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COMPARATIVE MORPHOLOGY AND ECOLOGICAL DISTRIBUTION OF MOLAT SAGO SPECIES (*METROXYLON SAGO ROTTBOL*) IN ANGGOPI VILLAGE

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Abstract: *Sago is the staple food of the people of Papua, which has a high starch content, with a distribution area that varies according to the texture of the soil owned by each region in Papua. The purpose of this study was to determine the comparative morphology of the Molat sago species (Metroxylon sago Rottbol) and the Ecological Distribution of the Molat sago species (Metroxylon sago Rottbol) in Anggopi Village, Oridek District, Biak Numfor Regency, Papua Province. This study used an observational qualitative method, in which researchers made observations on comparative morphology and ecological distribution in 3 quadrants in Angopi Village, Oridek District. The results of this study were that researchers were able to analyze the morphology of the sago molat species with details and the ecological distribution of the sago molat (Metroxylon sago Rottbol) in Anggopi Village, Oridek District, Biak Numfor Regency, Papua Province, based on the analysis of the Morisita study, which is in the category of clustered distribution because Id = 0.786 or more than > 0. Factors that affect the group Ecological Distribution of sago plants that grow wild in the forest in the area are Seed Morphology, Soil Texture, Soil Structure and Soil Acidity.*

Keywords: *Sago, comparative morphology, ecological distribution*

INTRODUCTION

Sago plant (Metroxylon sp) is a type of plant that is spread across Indonesia. Sago is one of the regional crops of Southeast Asia which grows a lot in swamp areas or areas with abundant water sources. Sago plants in Indonesia grow a lot in lowland areas and are found in Maluku and Papua (Lesilawang, 2020). The people of this area as well as those of Sulawesi (North, South and Southeast), Central Kalimantan, West Sumatra, Riau and Aceh once depended on sago for their staple food. This makes Indonesia take part as 60% as a provider of world sago (Bantacut, 2011). One of the sago producing regions in Indonesia is Papua. The types of sago in Papua are grouped into thorny sago (Metroxylon rumphii Mart.) and non-thorny sago (Metroxylon sago Rottb.) (Lesilawang, 2020) (Papilaya, 2007).

Indonesia has the largest comparative advantage of sago plants in the world compared to other sago producing countries, such as Papua New Guinea, Malaysia and Thailand. The area of sago forest in the world is around 2 million hectares, which is spread over Indonesia, which is approximately 1.1 million hectares or around 51.3%. Most of the potential area of the national sago plant is in eastern Indonesia, especially in Papua and Maluku reaching 96%, the rest is spread in other areas such as Central Sulawesi, South Sulawesi, Southeast Sulawesi, South Kalimantan, West Kalimantan, Jambi and Riau (Samin. 2008) (Soamole, 2014).

A lot of sago is processed into pearl sago which is generally made into pearl porridge in Indonesia, besides that there is also papeda which is one of the popular foods in Papua. Sago is one of the staple foods such as rice with a high carbohydrate content in the form of starch but a low protein content so that its physicochemical properties are different from wheat flour. Sago flour contains starch from the sago pith extraction process (Kanro et al., 2003). Sago starch contains 27% amylose and 73% amylopectin. The high amylose content makes the starch not too wet, not too sticky, and easily absorbs water (Caesy et al., 2018; Ahmad, 2013) (Widiya et al., 2019).

Experts estimate that the origin of sago (Metroxylon sp), especially Metroxylon rumphii Martius and Metroxylon sago Rottbol, is Maluku and Papua. This estimate is based on the discovery of extensive sago forests in the Maluku and Papua regions which consist of the two species above and other types that are almost similar to these species (Suripatty et al., 2016). According to (Haryanto & Pangloli, 1992), (Yunita & Mukhlisah, 2019) it is suspected that the similar species Metroxylon rumphii Martius and Metroxylon sago Rottbol are the result of cross-breeding of the two species.

Sago plants grow a lot in Indonesia, but in Maluku there are 5 types of sago, namely sago Tuni (Metroxylon rumphii Martius), sago Molat (Metroxylon sago Rottbol), sago Ihur (Metroxylon sylvester Marttius), sago Makanaru (Metroxylon longispinum Martius) and sago Rattan spines (Metroxylon microcanthumn Martius). What is meant by sago plants is true sago which belongs to the genus Metroxylon sp. This true sago plant is divided into two groups based on the presence or absence of thorns on the leaf stalks. The first group is the thorns, including: Metroxylon rumphii Martius which is the main species in this group. Other types are Metroxylon longispinum Martius, Metroxylon microcanthumn Martius and Metroxylon sylvester Martius. While the non-thorny group is Metroxylon sago Rottbol.

Sago is an annual plant that can reproduce or be propagated by saplings and or seeds. Sago tillers begin to form stems at around 3 years of age. Then around the stem grows buds or shoots that develop into sago saplings. The tillers obtain nutrients from their parents until the tillers are able to absorb their own nutrients and the leaves are able to carry out photosynthesis. This tiller growth pattern continues to form a clump. Under good soil conditions every 3-4 years two saplings will develop into trees. There are five phases of sago plant growth, namely: 1). Formation (Establishment), germination occurs until the formation of the first two young leaves; 2). Rosette (Rosette), from the formation of the first two leaves until the first mature leaves are formed; 3). Trunk formation, normally parallel to the formation of one mature leaf per month; 4). Flowering (Flower initiation), in line with the increasing number of shortened leaves and the formation of flowers; 5). Formation and decline (Fruit formation and deterioration), starting from the formation of fruit until the sago plants die.

From a morphological point of view, sago plants are different from the types of sago plants in Sopen Village, West Biak District, Biak Numfor Regency. The morphological character of the type of sago molat (Metroxylon sago Rottbol) has reddish-brown roots. This type of sago molat is lower, has a larger diameter and thick bark compared to other types in general. The leaves of the molat sago type are green. The leaves and petioles of molat sago are not thorny. This type of sago molat has shorter leaf stalks than other types of sago in general. The shape of the leaf blade on the mollat sago type is long and pointed. The location of the leaves on the molat sago type leaves far apart. This type of sago molat has shorter flowers compared to the length of flowers in general. The flowers on the type of sago molat are yellowish brown.

Sago palm (*Metroxylon sp*) taxonomically belongs to the order spsdicifora, family palmae, genus Metroxylon, species Metroxylon spp. The word Metroxylon comes from the Greek, namely Metro which means stem content and xylon which means xylem (Tenda et al., 2003). According to Bintoro et al., (2010) sago from the genus Metroxylon can be classified into two major groups. First, sago which flowers and bears fruit twice (*Pleonanthic*) with low starch content and secondly, sago plants which flower or bear fruit once (*Hepaxanthic*) which has high starch content so it has economic value to cultivate.

Sago plants grow well in freshwater swamp areas or peat swamp areas, areas along rivers, around water sources or swamp forests. Sago plants have high adaptability in swamps and marginal areas. The range of habitat for sago plants is quite wide, ranging from flooded land to dry land, from the lowlands along the coast to the highlands. Sago can act as a conservation plant. Sago plants that grow around springs can play a role in protecting and preserving the continuity of springs. The type of

sago that grows in Anggopi Village, Oridek District, Biak Numfor Regency, Papua Province, one of which is Sago Molat (*Metroxylon sago Rottbo*l), while Sago Molat is a type of sago that is not thorny.

Based on the description of the background above, the authors are interested in conducting research with the title "Comparative Morphology and Ecological Distribution of Sago Molate (*Metroxylon sago* Rottbol) in Anggopi Village, Oridek District, Biak Numfor Regency, Papua Province ." The purpose of this study was to determine the comparative morphology of the Molat sago species (*Metroxylon sago Rottbol*) and Ecological distribution of Molat sago species (Metroxylon sago Rottbol) in Anggopi Village, Oridek District, Biak Numfor Regency, Papua Province.

MATERIALS AND METHODS

The type of research used in this study is a qualitative descriptive research type with the observation method which is used to analyze Comparative Morphology and Ecological Distribution of Molat sago species (*Metroxylon sago* Rottbol) in Anggopi Village, Oridek District, Biak Numfor Regency. This research was carried out for 3 months starting from August 10 2022 to November 10 2022. The research location was located in Anggopi Village, Oridek District, Biak Numfor Regency.

The population in this study were all types of sago in Anggopi Village, Oridek District, Biak Numfor Regency. The sample in this study was Sago Molat (Metroxylon sago Rottbol) to observe Comparative Morphology and Ecological Distribution. In order to observe the comparative morphology of the Molat sago species (Metroxylon sago Rottbol), the tools and materials used can be seen in the following table:

Table 1. Tools and materials for observing sago morphology

No	**Tool**	**Utility**
1	Meters	As a measurement tool
2	Machete	As a cutting tool
3	Crowbar	As a digger (sago root)
4	Camera	As a documentation tool
5	Stationery	To write research results
No	**Material**	**Utility**
1	Sago molat (*Metroxylon sago* Rottbol)	As a sample in research

The data used in this study are primary and secondary data. Primary data was obtained during the research (observation) based on the identification of sago plant morphology which includes roots, stems, midribs, thorns, leaves, flowers and fruit found at the study site. As for the secondary data obtained through the literature, namely books, and supporting references related to the problems studied.

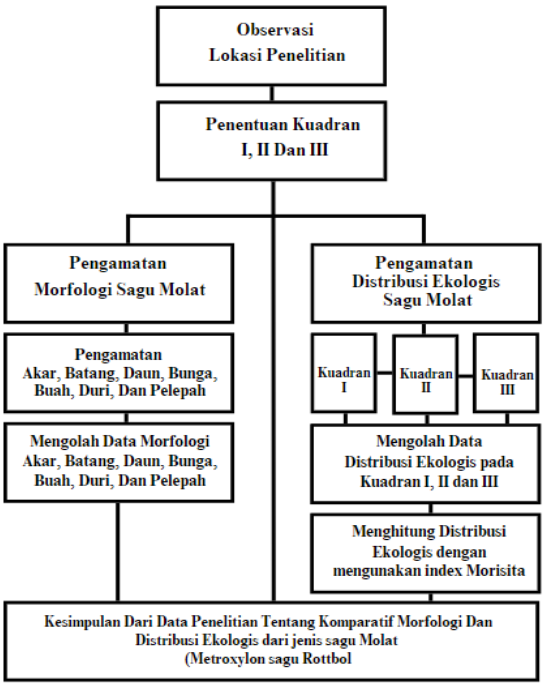


Table 1. Research Flow

The analysis technique used in this study included descriptive data related to Ecological Distribution , namely to determine the comparative morphology of the Sago Molat (*Metroxylon sago* Rottbol *)* species in the Oridek District , Biak Numfor Regency , Papua Province . The design in this study can be seen in the table below.

Table 2. Morphological Characteristics of Sago

Part Observed Based on Morphology of Sago Molat
Root :
Stem:
Leaf :
Flower :
Fruit :
Thorn :
Midrib:

RESULTS AND DISCUSSION

Comparative Morphology of Sago Molat (*Metroxylon sago* Rottbol)

The descriptive data related to the research results can be seen in the following table below .

Table 3. Comparative Observations on the morphology of sago Molat (*Metroxylon sago* Rottbol)

Observed Section	**Morphological Comparative Photo of Sago Molat (*Metroxylon sago* Rottbol)**	**Information**
Root		Sago roots are dark yellow, with some being brownish- dark red .
		Surface Molat Sago Root Flat.
		The root length of sago molat ranges from 45 cm to 50 cm

Observed Section	Morphological Comparative Photo of Sago Molat (*Metroxylon sago* Rottbol)	Information
		The surface of the sago root has young and stiff roots.
Stem	  	The height of molat sago stems ranges from 5-1.5 m
		Thickness of the skin Sago Molat stems range from 3-5 cm
		Molat sago stem circumference 150cm - 200cm
		Sturdy molat sago stems grow to on
		Stem shape round and straight
		There are many traces of fronds on the stem surface
		The color of the Molat sago stem is reddish brown
		The thickness of the base of the sago stem is 2cm
		The important part of this sago tree is the trunk , which contains starch, which can be consumed by humans
		The size of the rootstock is larger than the scion, which is due to the carbohydrate content contained in the sago pith (a lot of starch content is found at the bottom of the sago plant).
Leaf	   	The shape of sago leaves is the shape of a lanceolate leaf, with a pointed tip, rounded base of the leaf, the layout of the leaves is cross facing
		The edges of the leaflets are flat, the leaflets are flexible, the leaf veins are parallel and flexible
		Alternating leaf midribs _
		The width of the base of the frond is 20-25 cm
		The length of the leaf midrib is 150 cm
		not thorny
		Sago Molat leaves have midrib dorsal lines
		The color of the leaf midrib is green with white spots
		The length of the leaflets is 150-160 cm
		Distance between leaves 10 cm
		The width of the leaflets is 10cm-12 cm
		The top and bottom texture of the leaves are smooth . The width of the edge of the base of the leaf is 2 cm

Observed Section	Morphological Comparative Photo of Sago Molat (*Metroxylon sago* Rottbol)	Information
		The color of the upper surface of the leaf is dark green and the color of the lower surface of the leaf is light green
		The length of the midrib is 150-160 cm
		The color of the upper midrib is dark green and the color of the underbone is light green
Flower		Flower length 6 cm
		Flower stalk length 25-27 cm
		The width of the flower stalk is 2 cm
		The position of the bunch sits on the stem
		Form branched bunches
		Appearance of real bunches
		Flower shape like betel fruit
		color is dark brown, and the dry flower color is white brown
		The color of raw flower stalks is dark brown, the color of dried flower stalks is light brown
		The number of branches on the flower is 7
		Form a branched flower stalk
Fruit		The shape of molat sago fruit tends to be round like salak fruit
		The color of sago fruit when raw is green yellowish and the color of dry fruit (old) reddish brown
		The position of sago in the axillary found on each fruit stalk consists of 10-20 fruit in each stalk
		The length of the fruit stalk is 20-30 cm
		The width of the fruit stalk is 2-3 cm
		Number of fruit per stalk 7-12 fruit
		B with a single fruit 2-3 grams of fruit weight per bunch 1.2-1.5 kg
		The fruit of sago molat has a thick and hard skin, so it is not easy to open
Thorn		Sago Molat tend do not have thorns on the petiole midrib

Observed Section	Morphological Comparative Photo of Sago Molat (*Metroxylon sago* Rottbol)	Information
		Sago fronds are smooth or flat, so it is safe to take the stems and leaves
Midrib	 	The length of the leaf midrib in sago molat is in the range of 6 - 8 m with each leaf midrib
		Has a leaf range between 50-500 leaf blades (midrib type) for size mature sago

Identification of the Number of Sago Molat (*Metroxylon sago* Rottbol)

Based on the results of identifying the number of Sago Molate (*Metroxylon sago* Rottbol) in each quadrant at the study site, the identification can be shown in table 4.2 as follows:

Table 4. Identification of the number of Sago Molat (*Metroxylon sago* Rottbol) in each quadrant

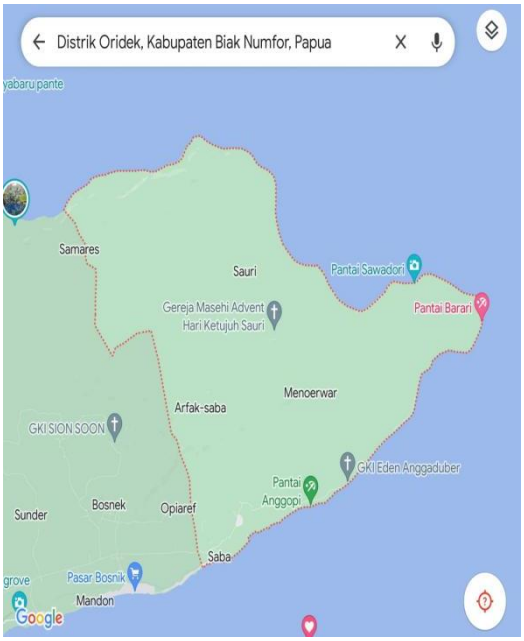
No	Quadrant sago Molat (*Metroxylon sago* Rottbol)	Amount
1	Quadrant I (Saba Location)	7
2	Quadrant II (Location of Wadibu)	1 3
3	Quadrant III (Location Manoerwar)	1 0
	Total	**3 0**

Based on the table above, it can be seen that the identification of the number of Sago Molat (*Metroxylon sago* Rottbol) in each quadrant has a different number from the three quadrants sampled. The total total of sago obtained was 30 individuals (Odum, 1998) (Odum, 1993). The highest abundance of Sago Molat (*Metroxylon sago* Rottbol) is in the 2nd quadrant and the lowest is in the 1st 2nd quadrant (see Appendix 1).

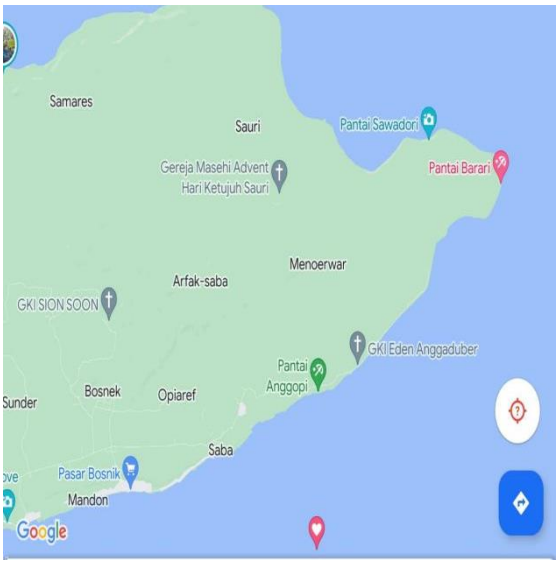
Ecological Distribution of Sago Molat (*Metroxylon sago* Rottbol)

The ecological distribution of Sago Molate (*Metroxylon sago* Rottbol) recorded by researchers is as follows.

Table 5 . Location of Sago Molat in Oridek District during sampling

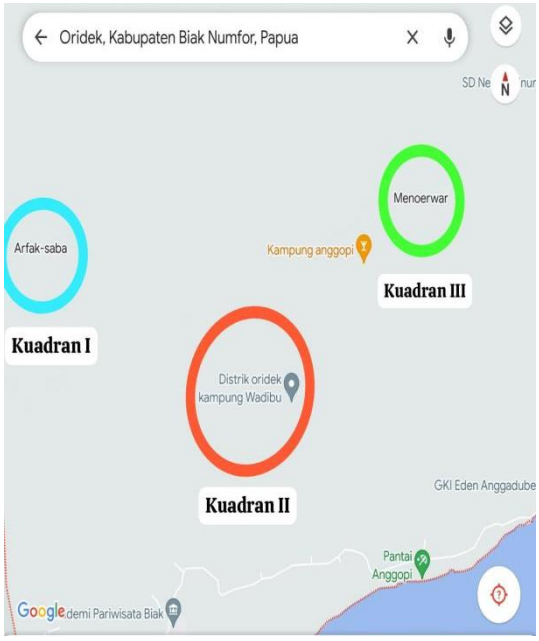
Place Description	Research sites
Biak Island Numfor Overall from Map Image	
The location where the research was conducted was the Oridek District, East Biak District	

Villages in Biak-Timur District, Oridek District, Biak-Numfor Regency.



The research village is in the Oridek District

- Quadrant I with the location of Saba Village
- Quadrant II with Location Wadibu
- Quadrant III with Location Manoerwar



Based on the distribution pattern of Molat sago (*Metroxylon sago* Rottbol) at the study site, the distribution pattern can be shown in table 4.3 as follows:

Table 6. Distribution pattern of Molat sago (*Metroxylon sago* Rottbol)

Quadrant	Frequency (N)	xi ^{2} - N
I	7	49 -3 0 = 19
II	1 3	1 69 -3 0 = 1 39
III	1 0	100 -3 0 = 70
n = 3	**∑xi = 3 0**	**∑ xi ^{2} - N = 2 28**

Based on the table above, it can be seen that the identification of the number of Sago Molat (*Metroxylon sago* Rottbol) in each quadrant has a different number from the three quadrants sampled. The total total of sago obtained was 30 individuals . The highest distribution of Sago Molat (*Metroxylon sago* Rottbol) is in the 2nd quadrant and the lowest is in the 1st 2nd quadrant (see attachment 2).

Based on the moricity index criteria, the distribution pattern of sago Molat (*Metroxylon sago* Rottbol) in Oridek District, Anggopi Village, Biak Numfor Regency, is in the clustered distribution category because Id = 0.7 86 or > 0 . This is because there are types of sago that grow wild in the forest and there are also sago molat which are widely cultivated (planted) by garden owners (hamlets) so that the sago multiplies in that place and forms groups of sago mothers and continues onwards. This happens because sago molat is cultivated as part of a source of income or livelihood to improve the local community's economy apart from being a staple food source or for personal consumption.

Discussion

Sago is one type of tropical forest palm plant that can be found in Indonesia, especially in the wet tropics. This type grows well in freshwater swamp areas, peat swamps, areas along rivers, around water sources, or swamp forests. Sago plants have high adaptability on marginal land which does not allow optimal growth for food crops and plantation crops (Suryana, 2007). Each condition of the land where sago grows has characteristics or characteristics that reflect the type of habitat for each. Characteristic indicators, among others, are shown by environmental characteristics which include soil properties, both physical and chemical, and climatic characteristics, especially the microclimate. According to Botanri, *et al* . (2011) (Botanri, 2010a) (Botanri, 2010b) (Botanri, Setiadi, et al., 2011) (Botanri, Guhardja, et al., 2011) sago palms on Seram Island, Maluku Province grew and developed in four types of habitats, namely: 1) dry land habitat types, 2) non-permanently flooded fresh water, 3) non-permanently flooded brackish water, and 4) permanently flooded (Botanri et al., 2017).

From a comparative morphological view, sago plants are different from other types of sago plants in the Oridek District, Anggopi Village, Biak Numfor Regency. The comparative morphology of sago molat (*Metroxylon sago* Rottbol) is as follows .

Root

Observation result on molat sago roots are as follows: Sago Plants Have roots that are dark yellow in color, with some being brownish- dark red. The surface of Molat Sago Roots is Flat with Molat Sago root lengths ranging from 45 cm to 50 cm. In Sago Plants on the surface there are young and stiff roots

Stem

Observation result on molat sago stems are as follows: The height of molat sago plant stems ranges from 5-15 m. Thickness of the skin Sago Molat stems range from 3-5 cm. Molat sago stem circumference 150cm - 200cm. Sturdy molat sago stems grow upwards. round and straight shape . There are many traces of fronds on the stem surface (Notohadiprawiro & Louhenapessy, 1993). The color of the sago stem is Molat reddish brown . The thickness of the base of the sago stem is 2cm. The important part of this sago tree is the trunk , which contains starch, which can be consumed by humans. The size of the rootstock is larger than the scion, which is caused by the carbohydrate content contained in the sago pith (a lot of starch content is found at the bottom of the sago plant).

Leaf

The results of observations on molat sago leaves are as follows: The shape of sago leaves is lanceolate, with a pointed tip, rounded base of the leaf, the layout of the leaves is cross facing . The edges of the leaflets are flat, the leaflets are flexible, the leaf veins are parallel and flexible . Alternating leaf midribs. The width of the base of the frond is 20-25 cm. the length of the midrib of the leaf is 150 cm. The shape of the leaf midrib is not thorny. Sago Molat leaves have midrib dorsal lines . the color of the leaf midrib is green with white spots. The length of the leaflets is 150cm-160cm, the distance

between the leaves is 10 cm. The width of the leaflets is 10-12 cm. The top and bottom textures of the leaves are smooth . The width of the edge of the base of the leaf is 2cm . The color of the upper surface of the leaf is dark green and the color of the lower surface of the leaf is light green. The length of the mother leaf bone is 150-160 cm. The color of the upper midrib is dark green and the color of the underbone is light green.

Flower

The results of observing the flowers from sago molat are as follows: Flower length 6 cm, Flower stalk length 25-27 cm . The width of the flower stalk is 2 cm. The position of the bunch sits on the stem. Form branched bunches. Appearance of real bunches. The flower shape is like betel fruit, the raw flower color is dark brown, and the dry flower color is white brown. The color of raw flower stalks is dark brown, the color of dry flower stalks is light brown. The number of branches on the flower is 7. The shape of the flower stalks is branched.

Fruit

The results of observations of molat sago fruit are as follows: The shape of molat sago fruit tends to be round like salak fruit. The color of sago fruit when unripe is green yellowish and the color of dry fruit (old) reddish brown. The position of sago in the axillary found on each fruit stalk consists of 10-20 fruit in each stalk. The length of the fruit stalk is 20-30 cm, the width of the fruit stalk is 2-3 cm. The number of fruits per stalk is 7-12 pieces, the weight of a single fruit is 2-3 grams, the weight of the fruit per bunch is 1.2-1.5 kg. The fruit of sago molat has a thick and hard skin , so it is not easy to open.

Thorn

The results of observations of thorns on sago molat are as follows: Sago molat tends do not have thorns on the petiole fronds, sago fronds are smooth or flat, so it is safe to take the stems and leaves.

Midrib

Observation result in Molat Sago Leaf Sheaths are as follows: The length of the Molat Sago Leaf Sheaths is in the range of 6-8 m with each leaf sheath . Has a leaf range between 50-500 leaf blades (midrib type) for size mature sago.

Sago Molate Ecological Distribution

The distribution of plant species in nature can be divided into three basic modes: random, ordered, and agglomerated. This distribution pattern is closely related to environmental conditions. Organisms in a place are interdependent, not by chance, and if one organism or several environmental factors get in the way, it affects the community. The coincidence factor is more influential if all the factors that influence the existence of a species are relatively few, where the species concerned manages to live in that place. This usually results in a distributed pattern. The local two-dimensional distribution of organisms is generally called dispersion. There are three basic distribution modes, namely Random (the state of an individual at a certain point does not affect the probability of having members of the same population at adjacent points), Clustering (the presence of an individual at a point will increase the probability of the same individual at another nearby point), and T regular or uniform (the presence of an individual at a point reduces the probability of the same individual at a point around it) (Papilaya, 2009).

Ecological Distribution is characteristic of the community level of organisms biological characteristics that can be used to express community structure. Structure A community is said to have low species diversity. The dispersal pattern is characteristic for each type of species and each type of

habitat. There are no isolated organisms or populations of species in nature. However, the population of species that live and experience an area. The structure of a natural community depends on the way animals are dispersed or dispersed within it. This pattern of diversity depends on the physico-chemical environment or the biological characteristics of the organism itself.

Sago plants have high adaptability in swamps and marginal areas. The range of habitat for sago plants is quite wide, ranging from flooded land to dry land. From the lowlands on the outskirts of the coast to the highlands. Sago plants that grow around springs can play a role in protecting and preserving the continuity of springs (Kapang, n.d.). Sago plants are also a habitat for species conservation. Analysis of the distribution pattern of Sago Molat uses the standardized Morisita's index (Morisita 1962 *in* Krebs 1998). The index is calculated by the equation:

$$I_d = n\left[\frac{\sum x^2 - \sum x}{(\sum x)^2 - \sum x}\right]$$

Information :
Id = Morisita dispersion index
n = Number of plots
x = Number of individuals found in each plot

The procedure for using the standard dispersion morisita index formula , if the results of the information analysis find a value of 0, then the distribution pattern is random, but if the value is above 0, the distribution pattern is clustered (clumped), otherwise a uniform pattern (uniform) can be recognized if the value is obtained at the base of 0 (Krebs, 1989). Total in Appendix (2)

Based on the research results it is known that the identification of the number of Sago Molat (*Metroxylon sago* Rottbol) in each quadrant has a different number of the three quadrants sampled. The total total of sago obtained was 30 individuals . The highest distribution of Molat sago (*Metroxylon sago* Rottbol) is in the 2nd quadrant and the lowest is in the 1st 2nd quadrant (see attachment 2).

The pattern of distribution of sago molat Molat (*Metroxylon sago* Rottbol) is based on the morisita index criteria, so the pattern of distribution of sago molat (*Metroxylon sago* Rottbol) in Oridek District, Anggopi Village, Biak Numfor Regency, is in the category of clustered distribution because Id = 0.786 or more than > 0. this is because many of these types of sago grow wild in the forest of Anggopi village, some are deliberately cultivated (planted) by the garden owner (hamlet) so that the sago multiplies in these places and forms groups of sago broodstock and goes on and on. This happened because sago molat These are cultivated as part of a source of income or livelihood to improve the community's economy.

From the description that has been put forward, it can be concluded that sago molat can act as a conservation plant. The Sago Molat plant (*Metroxylon sago* Rottbol) which grows on land independently or grows on its own as well as on community plantations can play a role in protecting and preserving the continuity of springs in the Oridek District, Anggopi Village, Biak Numfor Regency as well as a habitat for species that live on sago.

The ecological distribution of sago molat plants in the Oridek District has a group pattern, based on the analysis of the researcher, this condition is caused by several factors.

Seed Morphology

The morphology of Sago Molat seeds is hard (hard to peel) and has a skin like salak, heavy seeds so that the seeds will be difficult to move when blown by the wind or moved by insects. The seeds of sago molat are also not food for birds because they are round in shape and their skin is very hard. From

this brief description, an argument is obtained that the seeds which are ovaries in old molat sago will fall around the mother plant and will develop into new individuals without having to move to distant locations, because the morphology of the seeds is hard and not a food ingredient. from birds or other predators.

Soil Texture

Soil texture is the relative ratio of the various particles in the soil mass, especially the proportions of sand, silt, and clay. Soil texture is very important in the carrying capacity of groundwater and air. The soil found at the location where sago molat is found is soil with a larger proportion of particles that allows for good water management. Soil is wetter and contains more amount of water particles.

Soil Structure

Soil structure is the arrangement or binding of soil grains, which form soil aggregates in various shapes and sizes. Soil structure causes differences in the level of soil ability to pass water (porosity) and the size of the pores between soil grains (permeability). The influence of large porosity and permeability and valleys on sago plants found in the Oridek District affects the growth and development of Molat sago, the distribution of water, nutrients and air to all parts of the body.

Soil Acidity

Soil fertility is greatly influenced by various chemical processes and the exchange of chemical elements between plants. Plants are unable to absorb nutrients without being converted into liquid form. Soil acidity in the environment of sago plants is high. The best growth occurs in soils with high organic matter content and a slightly acidic reaction with a PH of 5.5 - 6.5. If the acidity of the soil is reduced to a certain level then the water will have little ability to retain the minerals that are converted into nutrients. As a result, even though the nutrients are in the soil, it is impossible for plants to live well there.

CONCLUSION

The morphology of sago Molat (*Metroxylon rumphii* Rottbol) is brownish-red roots with root lengths ranging from 20 cm to 1 m. Stem height ranges from 5-10 m with a thickness of bark ranging from 2-3.3 cm. The leaves tend to be yellowish green with a leaf pattern that is less dense (rare) with a leaf length ranging from 1-1.30 m. Flowers in general, namely with compound interest (primary) (one bud) that rises at the top (bud) at the end of sago when sago is old. The fruit tends to be round and yellowish brown in color which is found on each fruit stalk which consists of 15-30 fruit in each stalk. Sago molat tends not to have thorns on the leaf stalks so it is safe to take the stems and leaves. The frond length ranges from 5-7.2 m with each leaf midrib having a leaf range between 30-60.

The distribution pattern of Molat sago (*Metroxylon sago* Rottbol) in Anggopi Village, Oridek District, Biak Numfor Regency, Papua Province, is based on the analysis of the Morisita study. categorized as clustered distribution because Id = 0.7 86 or more than > 0 . Factors that affect the distribution of clusters are seed morphology, soil texture , soil structure and soil acidity.

Suggestions for the Health Service it is necessary to carry out health and nutrition counseling to increase public knowledge, especially mothers as a determinant of household food consumption, with the consideration that there is still a lack of maternal nutritional knowledge related to the benefits of local food ingredients (sago) as an additional consumption ingredient and its benefits . For the Department of Agriculture and Horticultural Plants, it is necessary to carry out agricultural counseling on how to grow crops properly to increase the production of agricultural products, especially types of staple crops (sago molat) and other types of sago as the largest contributor of energy in daily

consumption. It is necessary to conduct counseling on the diversification of staple food consumption by focusing on local staple food plant species such as sago, sweet potato, cassava and taro which have sufficient nutritional content.

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