Analysis Of the Density and Diversity of Plant Species in Muhammadiyah University of Tasikmalaya
(Field Research by PGSD Students of Muhammadiyah University of Tasikmalaya as an Implementation of Lecture Results of Science Basic Concept)

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Abstract
As living beings, apart from interacting with other humans, they also interact with living things and inanimate objects. These living things include animals, plants and inanimate objects such as air, water and soil. Therefore, humans are one of the living things that play a very important role in the survival of other creatures by establishing relationships with living things and inanimate objects around them. This study aims to measure the level of diversity and density of plant populations in the environment of Muhammadiyah University of Tasikmalaya. Primary data collection was carried out by using the quadratic method. The quadratic method is a method that uses sample plots, square, rectangular, and circle sample plots. The results of the research analysis show that in Muhammadiyah University of Tasikmalaya, in the biotic ecosystem, there are 36 species with a total of 70 individuals spread over 5 points. The results showed that the density and diversity of plants at Muhammadiyah University of Tasikmalaya were in the low category, and improvements had to be made immediately to create a green campus in the future.

Keywords:
Plant Diversity, Plant Population Density, Green Campus

A. INTRODUCTION

Education is a planned and conscious effort to create an atmosphere for the learning process so that students can develop their potential in religion, control, intelligence, and noble character. According to Barlia (2008) in Afandi (2013: 100) explained that education can educate individuals who are responsive to developments in technology, skills, and maintain natural sustainability. So, it is very important for students to gain knowledge for the needs of themselves and others and to know the benefits of protecting the environment. As in science, we can preserve nature even better by experimenting and observing to find out the results of the surrounding environment. According to Hizbullah, S.Pd., M.Pd., Nurhayati Selvi, S.Pd., (2018) in Moh. Fahmi Nugraha, (2020: 18) Science is a series of concepts that are interrelated with other developed concept charts as a result of experiments and observations, which are useful for further experiment and observation.

Education will affect the total population because each individual requires extensive knowledge in his area to keep pace with the development of information and communication technology 4.0. Based on the data downloaded on Wednesday, 23 May 2023 at 20.30 WIB on *worldometers*. So Indonesia is ranked 3rd with a population of 273,523,615 based on the table below.

#	Country (or dependency)	Population (2020)	Yearly Change	Net Change	Density (P/Km²)	Land Area (Km²)	Migrants (net)	Fert. Rate	Med. Age	Urban Pop %	World Share
1	China	1,439,323,776	0.39 %	5,540,090	153	9,388,211	-348,399	1.7	38	61 %	18.47 %
2	India	1,380,004,385	0.99 %	13,586,631	464	2,973,190	-532,687	2.2	28	35 %	17.70 %
3	Indonesia	273,523,615	1.07 %	2,898,047	151	1,811,570	-98,955	2.3	30	56 %	3.51 %

Figure 1. Resident Population

Indonesia is the third Asian largest population. Then it will indirectly affect the environment occupied by these residents. Because the environment cannot be separated from human life, both the natural environment and the surrounding environment. In human life, obviously they require air and a place to do their daily activities. As explained by Kartini (Eriawati, 2017) the environment is anything that surrounds humans and influences human development, both directly and indirectly.

There are two components of the environments, namely the biotic and abiotic environments. In human life, the biotic and abiotic environments are very important and can influence the behavior and prosperity of humans and other living things. Lots of benefits from the environment for humans, including the biotic environment, such as plants. Plants can be used as a source of learning to develop human potential as a whole and optimally. Utilizing learning resources that are around us, such as plants, is very influential in various situations and conditions, as well as the health of the surrounding environment.

As living beings, apart from interacting with other humans, they also interact with living things and inanimate objects. These living things include animals and plants, and inanimate objects such as air, water and soil. Therefore, humans are one of the living things that play a very important role in the survival of other creatures by establishing relationships with living things and inanimate objects around them. Therefore, the nature of the environment is interconnected, independent and mutually influencing. If one of the ecosystems is disturbed, it will have an impact on the surrounding environment. As it has to do with the imbalance of ecosystems in the city of Jakarta and its surroundings. The supply of land for reforestation in DKI Jakarta and its surroundings has decreased and can no longer accommodate rainfall, therefore DKI Jakarta often experiences flash floods due to a lack of land to serve as land for reforestation (Siahaan, 2004).

Phenomenon that is currently happening, the number of natural disasters that occur in various directions such as flash floods, landslides, earthquakes and so forth. This is caused by human activity itself, such as rampant illegal logging and so on. Therefore, we as human beings are endowed with reason and mind, must love nature. The impact of loving nature, we can breathe fresh air, a comfortable and clean atmosphere so that it can make us fresh. In addition, the surrounding environment can be used as a learning resource that can provide knowledge to students. However, we still don't take advantage of the surrounding environment so that the implementation of the teaching and learning process is still not optimal and the quality of education has not been achieved as expected (Eriawati, 2017).

B. METHOD

This research was conducted at Muhammadiyah University of Tasikmalaya Jl. Tamansari No.KM 2,5, Mulyasari, Kec. Tamansari, Kab. Tasikmalaya, West Java 46196. Primary data collection was carried out using the quadratic method. The quadratic method is a method that uses sample plots, square, rectangular, and circle sample plots.

In this study, observations were made at 5 research location points, namely square 1 in front of the rector's building, square 2 in front of the Ahmad Dahlan mosque, square 3 in front of the skill lab, square 4 in front of the canteen and square 5 in front of the lecturer's room of mining Engineering. The results of the data that has been collected, processed and analyzed are as follows:

1. **Density**

Density is the number of individuals of each species found in a plot. The density of each species is calculated using the formula according to Odum, 1993 (Safitri et al., 2018) as follows:

   a. **Absolute Density (KM)**

$$KM = \frac{Number\ of\ a\ species}{Sample\ plot\ area}$$

b. Relative Density (KR)

$$KR = \frac{Absolute\ density\ of\ a\ species}{Total\ density\ of\ a\ species} \times 100\%$$

2. Frequency

Frequency is the number of occurrences of each species encountered from all plots. Species frequency can be calculated using the formula according to Odum, 1993 (Safitri et al., 2018) as follows:

a. Absolute Frequency (FM)

$$FM = \frac{The\ number\ of\ sample\ plots\ occupied\ by\ the\ species}{The\ number\ of\ sample\ plots}$$

b. Relative Frequency (FR)

$$FR = \frac{Absolute\ frequency\ of\ species\ 1}{Total\ frequency\ of\ all\ species} \times 100\%$$

3. Dominance

Dominance is the basal area of the tree in each species found in the plot. Dominance can be calculated using the formula according to Odum, 1993 (Safitri et al., 2018) as follows:

a. Absolute Dominance (DM)

$$DM = \frac{Total\ basal\ area\ of\ species\ 1}{The\ total\ are\ of\ sample\ plots}$$

b. Relative Dominance (DR)

$$DM = \frac{Absolute\ dominance\ of\ species\ 1}{Total\ dominance\ of\ all\ species} \times 100\%$$

4. Important Value Index (INP)

The importance value index indicates the species that predominate in the study area. To calculate INP, you can use the formula according to Odum, 1993 (Safitri et al., 2018) as follows:

INP = Relative density (%) + Relative frequency (%) + Relative dominance (%)

Fahrul (2007) in Hidayat (2018) assert that the category of Important Value Index (INP) is as follows:

Tabel 1. Categories of Important Value Index (IVI)

No	Score	Category
1.	> 42,66	High
2.	42,66 – 21,96	Middle
3.	< 21,96	Low

C. RESULTS AND DISCUSSION

The results show that in Muhammadiyah University of Tasikmalaya, there was found plant species, they are grasses and trees. So for the results of calculations with data that has been collected, processed and analyzed it show the following values:

Tabel 2. Plant Species on Muhammadiyah University of Tasikmalaya

Plot	No	Species Name	M	LBDS	Pi	KM	KR	FM	FR	DM	DR	INP
1	1	Cemara	2	3.14	1	0.5	0.00	0.2	0.03	0.03	0.03	0.06
	2	Rumput Gajah	2	3.14	500	250.0	0.40	0.2	0.03	0.03	0.03	0.46
	3	Pegagan	2	3.14	100	50.0	0.08	0.2	0.03	0.03	0.03	0.14
	4	Benalu	2	3.14	1	0.5	0.00	0.2	0.03	0.03	0.03	0.06
	5	Lumut	2	3.14	1	0.5	0.00	0.2	0.03	0.03	0.03	0.06
	Jumlah 5		10	15.70	603	301.5	0.49	1	0.14	0.14	0.14	0.77
2	6	Tanaman bungan Asoka	2	3.14	1	0.5	0.00	0.2	0.03	0.03	0.03	0.06
	7	Rumput hias (*Muidania loriformis*)	2	3.14	1	0.5	0.00	0.2	0.03	0.03	0.03	0.06
	8	Tanaman *Neoregelia cruenta*	2	3.14	5	2.5	0.00	0.2	0.03	0.03	0.03	0.06
	9	*Lactuca virosa*	2	3.14	1	0.5	0.00	0.2	0.03	0.03	0.03	0.06
	10	Tumpang Air	2	3.14	13	6.5	0.01	0.2	0.03	0.03	0.03	0.07
	11	Calingcing	2	3.14	2	1.0	0.00	0.2	0.03	0.03	0.03	0.06
	12	Rumput gajah	2	3.14	50	25.0	0.04	0.2	0.03	0.03	0.03	0.10
	13	Sintrong	2	3.14	1	0.5	0.00	0.2	0.03	0.03	0.03	0.06
	14	Meniran	2	3.14	15	7.5	0.01	0.2	0.03	0.03	0.03	0.07
	15	Tanaman paku	2	3.14	4	2.0	0.00	0.2	0.03	0.03	0.03	0.06
	16	Jonghe	2	3.14	4	2.0	0.00	0.2	0.03	0.03	0.03	0.06
	Total 11		22	34.54	97	48.50	0.08	2.20	0.31	0.31	0.31	0.71
3	17	Lumut Daun	2	3.14	50	25.0	0.04	0.2	0.03	0.03	0.03	0.10
	18	Sisik Naga	2	3.14	50	25.0	0.04	0.2	0.03	0.03	0.03	0.10
	19	Palm	2	3.14	11	5.5	0.01	0.2	0.03	0.03	0.03	0.07
	20	Jambu	2	3.14	1	0.5	0.00	0.2	0.03	0.03	0.03	0.06
	21	Gulma Katumpangan	2	3.14	70	35.0	0.06	0.2	0.03	0.03	0.03	0.11
	22	Hias Adam Hawa	2	3.14	70	35.0	0.06	0.2	0.03	0.03	0.03	0.11
	23	Rumput Liar	2	3.14	50	25.0	0.04	0.2	0.03	0.03	0.03	0.10

	No	Species										
	24	Selada Air	2	3.14	50	25.0	0.04	0.2	0.03	0.03	0.03	0.10
	Total 8		**16**	**25.12**	**352**	**176**	**0.28**	**1.6**	**0.23**	**0.23**	**0.23**	**0.74**
4	25	*Japanesh Rush*	2	3.14	1	0.5	0.00	0.2	0.03	0.03	0.03	0.06
	26	Pepaya	2	3.14	5	2.5	0.00	0.2	0.03	0.03	0.03	0.06
	27	Tumbuhan Paku	2	3.14	2	1.0	0.00	0.2	0.03	0.03	0.03	0.06
	28	*Boehmeria*	2	3.14	1	0.5	0.00	0.2	0.03	0.03	0.03	0.06
	29	Tumpang Air	2	3.14	1	0.5	0.00	0.2	0.03	0.03	0.03	0.06
	Total 5		**10**	**15.70**	**10**	**5**	**0.01**	**1**	**0.14**	**0.14**	**0.14**	**0.29**
5	30	Pohon *Veltchi*	2	3.14	20	10.0	0.02	0.2	0.03	0.03	0.03	0.07
	31	Pohon Daun Afrika	2	3.14	1	0.5	0.00	0.2	0.03	0.03	0.03	0.06
	32	Pohon Mondok Kaki	2	3.14	1	0.5	0.00	0.2	0.03	0.03	0.03	0.06
	33	Pohon *Curcuma caesia*	2	3.14	5	2.5	0.00	0.2	0.03	0.03	0.03	0.06
	35	Pohon Mangga	2	3.14	1	0.5	0.00	0.2	0.03	0.03	0.03	0.06
	36	Rumput	2	3.14	150	75.0	0.12	0.2	0.03	0.03	0.03	0.18
	Total 6		**12**	**18.84**	**178**	**89**	**0.14**	**1.2**	**0.17**	**0.17**	**0.17**	**0.49**
	Total 36		**70**	**109.90**	**1240**	**620**	**1**	**7.00**	**1**	**1**	**1**	**3.00**

Based on the results of Table 1. shows that there are 36 species with a total number of individuals of 70 spread over 5 research location points, namely square 1 in front of the rectorate building, square 2 in front of the Ahmad Dahlan Mosque, square 3 in front of the skill lab, square 4 in front of the canteen, and square 5 in front of the lecturer's room of Mining Engineering. From these 5 points, new species can be found, ranging from grass to similar trees, and the absolute density results are 620 and a relative density is 1, the results for an absolute frequency are 7.00 and a relative frequency is 1, the results for absolute dominance is 1 and relative dominance is 1. So for the results of the important value index (IVI) with a total of 3.00 because the IVI is a plant species from a community, which is one of the parameters to show the role of plant species from a place in adapting to habitat conditions in its environment.

D. CONCLUSION

Based on the results of the research conducted in Muhammadiyah University of Tasikmalaya, it showed that there were 36 species of biotic ecosystem with a total of 70 individuals spread over 5 points, namely in front of the rector's building, in front of the Ahmad Dahlan Mosque, in front of the skills lab, in front of the canteen, and in front of the lecturer's room of Mining Engineering. However, these 5 points produce a relative density of 1, relative frequency of 1, relative dominance of 1, and the results of the important value index (INP) produce a total of 3.00 in the low category, due to the lack of reforestation activities and awareness from humans to preserve the surrounding environment. So to rectify this, the green area in Muhammadiyah University of Tasikmalaya should be expanded again by adding green space, cultivating some plants, preserving the environment, and adding several parks to support a comfortable learning atmosphere.

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