Diversity Of Avicennia Mangrove Plants In Pematang Kuala Village, Dusun V In The Making Of Acrylic Herbarium

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Abstract

This study aims to obtain data on the diversity of Avicennia mangrove plants and to determine the physical conditions of the mangrove forest environment including; salinity, pH, substrate, and temperature of Pematang Kuala Village, Hamlet V for the manufacture of Acrylic Herbarium. The population in this study was all Avicennia genus plants in the mangrove forest area of Pematang Kuala Village, Hamlet V. The sample in this study was the mangrove plant species Avicenniaobtained at each observation station of the Mangrove Forest in Pematang Kuala Village, Hamlet V, data was collected using the exploratory survey method with the purposive sampling technique and divided into three research stations, at each station two research plots were created. Research Results of Avicennia Mangrove Growth Diversity Data in Pematang Kuala Village, Hamlet V, there are 3 (three) species, namely; Avicennia marina, Avicennia alba, Avicennia lanata. and Measurement of physical factors ranges between 30.6o C - 30.8° C, pH ranges between 5.0 - 6.0. Salinity ranges between 21 ppt - 26 ppt and the substrate is mud, Sandy mud, Sandy Soil Mud. The type of Mangrove that dominates in the Mangrove Forest area of Pematang Kuala Village, Hamlet V is the Avicennia marina plant with the Diversity Index Value (H') of Mangrove Vegetation Station I, namely: 0.3128, Station II, namely 0.4428, Station III, namely: 0.3912 obtained a low category value.

INTRODUCTION

Mangrove is a forest area that grows in estuary areas, intertidal zones or coastal areas. According to (Novianty et al, 2004), mangrove is one type of forest ecosystem found in the intertidal zone near the coast and small islands, and has the potential as a natural resource. Mangrove is also an area that has quite high economic and ecological value, but if it is not maintained, preserved, and controlled, the mangrove will be easily damaged. Ecologically, mangrove forests include protecting coastal areas and small islands, reducing coastal abrasion and seawater intrusion, maintaining the existence of marine animal species and vegetation, and can function as a buffer for sedimentation, while in economic terms, mangrove forests function as providers of various types of raw materials for human needs in production, such as wood, charcoal, food, cosmetics, dyes, and tanneries, sources of animal feed and bees(Yuliarsana et al, 2000).

The condition of the mangrove ecosystem is contained in the Presidential Regulation of the Republic of Indonesia. No. 73 of 2012 states that coastal wetland resources and life support systems and natural resources are of very high value, therefore it is necessary to make efforts to protect, preserve and utilize them sustainably for the welfare of the community. Indonesia has 3,112,989 Ha, mangrove forests, and mangrove forests in Indonesia include 22% of the total area of mangrove forests in the world, although mangrove forests in Indonesia are included in the broad condition of the ecosystem, mangrove forests in Indonesia are quite concerning(Syamsu et al., 2018). Pematang Kuala Village, Teluk Mengkudu District, Serdang Bedagai Regency has 5 hamlets with a population of 3016 people. Most of the people's livelihoods in Pematang Kuala Village are as food crop farmers or as plantation

laborers/employees and also fishermen catching fish at sea. Pematang Kuala Village, Teluk Mengkudu District, Serdang Bedagai Regency has an area of 10.6 km2 (Teluk Mesangkudu District in Figures, BPS Serdang Bedagai, 2022), located on the coordinate line 3o30'40 ".41N 99o11'1.89" E and is a lowland area with an altitude of +3m above sea level. The seasonal conditions in Pematang Kuala Village are generally the same as other coastal areas of North Sumatra Province along the Malacca Strait, namely the most common seasons are the dry and rainy seasons.

The hamlet that has a mangrove forest with mangrove plants that are still preserved such as the Avicennia Genus Plant is located in Hamlet V, Pematang Kuala Village, Teluk Mengkudu District, Serdang Bedagai Regency, which has a Mangrove Forest area in Hamlet V of 54 hectares and the Avicennia Genus plant has an area of 30 hectares which is located on the coast. The seasonal conditions in Pematang Kuala Village are generally the same as the coastal areas of North Sumatra Province in the Malacca Strait. The most common seasons are the dry and rainy seasons.

Environmental conditions of mangrove forests include physical and chemical factors. Physical properties such as: tides, soil texture. Chemical properties such as: water temperature, climate, humidity, salinity, Plants that are abundant in the coastal mangrove area of Pematang Kuala Village, Hamlet V are fire plants (Genus Avicennia). Fire plants in the community have a role and benefit as a buffer for the mangrove zone, especially on the coast. Avicennia is a genus that has a high tolerance to salinity when compared to others. Avicennia can grow at salinities approaching freshwater up to 90%. The areas closest to the sea or in open mangrove zones are often overgrown with Avicennia with a rather sandy substrate type.(Rahmania et al., 2019).

Mangrove vegetation is a system that always develops according to the conditions of its habitat. Mangrove vegetation specifically shows a zonation pattern. This is closely related to the type of soil (mud, sandy, or peat), openness (to wave action), salinity and the influence of sea tides (Safrin, 2013).

Diversity is a term that includes all forms of life in the form of genes, plant species, animals, and microorganisms as well as ecosystems and ecological processes (Endawati, 2005 in Sutoyo, 2010). Diversity is the total number of species in an area as the number of species or the total number of individuals and species in a community (Ratnasari, 2015).

The reason for calculating the diversity of mangrove plants of the Avicennia genus is to find out the diversity of mangrove plant species and to help in efforts to preserve biodiversity so that the ecosystem is well maintained. Then, the diversity of mangrove plants can be an indicator of the health of coastal ecosystems, and high diversity indicates a stable and healthy ecosystem, by understanding the diversity of mangrove plants of the Avicennia genus, we can make better decisions for conservation and management of ecosystems.

The diversity found in the Mangrove Forest of Pematang Kuala Village,Hamlet V is the Avicennia Genus. The benefit of calculating the diversity of mangrove plants of the Avicennia Genus is to find out how many Avicennia species are found in the Pematang Kuala Village area, Hamlet V for Making Acrylic Herbarium.

METHODS

This research was conducted in the Mangrove Coastal Area of Pematang Kuala Village, Hamlet V, Teluk Mengkudu District, Serdang Bedagai Regency, North Sumatra Province, which has a mangrove forest area of 54 ha, including 30 ha of Avicennia plants along the coast, and a total village area of 10.6 km² located 76 km from Medan City. Sample identification was further carried out in the Biology Laboratory, Faculty of Teacher Training and Education, Islamic University of North Sumatra, located on Sisingamangaraja Street, Teladan Village, Medan City. The research lasted for three months, from March to July 2024. The population in this study

consisted of all Avicennia genus plants found in the mangrove coastal area of Pematang Kuala Village, while the samples were the Avicennia species identified at each observation station. This study used an exploratory descriptive method, aiming to describe the condition of a phenomenon without testing a specific hypothesis but rather to present variables and conditions as they are (Arikunto, 2002). Data collection was conducted using a purposive sampling technique with 5×5 m² plots spaced 10 m apart, and the data obtained were analyzed quantitatively, with the results later arranged into an acrylic herbarium. Prior to data collection, coordinate points were determined using a GPS device, after which data on the diversity of Avicennia mangrove plants were collected at each observation station during low tide, from 13.00 to 17.00 WIB, in the Mangrove Coastal Area of Dusun V, Pematang Kuala Village, Teluk Mengkudu District, Serdang Bedagai Regency.

RESULTS AND DISCUSSION

Research Results

1. Description of Research Data

Based on the results of measurements of environmental conditions and mangrove vegetation carried out in Hamlet V, Pematang Kuala Village, Teluk Mengkudu District, Serdang Bedagai Regency, North Sumatra, which were obtained at the observation station, the author obtained the following data:

Table 1.1 Table of Results of Measurement of Physical and Chemical Parameters of Avicennia Mangrove Vegetation in Pematang Kuala Village, DusunV

No	Parameters	Station		
		I	II	III
	Physics			
1.	Temperature (oC)	30.7	30.8	30.6
2.	Substrat	Sandy mud	Pure mud	Sandy soil mud
	Chemistry			
3.	PH	5.5	6.0	5.0
4.	Salinity (0/00)	24 ppm	26 ppm	21 ppm

Results of Measurement of Physical and Chemical Parameters of Avicennia Mangrove Vegetation in Pematang Kuala Village, DusunV is:

Temperature (oC)

The results of temperature observations conducted at the three observation stations during the study obtained a temperature of around 30.6 oC - 30.8 oC. The temperature conditions in the Mangrove ecosystem obtained during the study were slightly less than optimal with the temperature of mangrove life, but they can tolerate higher temperatures but cause stress if the temperature consistently exceeds the range of mangrove life temperatures or drops far below it.

Degree of Acidity (pH)

Based on pH meter measurements at the research location, the average soil pH in Pematang Kuala Village, Dusun V, Teluk Mengkudu District is 5.0 - 6.0. This shows that the research area is not optimal, because the acidity level (pH) greatly affects the biochemical

Process of water. According to (Wantasen, 2013) the pH value greatly affects the biochemical process, for example the nitrification process will end at a low pH. If the pH drops, then among others; decreased dissolved oxygen, decreased oxygen consumption, and if the pH drops, there will be a decrease in dissolved oxygen, decreased oxygen consumption, and

increased respiratory activity. The tolerance range is around 6.0-9.0 and the optimal pH is around 7.0 - 8.5. Water salinity and seepage soil salinity are important factors in the growth, resistance, and zones of mangrove species.

Salinity

Based on the results of salinity measurements at station I located in the mangrove forest area near the pond, which is 24 ppm, station II is located in the natural coastal mangrove forest area, which is 26 ppm, and station III is located in the mangrove forest near the residential area, which is 21 ppm. This shows that the location is very good for the growth of Avicennia mangroves. Mangrove plants that grow well on the coast with a salinity of 10 ppm - 30 ppm.

Substrat

From the observation results, the substrate at station I, located in the mangrove forest area near the pond, is sandy mud, at station II, located in the natural mangrove forest area on the coast, it is pure mud, and at station III, located in the mangrove forest area near residential areas, it is sandy mud. From these results it can be seen that many mangrove plants are found on mud substrates. According to (Ghufran et al., 2012) The substrate on a beach influences mangrove growth.

Table 1.2 of Avicennia Mangrove Plant Species Found in the Mangrove Forest Area of Pematang Kuala Village, DusunV, Consisting of 3 Avicennia Species

No	Species	Station I		Jlh	Station II		Jlh	Station III		Jlh
		1	2		1	2		1	2	
1.	*Avicennia marina*	7	11	18	17	13	30	38	34	72
2.	*Avicennia alba*	6	7	13	10	3	13	5	6	11
3.	*Avicennia lanata*	-	-	-	7	7	14	18	26	14
Total number of species		**13**	**18**	**31**	**34**	**23**	**57**	**61**	**66**	**127**
Number of Species Types		**2**	**2**	**2**	**3**	**3**	**3**	**3**	**3**	**3**

Based on the table above, it can be seen that the type of Avicennia mangrove plant found in the Mangrove Forest area of Pematang Kuala Village, Dusun V, Teluk Mengkudu District, Serdang Bedagai Regency. Based on the results of the study, 3 species of Avicennia Mangrove Plants were found, namely: Avicennia marina (White Api- api), Avicennia alba (Boak Api-api), and Avicennia lanata.

Based on the research results, at station I which is located in the mangrove forest area near the pond, there are 2 species with a total of 31 individuals, including 18 individuals of Avicennia marina and 13 individuals of Avicennia alba.

At station II, located in the coastal natural mangrove forest area, there are 3 species with a total of 57 individuals, including 30 individuals of Avicennia marina, 13 individuals of Avicennia alba, and 14 individuals of Avicennia lanata.

At station III located in the mangrove forest area near residential areas, there are 3 species with a total of 127 individuals, including 72 individuals of Avicennia marina, 11 individuals of Avicennia alba, and 44 individuals of Avicennia lanata.

From 3The stations with the highest number of species and individuals were found at Station III in the mangrove forest area near residential areas and Station II in the coastal natural mangrove forest area, while the lowest was found at Station I in the mangrove forest area near the pond. The types of Avicennia Mangrove Plants above can be found at the research location,

but not all of them were found completely at each observation station.

Based on the level of vegetation diversity of the mangrove forest, Avicennia plants found at each observation station in the mangrove forest of Pematang Kuala Village, Dusun V, Teluk Mengkudu District, Serdang Bedagai Regency, from the results of the calculation of Relative Density (KR) and Relative Frequency (FR) of each species, as seen in the table below:

Table 1.3 Relative Density (KR) and Relative Frequency (FR) Values of Avicennia Mangrove Vegetation in Pematang Kuala Village, Dusun V

No	Species	Station I			Station II			Station III		
		FM	KR (0/0)	FR (0/0)	FM	KR (0/0)	FR (0/0)	FM	KR (0/0)	FR (0/0)
1.	*Avicennia marina*	2	58.06	50	2	52.63	33.33	2	56.69	33.33
2.	*Avicennia alba*	2	41.93	50	2	22.81	33.33	2	8.66	33.33
3.	*Avicennia lanata*	-	-	-	2	24.56	33.33	2	34.64	33.33
Total		**4**	**99.99**	**100**	**6**	**100**	**99.99**	**6**	**99.99**	**99.99**

Based on the level of sub-diversity of mangrove forest vegetation of Avicennia plants found at each observation station in the mangrove forest of Pematang Kuala Village, Dusun V, from the results of the calculation of Relative Density (KR) and Relative Frequency (FR) of each species seen in the Relative Density (KR) Value table, namely:

At station I located in the mangrove forest area near the pond of Pematang Kuala Village, Hamlet V, namely; Avicennia marina species 58.06%, Avicennia alba 41.93%, Avicennia lanata 0%. Thus, the species with the highest density value at this station is Avicennia marina. At Station I, Avicennia Mangrove Plants obtained a total Relative Density Value (KR) of 99.99%. On Station II located in the natural mangrove forest area of the coast of Pematang Kuala Village, Hamlet V, namely: Avicennia marina species 52.63%, Avicennia alba 22.81%, and Avicennia lanata 24.56%. Thus, the species with the highest density value at this station is Avicennia marina. At Station II, Avicennia Mangrove Plants obtained a total Relative Density Value (KR) of 100%

OnStation III located in the mangrove forest area near the settlement of Pematang Kuala Village, Hamlet V, namely the Avicennia marina Species 56.69%, Avicennia alba 8.66%, and Avicennia lanata 34.64%. Thus, the Species with the highest Density Value at this station is Avicennia marina. At Station III Avicennia Mangrove Plants, the total Relative Density Value (KR) was 99.99%

The total density value shows that station II has the highest Relative Density Value (KR), at 100% and Station I and station III have the same Total Relative Density Value, at 99.99%. Furthermore, to see the distribution of Avicennia plants in the mangrove forest area of Pematang Kuala Village, the Relative Frequency Value (FR) was obtained at station I located in the mangrove forest area near the pond of Pematang Kuala Village, Hamlet V, namely; Avicennia marina species 50%, Avicennia alba 50%, and Avicennia lanata 0%. Thus, the species with the highest distribution value at this station are Avicennia marina and Avicennia alba. found at Station I Avicennia Mangrove Plants, the Total Relative Frequency Value (FR) is 100%

OnStation II located in the coastal natural mangrove forest area of Pematang Kuala Village, Hamlet V, namely; Avicennia marina species 33.33%, Avicennia alba 33.33%, and Avicennia lanata 33.33%. Thus, the species with the highest distribution value at this station is Sama. found at Station II Avicennia Mangrove Plants, the Total Relative Frequency Value (FR) is 99.99%. OnStation III located in the mangrove forest area near the settlement of Pematang Kuala Village, Hamlet V, namely; Avicennia marina species 33.33%, Avicennia alba 33.33%, and Avicennia lanata 33.33%. Thus, the species with the highest distribution value at this station

is Sama. found at Station III Avicennia Mangrove Plants, the Total Relative Frequency Value (FR) is 99.99%. The Total Distribution Value shows that station I has the highest Relative Frequency (FR) Value of 100% and Station II and station III have the lowest Relative Frequency Value with the same total value of 99.99%.

Table 1.4 of Important Value Index (INP) of Avicennia Mangrove Plants in Pematang Kuala Village, Dusun V

No	Species	Station		
		I	**II**	**III**
1.	*Avicennia marina*	108.06	85.96	90.02
2.	*Avicennia alba*	91.93	56.14	41.99
3.	*Avicennia lanata*	-	57.89	67.97
	Number of Species	**2**	**3**	**3**
	Importance Value Index	**199.99**	**199.99**	**199.98**

Based on the table above, the Importance Value Index (IVI) at station I located in the mangrove forest area near the ponds of Pematang Kuala Village, Hamlet V obtained an Importance Value Index (IVI) of 199.99. At station II located in the natural mangrove forest area on the coast of Pematang Kuala Village, Hamlet V, obtained an Importance Value Index (IVI) of 199.99. and at station III located in the mangrove forest area near the settlements of

Pematang Kuala Village, Hamlet V, obtained an Importance Value Index (IVI) of 199.98. Based on the Important Value Index (INP), it shows that station III has the lowest Important Value Index (INP), which is 199.98, and stations II and III show the highest Important Value Index (INP) with the same number of Important Value Index (INP), which is 199.99.

Table 1.5 Diversity Index Values (H') of Avicennia Mangrove Plants in Pematang Kuala Village, Hamlet V, Teluk Mengkudu District, Serdang Bedagai Regency

No	Species	Station		
		I	**II**	**III**
1.	*Avicennia marina*	0.1370	0.1467	0.1397
2.	*Avicennia alba*	0.1758	0.1464	0.0920
3.	*Avicennia lanata*	-	0.1497	0.1595
	Number of Species	**2**	**3**	**3**
	Diversity Index	**0.3128**	**0.4428**	**0.3912**

Based on the level of diversity, the Diversity Index value at station I located in the mangrove forest area near the ponds of Pematang Kuala Village, Hamlet V obtained a Diversity Index of 0.3128, at station II located in the natural mangrove forest area on the coast of Pematang Kuala Village, Hamlet V obtained a Diversity Index of 0.4428, and at station III located in the mangrove forest area near the settlements of Pematang Kuala Village, Hamlet obtained a Diversity Index of 0.3912.

ResultsThe diversity index research shows that station II has the highest diversity index value of 0.4428 and station I has the lowest diversity index value of 0.3128.

Table 1.6 Dominance Index Table (C) of Avicennia Mangrove Plants in Pematang Kuala Village, Hamlet V

No	Species	Station		
		I	**II**	**III**
1.	*Avicennia marina*	0.3371	0.2770	0.3214
2.	*Avicennia alba*	0.1758	0.0520	0.0075

3.	*Avicennia lanata*	-	0.0603	0.1199
	Number of Species	**2**	**3**	**3**
	Dominance Index	**0.5129**	**0.3893**	**0.4488**

Based on the table above, the dominance index of Avicennia mangrove plants found in Pematang Kuala Village, Hamlet V, Teluk Mengkudu District at each observation station. At station I located in the mangrove forest area near the pond of Pematang Kuala Village, Hamlet V, the Dominance Index Value was 0.5129, at station II located in the natural mangrove forest area on the coast of Pematang Kuala Village, Hamlet V, the Dominance Index Value was 0.3893 and at station III located in the mangrove forest area near the settlement of Pematang Kuala Village, Hamlet V, the Dominance Index Value was 0.4488.
Based on the research results, the Dominance Index Value at observation station I was dominated by Avicennia marina as much as 0.3371, at Station II it was dominated by Avicennia marina as much as 0.2770, and at Station III it was dominated by Avicennia marina as much as 0.3214.

Discussion

Identification of Mangrove Plant Species Avicennia

From the results of research conducted in the mangrove forest area of Pematang Kuala Village, Hamlet V, Teluk Mengkudu District, Serdang Bedagai Regency, 3 (three) species of Avicennia plants were found at the research location, namely: Avicennia marina, Avicennia alba, and Avicennia lanata.
The dominant species found at station III located in the mangrove forest area near residential areas as many as 127 species, at station II located in the coastal natural mangrove forest area as many as 57 species, and at station I located in the mangrove forest area near the pond as many as 31 species. From this value it can be seen that station III has the highest number of individuals with 127 species obtained and station I has the least number of individuals obtained as many as 31 species. This is because at station I is a mangrove forest that is close to the pond making it one of the ways for community activities, especially fishermen to go to sea and this station is also overgrown with plants that are far apart. This is one of the unstable mangrove ecosystems that do not support the regeneration process.
According to (Huda, 2008) Damage to the mangrove forest ecosystem is a change that occurs in coastal areas in general influenced by human activities around it. This pressure arises due to trading activities because coastal areas are most vulnerable to natural and physical changes so that there is a decrease in environmental quality, one of which is the mangrove ecosystem. Based on the results of field research, researchers found damage in the mangrove forest area caused by natural factors in Pematang Kuala Village, Hamlet V, Teluk Mengkudu District, reduced due to abrasion which caused damage to mangrove forest stands due to conservation and resulted from ocean currents, sedimentation and tides. While the damage to mangrove forests caused by human factors in Pematang Kuala Village, Hamlet V, Teluk Mengkudu District, Serdang Bedagai Regency is mostly caused by human activities. From the researcher's observations, the damage to mangrove forests is caused by the conversion of mangrove forest land into fish ponds, tree felling, local community roads for fishermen to the sea and the lack of community concern for mangrove plants.
While Station III is a mangrove forest close to residential areas, with dense plants that are not spaced apart, because the station located near residential areas is not at all a local resident's road route, but this station has a land that is maintained and cared for. According to (Ghufran et al., 2012) the soil on a beach affects mangrove growth. Clay and sand types. Clay is a supporting factor for the regeneration process where clay particles in the form of mud will catch the fallen mangrove fruit. When ripe, this process greatly affects the density of mangroves in an area.
Thus, the dominant Avicennia plant species in Pematang Kuala Village, Dusun V, Teluk

Mengkudu District at each Station is the Avicennia marina plant. Where at Station I is located in a mangrove forest area near a pond with 18 Avicennia marina. At Station II, it is located in a natural coastal mangrove forest area with 30 Avicennia marina. And at Station III, it is located in a mangrove forest area near a residential area with 72 Avicennia marina. This is due to physical and chemical factors that affect the growth requirements of Avicennia plants.

Relative Density (KR) and Relative Frequency (FR) of Avicennia Mangrove Plants

Based on the research that has been conducted, the relative density value (KR) of mangrove at station I located in the mangrove forest area near the pond obtained a Total Relative Density Value of 99.99%. At station II located in the coastal natural mangrove forest area, the Total Relative Density Value was 100%, and at station III located in the mangrove forest area near the residential area, the Total Relative Density Value was 99.99%. The highest total relative density value (KR) is found at station II at 100%, and the lowest relative density value (KR) is found at stations I and II with the same amount of 99.99%. This is because the mangrove plants are not dense at the research location which makes the number of species small.

The relative frequency (FR) at station I located in the mangrove forest area near the pond obtained a total relative frequency value of 100%, station II located in the coastal natural mangrove forest area obtained a total relative frequency value of 99.99%. And at station III located in the mangrove forest area near the residential area obtained a total relative frequency value of 99.99%. Total ValueThe highest relative frequency (FR) found at the research location in Pematang Kuala Village, Dusun V was at station I obtaining (FR) 100%. And the lowest total relative frequency value was at stations II and III obtaining (FR) 99.99%.

Importance Value Index (IVI) of Avicennia Mangrove Plants in Location Study

MarkThe highest important value index (INP) at station I is located in the mangrove forest near the pond, namely Avicennia marina at 108.06. The highest value (INP) at station II is located in the natural coastal mangrove forest, namely in the Avicennia marina species at 85.96. While the highest value (INP) at station III is located in the residential mangrove forest, namely in the Avicennia marina species with an INP value index of 90.02.

Diversity Index Value (H') of Avicennia Mangrove Plants in Pematang Kuala Village, Hamlet V

The Diversity Index (H') in the study conducted in Pematang Kuala Village, Dusun V, Teluk Mengkudu District, obtained category values at station I located in the mangrove forest area near the pond, namely 0.3128, at station II located in the natural coastal mangrove forest area, namely 0.4428, and at station III located in the mangrove forest area near residential areas, namely 0.3912.

The Diversity Index (H') value in the study conducted in Pematang Kuala Village, Dusun V, Teluk Mengkudu District, obtained the highest value at Station II located in the coastal natural mangrove forest area of 0.4428. and the lowest was at Station I located in the mangrove forest area near the pond of 0.3128.

Total ValueThe Diversity Index (H') illustrates that at each station of 0.3128 - 0.4428 with the Diversity Index (H') of each observation station is classified as low. This is in accordance with the statement of Shanon winner, where if the diversity index (H' < 1 = classified as low), if the diversity index (1 < H' < 3 = classified as moderate), and if the diversity index (H' > 3 = classified as high).

Dominance Index (C) of Avicennia Mangrove Plants in Pematang Kuala Village, Hamlet V

The Mark Dominance Index (C) at Station I, located in the mangrove forest area near the pond, was 0.5129; at Station II, located in the natural coastal mangrove forest area, it was 0.3893; and at Station III, located in the mangrove forest area near the residential area, it was 0.4488. Based on these results, all stations are categorized as "no single species dominating." The highest dominance index was recorded at Station I (0.5129), while the lowest was observed at Station II (0.3893). This finding is consistent with Yona (2002), who stated that the dominance index (C) indicates the presence or absence of species dominance in a community. All three stations showed a low dominance index (C), indicating that the aquatic environment is stable. This is in line with Anggelia et al. (2019), who stated that the higher the dominance index value at a station — meaning one species dominates over others — the more unstable the waters become. Conversely, a lower dominance index value indicates that the aquatic ecosystem is more stable. Therefore, the dominance index can be used as an indicator to assess species richness within a community and the balance of individual numbers among species.

CONCLUSION

This study revealed that the diversity level of Avicennia mangrove species in the coastal area of Pematang Kuala Village, Hamlet V, Teluk Mengkudu District, Serdang Bedagai Regency, is categorized as low, with a diversity index (H') ranging from 0.3128 to 0.4428. Station II, located in a natural mangrove forest area near the coastline, exhibited the highest diversity index (0.4428), while Station I, located near the pond area, recorded the lowest value (0.3128). The study also identified three main species of the Avicennia genus, namely Avicennia marina, Avicennia alba, and Avicennia lanata, with varying numbers of individuals at each observation site. These findings indicate that environmental conditions, the degree of disturbance, and proximity to human activities significantly influence the mangrove community structure in the study area. Furthermore, the results of this research hold practical value as an environment-based learning resource, particularly through the development of educational media in the form of acrylic herbariums, which can enhance understanding and awareness of the importance of mangrove ecosystem conservation.

ACKNOWLEGMENT

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REFERENCES

Anggelia, N., Putri, D. S., & Rahmawati, F. (2019). Analysis of dominance index as an indicator of aquatic community stability. Journal of Aquatic Ecology and Environmental Science, 8(2), 115–123.

Arikunto, S 2002. Research Methodology: A Proposal Approach. Jakarta: PT. Rineka Cipta.

Ghufran, M., & Kodi, KM (2012). Mangrove Ecosystem: Potential, Function, and Management. Rineka Cipta.

Huda, N. 2011. Sustainable mangrove management policy strategy in the coastal area of Tanjung Jagung Timur Regency, Jambi. (Thesis). Semarang, Diponegoro University.109.

Novianty, R., Sastrawibawa, S., & Prihadi, DJ (2004). Identification of damage and rehabilitation efforts for mangrove ecosystems on the north coast of Subang Regency. Unpad Journal, 1(1), 1–9.

Rahmania, R., Sunarni, S., Maturbongs, M., & Arifin, T. (2019). Zoning and structure of mangrove communities, on the coast of Merauke Regency. National Marine Journal, 14. https://doi.org/10.15578/jkn.v14i3.7961.

Shilpi JA, Islam ME, Billah M, Islam KM, Sabrin F, Uddin SJ, Nahar L, Sarker SD.2012. Antinociceptive, anti-inflammatory and antipyretic activities of mangrove plants, a mini review. Advan Pharmac. Sci. 2012:1–7. Simlai A, Roy A.2013. Biological activities and chemical concentration profile of some mangrove species from Sundarban estuary. Rev. Pharmacogn 7:170–178.

Smith, R.L. and Smith, T.M. (2001). Ecology and Field Biology.

Yuliarsana, N., & T. Danisworo. (2000). Rehabilitation of Mangrove Forested Coasts, in Proceedings of the National Seminar on Management of Coastal Ecosystems and Small IslSands in the Context of an Archipelagic State. Faculty of Geography, Gadjah Mada University.

Yona, P. (2002). Community structure and species dominance in aquatic ecosystems. Indonesian Journal of Marine and Aquatic Sciences, 5(1), 45–52.