RUMPHIUS PATTIMURA BIOLOGICAL JOURNAL
2022, 4 (2): 62-66
E-ISSN: 2684-804X

DIVERSITY PHENETICS OF TYPES SEAGRASS IN VILLAGE POKA BEACH MALUKU BASED ON MORPHOMETRICS

Chalvin Salmon Siahaya[1*], Prelly Marsell Jolanda Tuapattinaya [1], Stevin Melay[1]

[1]Department of Biology Education, Universitas Pattimura. Jl. Ir. M. Putuhena, Ambon 97233, Indonesia

**Corresponding Author*: calvin@gmail.com

Received: 1 Mey 2021 Accepted: 1 September 2022 Published: 25 September 2022

ABSTRACT

This research aims to determine the phenetic diversity of seagrass species in the coastal waters of Poka Village based on morphometrics. This research is a type of descriptive research, in which morphometric measurements are carried out to determine the phenetic diversity of seagrass species. Meanwhile, for kinship relationships between seagrasses. Software is used past 4.0. The results of this research were that four types of seagrass were found, namely *Thalasssia hemprichii*, *Enhalus acoroides*, *Halophila pinifolia* and *Halophila ovalis*. This indicates that the Poka Village beach has a high phenetic diversity of seagrass species with varying morphometrics for each character and type, which is influenced by the type of substrate and environmental parameters. Seagrasses that are closely related, namely, *Thalasssia hemprichii* and *Enhalus acoroides* are in one monophyletic group (ingroup) and are very closely related. Likewise with *Halodule pinifolia* and *Halophila ovalis.*

Keywords: *diversity, phenetic, seagrass, morphometric.*

To cite this article:
Siahaya, C.S., Tuapattinaya, P.M.J., Melay, S. 2022. Diversity phenetics of types seagrass in village poka beach maluku based on morphometrics. *Rumphius Pattimura Biological Journal*. 4 (2), 62-66. *DOI:* https://doi.org/10.30598/rumphiusv4i2p062-066

INTRODUCTION

Seagrass beds, mangroves and coral reefs are the components of coastal aquatic ecosystems. The units that make up the coastal ecosystem can produce economic value, namely they can produce certain goods and services for the community (Oktawati et al., 2018). Substrate conditions and sedimentation in a body of water greatly influence the presence of seagrass species. The characteristics of the types of seagrass that appear will always be inherited, resulting in variations in the same type of seagrass, however grows in different water locations which is characterized by high heterozygosity in the species (Pharmawati, 2015). Information regarding the phenetic diversity of seagrass species in the coastal waters of Ambon Island is still relatively minimal and has never been reported based on morphometrics and meristics, so this research is important to carry out. Apart from that, it's minimal Information about seagrass phenetic diversity can be an indirect limiting factor for seagrass resource management in general. Basic information regarding seagrass morphometrics and meristics can be the basis for identifying seagrass species in Ambon Island waters (Rachmawati, 2009).

Morphometrics is a measurement of an object or organism which aims to determine the quantitative shape (morphology) of an organism, while meristics is a calculation of the number of parts of an organism (Putri et al., 2017). Morphometric and meristic studies can be used to determine genetic diversity because

the traits and appearances that are measured will be inherited. Research on phenetic diversity based on morphometrics and meristics is the first step to finding out genetic information, namely traits that appear morphologically (Safitri et al., 2017). Morphometrics and meristics can provide an indication of the state of seagrass and the surrounding environment (Cobaco et al., 2019). Therefore, morphometric study data and seagrass meristics are very important in efforts to manage seagrass resources in the coastal waters of Ambon Island.

Phenoetic diversity is a classification of the overall taxa equation. Phenoetic characters include morphological diversity in terms of shape, size and fruit color (Sulistyaningsih, (2013). The diversity of seagrass in tropical waters is very high, especially in the Indo-Pacific region, it is known that there are up to 14 species of seagrass in one ecosystem (El Shaffai, 2011). Morphometrics can be defined as a method in which morphological characters are described through measurements and calculations (Makhzuni, 2013). Morphometrics is considered the easiest method for specimen identification which is referred to as systematic morphology (Langer, 2013). Morphometric measurements can confirm the type of species (Hazarika, 2011). Morphological characters can help in identifying genus and species (Negi, 2010). The benefit of morphometrics is that it is easier to determine a plant based on its special characteristics, so that adequate morphometric data can be obtained by selecting species that are considered to have established morphological characters (Haryono, 2001). Seagrass morphometrics is a description from a research station that can show the condition of the seagrass and its surrounding environment (Cobaco, 2009). Most types of seagrass are found on sand substrates because the sediment grains of the substrate are smaller. The same type of seagrass can grow in different habitats showing different growth and groups of seagrass types forming clear stand zones, either pure or an association of several types (Haris, 2012).

METHOD

This type of research is descriptive, namely research that aims to explain or describe an event, situation and object, or anything that can be explained using numbers or words. This research was carried out in Poka village from March 3 2021 to April 8 2022. The population in this study were seagrass plants that grow naturally in the coastal waters of Poka Village. The samples in this research were each type of seagrass found and the substrate on the Poka Village beach.

Procedure

1. Preparation Stage

This stage includes literature study and gathering information regarding the general conditions of the research location, initial field survey and preparing tools that will be used during research in the field.

2. Implementation Stage

- Prepare a 100x100cm plastic pipe/wire quadrant.
- Seagrass sampling was carried out at low tide using the quadrant transect method. With 3 transects, the length of each transect is 100m vertically and 100m horizontally so the total transect area is 100 x 100m. The distance between one transect and the other transect is each 50m from the horizontal line. then the quadrants are placed on the right side of the transect with a distance of 20 cm between one quadrant and the other quadrant.
- Then take seagrass samples, then put them in sample plastic and then label them with the name of the species, the total number of samples for each is 20 individuals.

Data analysis

Morphological measurements carried out on seagrass plants include: total number of leaves (number of all leaves), number of whole leaves, number of leaf veins, a) leaf width (mm), b) leaf length, c) rhizome distance between one stand and another, d) length roots, e) rhizome diameter, and f) root diameter.

DISCUSSION RESULT

1. Seagrass Type Composition

Based on research conducted in the coastal waters of Poka Village, Teluk Ambon District, Ambon City. With muddy and sandy substrates, 4 species of seagrass were found so that this water area is categorized as a mixed type seagrass ecosystem. The seagrass species identified include Thalassia

hemprichii, Halophila ovalis, Enhalus acoroides, and Halodule pinifolia. The presence of seagrass species can

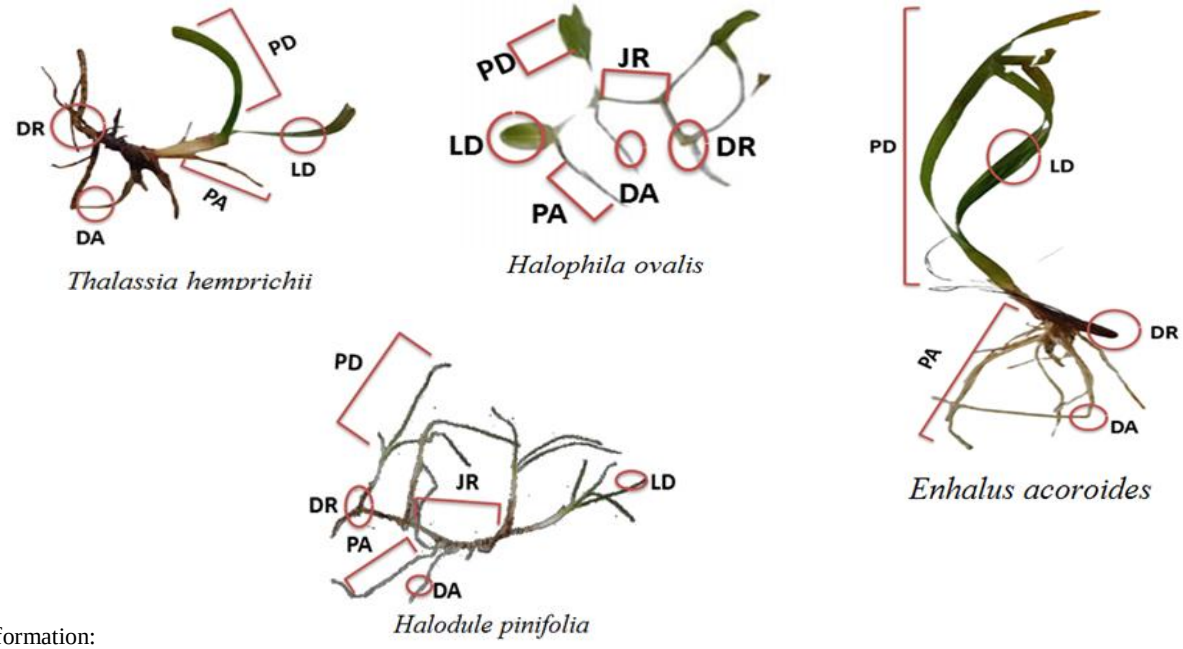
Table 1. Presence of Seagrass Types in Poka Village Beach Waters

No	Species	type of seagrass		
		Transect 1	Transect 2	Transect 3
1	*Thalassia hemprichii*	√	√	-
2	*Halophile ovalis*	-	√	-
3	*Enhalus acoroides*	√	√	√
4	*Halodule pinifolia*	-	√	√

Table 2. Composition of seagrass species on Poka Village beach

Location	Suhu	Salinity	Dissolved oxygen	Degree of similarity (pH)	Substrate
Poka village	23^0C	14%	1.9 mg/L	8.18	Sandy and muddy

2. Phenetic diversity of seagrass species



Information:
PD = Leaf Length
JR = Rhizome Distance between stands
PA = Root Length
DR = Rhizome Diameter
DA = Root Diameter
JR = Rhizome distance between stands
PA = Root length
DR = Diameter Rhizome
DA = Root diameter

The results obtained, it can be seen that the coastal waters of Poka Village have a temperature of 23^0C. According to (Unsword, 2012), it was found that seagrass that grows in low light conditions has a lower temperature for photosynthesis while plants at high temperatures need more light. to carry out photosynthesis. According to (Nurzahraeni, 2014), the temperature range for seagrass growth is around 15-30^0C. At the research location in the coastal waters of Poka Village, the salinity is 14‰. According to (Hutomo, 1999), salinity as one of the supports for seagrass growth has capabilities vary, but generally the salinity range is around 10-40%. The coastal waters of Poka Village have an acidity degree (pH) of 8.18.

According to (Odum, 1971), sea water is a very broad buffer system with a relatively stable pH ranging from 7.0-8.5. The coastal waters of Poka Village show dissolved oxygen, namely 1.9 mg/l. Meanwhile, dissolved oxygen in water comes from photosynthesis by phytoplankton or other aquatic plants and diffusion from the air (Andriani, 1999), where dissolved oxygen decreases between 0.2 and 0.3 mg/l for every increase in temperature degrees Celsius (Sakarudin, 2011). The composition of seagrass species found in the waters of Poka Village Beach includes seagrass species including Thalassia hemprichii, Halophila ovalis, Enhalus acoroides, and Halodule pinifolia. The presence of the seagrass species Thalassia hemprichii is found in transects 1 and 2 because it has a sandy substrate. The results of environmental parameter measurements show that the coastal waters of Poka Village are predominantly sandy. (Christon, 2012), revealed that seagrass that grows on sandy bottoms with clear water has smaller leaf sizes, shorter erect rhizomes compared to seagrass that grows on muddy bottoms and murky water.

Morphometrics is a measurement of an object or organism which aims to determine the quantitative shape (morphology) of an organism, while meristics is a calculation of the number of parts of an organism (Putri, 2017). Leaf length (PD) of the four seagrass species in table 4.1. The above shows the length of the leaves of the Seagrass Enhalus acoroides with a leaf length of 46.39 cm. According to (Arifin, 2001), in calm waters, seagrass growth is more focused on leaf length, while the tops of the leaf blades are often eroded by waves and openness to tides in relatively shallow waters. Enhalus acoroides and Thalassia hemprichii are in one monophyletic group (ingroup), because they have the same characters so that their kinship is also close to the confidence value of 91%, then Halodule pinifolia and Halophila ovalis also have the same characters so that their kinship relationship is with a confidence value of 71%. Enhalus acoroides and Thalassia hemprichii have the same character, namely having ribbon-like leaves, while Halodule pinifolia and Halophila ovalis have the same root shape. According to (Layon, 1985),

CONCLUSION

1. There are 4 types of seagrass in the coastal waters of Poka Village, namely Halophila ovalis, Talasssia hemprichii, Enhalus acoroides, Halodule pinifolia.
2. Morphometric analysis of seagrass species in Dessa Poka coastal waters shows varying average values for each character observed.
3. Relationship between the 4 types of seagrass found in the waters of Poka Village Beach, namely *Thalasssia hemprichii* and *Enhalus acoroides,* which are very closely related. Likewise with *Halophila pinifolia* and *Halophila ovalis.*
4. The phenetic diversity of seagrass species is very influential on the morphometrics seen from the external appearance of a seagrass species.

REFERENCES

Akhmad, S., Syakur A. 2020. Types of Seagrass in Ponnori Waters, South Larompong District, Luwu Regency. Journal of Biology Education. 5 (1): 55-87.

Gregory K., Subat, S.G. 1994. Assessment of genetic diversity of seagrass populations using DNA fingerprinting: Implications for population stability and management. Proc. Nat. Acad. Sci. USA Vol. 91, pp. 1049-1053, Plant Biology

Andi, Z., Zulfikar A. 2020. Study of the Allometric Relationship and Biomass of Seagrass Thalassia hemprichii as an Environmental Bioindicator. Indonesian Journal of Agricultural Sciences (JIPI). 25 (3): 356-364.

Budi, S., Santoso B. 2018. Growth and Productivity of Thalassia hemprichii (Ehrenb) Ascherson Seagrass Leaves in Tanjung Benoa Waters, Bali. Marine and Fisheries Science Study Program, Udayana University, UNUD Bukit Jimbaran Campus, Bali 80361, Indonesia. 5 (2): 278-285.

Herni, A., Ahmad, H. 2017. Composition and Diversity of Seagrass in Lamu Village. Department of Aquatic Resources Management, Faculty of Fisheries and Marine Sciences, Gorongtalo State University. 5 (4) : 90-109.

Ida, A.N., Wandiani, W.I. 2020. Potential of Seagrass Resources to Support Tourism Development on Mengiat Beach Nusa Dua, Bali. Aquatic Resources Management, Faculty of Maritime Affairs and Fisheries, Udayana University, UNUD Bukit Jimbaran Campus, Bali. 6 (1) : 78-89.

I Gusti Ayu Ricca Mahatma Putri, Putri I. 2018. Morphometric and Meristic Comparison of Lalophila ovalis seagrass in the waters of Serangan Island and Tanjung Benoa, Bali. Marine Science Study Program, Faculty of Marine Affairs and Fisheries, Udayana University, Jimbaran Hill, Badung, Bali-Indonesia. 4 (2) : 213-224.

I Kadek Vidyananda S Rahardiata, Rahardiata I. 2019. Seagrass Carbon Storage in the Mengiat Beach Area, Nusa Dua Bali. Marine Science Study Program, Faculty of Maritime Affairs and Fisheries, Udayana University, UNUD Bukit Jimbaran Campus, Bali, Indonesia. 5 (1) : 1-10.

Ita Riniatsih, Riniatsih I. 2016. Distribution of seagrass types is related to the distribution of aquatic nutrients in the seagrass beds of Jepara Ayur Bay. Department of Marine Science, Faculty of Fisheries and Marine Sciences, Diponegoro University. 19 (2) : 101-107.

Lalu Raftha Patech, Patech L. 2020. Abundance and Diversity of Echinodermata Species as an Indicator of the Ecological Function of Seagrass in the Coastal Waters of East Lombok. PMIPA FKIP Biology Education Study Program, Mataram University. 6 (1) : 40-49.

Mafi Ristina, Ristina M. 2018. Relationship between seagrass density and sea cucumber abundance on Alang-Alang Beach, Karinmujawa National Park. Aquatic Resources Management Study Program, Department of Aquatic Resources, Faculty of Fisheries and Marine Sciences, Diponegoro University. 7 (4) : 452-457.

Maliza Kurnia, Kurnia M. 2015. Types of seagrass on Lambongan Beach, Nusa Lambongan and their analysis using rbcL RUAS PCR. Department of Biology, FMIPA, Udayana University, Bukit Jimbaran Campus, Bali. 3 (1) : 330-333.