaceae	47	*Laportea aestuans* (L.) Chew	Pulus	Leaves
33.	Zingiberaceae	48	*Zingiber officiale* Rosc	Jahe	Rhizome

Based on the distance in the Bantarbolang Nature Reserve block 19-21 from the edge to 200 m, the diversity decrease from 1,22; 1,08; 0,97; 0,94; and 0,89 respectively (Table 3). The deeper the forest, the diversity will decrease. The highest diversity of medicinal plants at 0 m distance plot, located near the road and placed in the open environment. The diversity of medicinal plants decreases at any distance away from the road and open environment, influenced by microclimate hence there is an edge effect on the vegetation conditions (Siregar & Ni Kadek, 2014).

Edge effects can cause the differences in structure, composition, and function near the edges compared to the side ecosystem. The edge effects referred to this research are roads, fields, residential areas, and the other open environment. Edge effects are also influenced by microclimates (Supartono *et al*., 2016). A microclimate is a climatic condition in a space that is very limited or small, which is influenced by sunlight, air temperature, air humidity, and rainfall (Setiawati, 2012).

The diversity of medicinal plants influenced by the edge effects in the Bantarbolang nature reserve block 19-21 is in accordance with measurements of environmental factors namely temperature, humidity, light intensity, soil pH, and canopy cover (Table 2). The most influential factor is canopy cover. The high density of canopy covers is caused by the broad and thick canopy of trees found in 200 meters distance plot, which is range 4,2–88,9% from the distance of 0-200 m plots. The dense canopy cover will affect the intensity of the light entering the forest floor will be too low, so the air temperature becomes very low, and the soil moisture under the canopy becomes very high. Low temperatures and high humidity make the soil pH higher (Kunarso & Fatahul, 2013).

Plants need a temperature of 15-25 ^{0}C to grow optimally. If the temperature is too high or low, it will cause the plant to die. The high humidity will inhibit the transpiration process in plants resulting in the inhibition of plants to absorb mineral salts and water from the soil. Humidity as the supplier of water for plant growth and vital processes, is determined by the

amount of rain, especially those that fall in an area for a year. The higher soil PH, the more diverse the species will be because the higher the pH the availability of certain acids will decrease (Destaranti *et al*., 2017).

Based on the environmental parameters at a distance of 0 m to 200 m in the Bantarbolang Nature Reserve block 19-21, there are some influential relationships for the diversity of medicinal plants. The data showed that the community of Bantarbolang Nature Reserve blocks 19-21 has a high diversity of medicinal plants.

Table 3. Measurement of Environmental Factors, Diversity Index (H ') and Evenness Index (e) Medicinal Plants in Bantarbolang Nature Reserve Blok 19-21.

Distance (m)	Temperature (^{0}C)	Humidity (%)	Light Intensity (lux)	Soil pH	Canopy cover (%)	Diversity Index	Evenness Index
0	29-30	63- 78	500 - 970	3,6 - 4,5	4,2 -26,7	1,22	0,34
50	28- 29	64- 75	420 -1300	3,9 - 4,2	11,5 - 46	1,06	0,33
100	27-29	69 -76	400- 1300	4 - 4,5	27,8 -65,7	0,97	0,32
150	27-28,5	70 – 74,5	420 – 640	3,7- 4,3	20,8-52	0,92	0,31
200	21-27	72- 78	280 – 520	4,5 - 4,8	36,8 - 88,9	0,89	0,30

Based on Table 3 the evenness index in the Bantarbolang Nature Reserve block 19-21 at a 0 m - 200 shows that evenness is low and medicinal plants in every distance is not evenly distributed. Low evenness index in medicinal plants in Bantarbolang Nature Reserve block 19-21 because in the community there are a dominant species from a distance of 0 to 200 m, namely Nampu hijau (*A. cucullata*). The dominant species is the species in a community with significant productivity, and most of it controls the flow of energy. This happens because of the availability and utilization of different nutrients (Tsauri, 2017).

Based on Table 4, there are 35 species of medicinal plants found in Bantarbolang Nature Reserve block 19-21 at the distance of 0 m. The highest important value index in this distance is *A. cucullata* (31,83%) and the lowest important value index is *C. pseudibericum* with percentage 1,40%. Besides, there are 24 species of medicinal plants found at a distance of 50 m. The important value index of the species at this distance are *A. cucullata* (48,16%); *P. amaryllifolius* (22,37%); *A. japonica* (17,12%), and 1,60% of each *A. campanulatus*, *M. vitifolia*, *M. capitulata*, and *A. montana* respectively.

Table 4. Important Value Index (IVI) of Medicinal Plants in Bantarbolang Nature Reserve Block 19-21 distance of 0 to 200 meters.

No.	Species	IVI (100%)				
		Distance (m)				
		0	50	100	150	200
1.	*Alocasia cucullata*	**31,83**	**48,16**	**48,77**	**54,37**	**59,09**
2.	*Aucuba japonica*	9,78	17,12	7,57	3,95	20,72
3.	*Annona muricata*	6,51	3,88	19,62	6,04	13,95
4.	*Cleome rutidosperma*	6,55	14,38	41,34	4,86	2,97
5.	*Ixora* sp.	7,36	8,90	2,67	12,88	2,46
6.	*Dicksonia blumei*	6,77	11,64	3,99	4,86	2,80
7.	*Neocheiropteris palmatopeda*	3,82	4,11	4,71	0	7,79
8.	*Piper nigrum*	2,04	14,38	5,35	1,86	3,98
9.	*Cheilocostus speciosus*	8,38	0	6,48	39,56	5,94
10.	*Maranta* sp.	2,37	3,65	4,89	0	11,04
11.	*Maranta arundinacea*	1,72	3,42	4,21	0	4,59
12.	*Melastoma polyanthum*	4,51	5,48	1,99	2,32	0
13.	*Pandanus amaryllifolius*	0	22,37	0	3,95	4,93
14.	*Stenochlaena palustris*	0	3,88	0	3,67	5,60
15.	*Liparis nervosa*	0	10,04	5,98	4,41	0
16.	*Albizia julibrissin*	4,51	0	3,35	0	4,26
17.	*Porana volubilis*	10,96	4,11	0	2,09	0
18.	*Hyptis brevipes*	1,88	3,65	0	7,18	0
19.	*Amorphophallus campanulatus*	1,72	1,60	5,98	0	0

20.	*Abrus precatorius*	21,79	4,11	0	0	0
21.	*Parameria barbata*	4,46	4,11	0	0	0
22.	*Dioscorea alata*	4,25	2,51	0	0	0
23.	*Merremia vitifolia*	1,88	1,60	0	0	0
24.	*Molineria capitulata*	2,04	2,05	0	0	0
25.	*Piper* sp.	0	3,20	1,99	0	0
26.	*Smilax tamnoides*	0	0	12,23	5,82	0
27.	*Physalis minima*	2,37	0	6,71	0	0
28.	*Polygonum persicaria*	0	0	5,12	0	2,13
29.	*Drymaria* sp.	0	0	4,89	11,02	0
30.	*Pothos chinensis*	0	0	2,22	0	3,47
31.	*Drynaria quercifolia*	3,44	0	0	19,33	0
32.	*Malvaviscus arboreus*	0	0	0	2,77	4,65
33.	*Phyllanthus niruri*	13,99	0	0	0	0
34.	*Piper margiantum*	9,77	0	0	0	0
35.	*Momordica charantia*	8,50	0	0	0	0
36.	*Smilax celebica*	1,56	0	0	0	0
37.	*Merremia emarginata*	2,53	0	0	0	0
38.	*Zingiber officiale*	1,56	0	0	0	0
39.	*Synedrella nodiflora*	2,37	0	0	0	0
40.	*Peperomia pellucida*	2,04	0	0	0	0
41.	*Commelina diffusa*	2,04	0	0	0	0
42.	*Laportea aestuans*	1,72	0	0	0	0
43.	*Urena lobata*	1,56	0	0	0	0
44.	*Cyclamen pseudibericum*	1,40	0	0	5,26	0
45.	*Annona montana*	0	1,60	0	0	0
46.	*Smilax leucophylla*	0	0	0	3,67	0
47.	*Smilax* sp.	0	0	0	0	35,17
48.	*Justicia* sp.	0	0	0	0	4,76
	Sum of IVI	199,97	199,93	200,08	199,87	200,30
	Number of Species	35	24	21	20	19

The medicinal plants obtained at a distance of 100 m are 21 species. The important value index of these species are *A. cucullata* (49,77%); *C. rutidosperma* (41,34%); *A. muricata* (19,62%); with *M. polyanthum* (1,99%) and *Piper* sp. (1,99%) as the species with the lowest important value index. Then, the medicinal plants found at the distance of 150 m are 20 species. The important value are *A. cucullata* (54,37%); *C. speciosus* (39,56%); *D. qurcifolia* (19,33%), and *P. nigrum* (1,86%) respectively. At the distance of 200 m, there are 19 species of medicinal plants. The important value of these species are *A. cucullata* (59,09%); *Smilax* sp. (35,17%); *A. japonica* (20,72%), and *P. persicaria* (2,13%).

The Important Value Index (IVI) shows the vital role of the plant species in the community. The species with the highest IVI can be categorized as the dominant species. The dominant species has such a big impact in changing the environmental conditions and the existence of other species in the community. The IVI is greatly affected by the biotic and abiotic factors. The biotic factors which affected the IVI, such as competition between the individuals. Then, the abiotic factors are light intensity, air humidity, soil, climates, and topography. The more extreme the condition of environment, the diversity of plants will be less. Plants with the highest adaptation and competition and can produce better than the other plants, then it will dominate in the community (Efendi *et al*., 2013).

The dominant species of medicinal plants in Bantarbolang Nature Reserve block 19-21 at plot 0-200 m is *A. cucullata* (Table 4). This species has a big influence on the changes environmental conditions and the existence of the medicinal plant species. The medicinal plant species with low IVI is caused by the small number of species found in the plots. Hence, the role of these species in the community is relatively low compared to the other species. Even though the presence of these species is considered low, we should not ignore the role of these species as the medicinal plants (Abdiyani, 2008).

A. cucullata can be classified as a member of Araceae or taro family. Araceae can grow in three types of habitats i.e. land, waters, and as epiphytes. This plant mostly grew on the land, forest floor, riverbanks, and on the rocks. Araceae live in a moist and protected place although some species can grow in dry and open places. Araceae have a wide life span, except in places with extreme environmental conditions. Tropical climates such as Indonesia is a habitat that is very suitable for this plant. It is proven that around 90% of clans and 95% of Araceae live in the tropics (Kurniawan & Ni, 2012).

Alocasia genus is composed of tropical plants with mostly show large leaves. *Alocasia cucullata*

belongs to the Araceae family, and the chemical composition of *Alocasia cucullata* was found to consist of mostly polysaccharides (66%) and proteins (7%). The active components that may account for *Alocasia cucullata*'s pharmacological effects possibly include amino acids and polysaccharides, which both have been shown to have immuno-stimulatory effects. Although *Alocasia cucullata* consists of potentially immuno-regulating components, it is largely unknown whether *Alocasia cucullata* indeed exerts antitumor effect by activating antitumor immunity. *Alocasia cucullata* roots could significantly attenuate tumor growth in mouse (Peng *et al*., 2013).

The type similarity index shows the value of community similarity which describes the level of similarity in structure and species composition in the entire community. Based on Table 5, the highest similarity index of medicinal plants plots in Bantarbolang Nature Reserve block 19-21 are plots 100 m and 200 m, with the percentage of similarity index about 70,00%. The high percentage of similarity index indicates that the species composition and the communities of these two plots are similar. The lowest similarity index showed by plots 0 m and 150 m, with the percentage of 43,64%. The low percentage indicates the different composition of species and communities between these two plots. The index value of similarity of medicinal plants in the Bantarbolang Nature Reserve is influenced by microclimate conditions which tend to be the same so that it will be occupied by the individuals of the same species. This is because species naturally have some developed mechanisms and tolerance to their habitat (Zulkarnaen, 2017).

Table 5. Similarity Index in Bantarbolang Nature Reserve Block 19-21.

Distance	0	50	100	150	200
0		64,41%	53,57%	43,64%	44,44%
50			62,22%	59,09%	55,81%
100				58,54%	70,00%
150					56,41%
200					

CONCLUSION

The diversity of medicinal plants in the Bantarbolang Nature Reserve Block 19-21 consists of 48 species from 33 families with percentage 85,71% from all of the undergrowth. The evenness index of medicinal plants species in the Bantarbolang Nature Reserve Block 19-21 are relatively low because in the community there is a dominant species, namely Nampu hijau (*A. cucullata*).

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