

Morphometrics and Meristics of Senangin (*Eleutheronema Tetradactylum*) Results of Gillnet Catch in Mendahara Ilir of East Tanjung Jabung District

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ABSTRACT

Mendahara Ilir is an area located on the coast with the majority of the community working as fishermen. Fishermen in this area catch fish using Gillnet fishing gear. Overfishing is a form of excessive fishing, the fish population is decreasing over time so that it can cause extinction and will cause degradation of fish resources leading to the extinction of the Senangin species. The purpose of this study was to determine the morphometric and meristic measurements of Senangin (*Eleutheronema tetradactylum*) in the waters of Mendahara Ilir which can be used as a consideration in making fisheries resource management policies. The method used in this study was the survey method. Data collection was carried out on 30 Senangin samples. Morphometric measurements used 10 characters and meristic calculations used 7 characters. The results of this study showed that the longest Senangin was 65.8 cm and the shortest was 19.0 cm. The average length of the Senangin obtained was 34.7 cm. The determination coefficient R^2 of senangin from morphometric characters to total length (TL) ranges from 0.94 to 0.99 where the value shows a very close relationship. The correlation results are influenced by food availability. Meristics of senangin are D.II: D17-19, A.II: A15-70, P.II: 10-76, C.II: 31-182, scales on the tail stem with a total of 136 and a minimum of 40, lateral line scales with a total of 170 and the minimum of 62. The conclusion is that Senangin in Mendahara Ilir are still well maintained habitat in Mendahara Ilir.

INTRODUCTION

Tanjung Jabung Timur Regency has the largest fisheries potential with a coastline of \pm 191 km. Based on the length of the coastline, Tanjung Jabung Timur Regency is one of the centers of fisheries business with a catchment area of \pm 5,503 km² and consists of \pm 28,763

Ha. (Dinas Perikanan dan Kelautan Provinsi Jambi, 2017). Tanjung Jabung Timur Regency consists of several villages, one of the villages which is a fishing area is Mendahara Ilir Village.

Mendahara Ilir Village is an area located on the coast with the majority of the community working as fishermen. Fishermen in this area catch fish using various fishing gear, namely Sondog, Gillnet, Rawai, Togok and Bubu fishing gear, among the many fishing gear used by Mendahara Ilir fishermen, one of which is the bottom gill net.

Bottom gillnet is a type of fishing tool made from netting material that is rectangular in shape with the same mesh size (Ngamel *et al.*, 2023). The Bottom Gillnet fishing gear used by fishermen to catch fish is not a new technology for fishermen, this is because the materials are easier to obtain, technically easy to operate and cheap, economically and affordable for fishermen, and more selective about the size of the fish caught (Dermawati *et al.*, 2019). Fishing using the Bottom gillnet bottom gillnet response tool used by fishermen in Mendahara Ilir village aims to catch Senangin (*Eleutheronema tetradactylum*) (Nita *et al.*, 2023).

Senangin is a marine fish belonging to the Polynemidae family. Senangin included in the group of fish that live in bottom waters (demersal) with muddy water conditions according to the habitat of Senangin which likes brackish and muddy waters (Maulana *et al.*, 2020). Senangin also has a fairly high economic value compared to other fish in Mendahara Village with a selling price reaching IDR 35,000 - IDR 50,000 per kg, while the market price in Mendahara Ilir Village reaches IDR 60,000 per kg. The high price of Senangin in Mendahara Ilir Village causes fishermen to continuously catch Senangin which can potentially overfish the area. Overfishing can cause extinction and will cause degradation of fish resources leading to the extinction of Senangin species, therefore efforts are needed to manage fish resources (Atmaja *et al.*, 2017).

Management based on biological information is very important to maintain sustainability in efforts to maintain sustainability (Purba *et al.*, 2023). Information on the biological aspects of Senangin in Mendahara Ilir village is still very limited, such as the relationship between body length and body weight, gonad maturity level, fecundity, structure size, and meristic morphometry (Abdullah *et al.*, 2019).

This study focuses on the morphometric and meristic variables of Senangin. Morphometrics is a measurement method used to identify fish in the field of fisheries biology by measuring certain parts of the body of Senangin (Valen *et al.*, 2022). In addition according to Magwa, *et al.*, (2023) that morphometric measurements are also useful for estimating fish populations. The results of the measurements are usually expressed in millimeters or centimeters, this size is called absolute size (Akmal *et al.*, 2018). Meristics is a quantitative calculation of the characteristics (body parts) of fish (Haryono, 2001). The availability of morphometric and meristic data can be used as a basis for managing Senangin resources, to find out the appropriate management of Senangin resources can be utilized optimally, so morphometric and meristic research is needed on Senangin (*Eleutheronema tetradactylum*) from gillnet catches in the waters of Mendahara Ilir, East Tanjung Jabung Regency.

METHODS

This research was conducted in Mendahara Ilir Village, East Tanjung Jabung Regency, Jambi Province. From January 28 to February 28, 2024. The tools used in this study were a ruler to measure the morphometrics of Senangin, a digital scale to measure the weight of Senangin, millimeter paper, a magnifying glass, a coolbox, ice cubes, plastic, labels, stationery, and a digital camera. This study used a survey method. The technique of taking and collecting

fish data and fish size was carried out by direct observation of the fish caught, data collection of fish size results was obtained from collectors using gillnet fishing gear, with 30 Senangin samples caught by fishermen. The data analysis used was the analysis of the morphometric character ratio, simple linear regression between total length (TL) and other characters, and the coefficient of determination.

Morphometric data collection accompanied by taking photos was carried out on a white background (millimeter paper) and a ruler, the photos obtained were used as secondary data in the measurements. The morphometric measurements measured were modified from (Haryono, 2001) in the form of 10 morphometric characters in table 1:

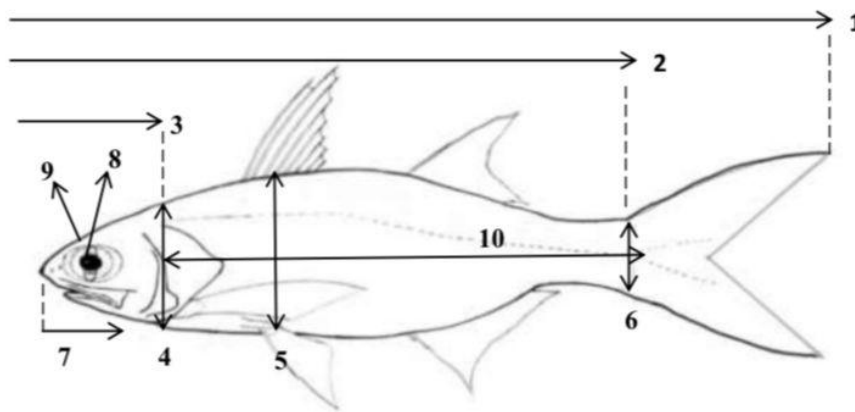


Figure 1. Morphometrics of Senangin

Table 1. Morphometrics of Senangin

No	Morphometric Measurement	Information
1.	Total length (TL)	The straight line distance between the tip of the front part of the head to the tip of the rearmost fin.
2.	Standard length (SL)	The straight line distance between the tip of the front head to the base of the tail
3.	Head length (HL)	The straight line distance between the ends of the front head section
4.	Head height (HH)	The straight line distance measured vertically at the highest part of the head
5.	Height (H)	The straight line distance measured vertically at the highest part of the body
6.	Tail base height (TPH)	The straight line distance measured vertically at the highest base of the tail
7.	Snout length (ML)	The straight line distance from the base of the face to the widest part of the operculum
8.	Eye diameter (EM)	The length of the center line of the eyeball is measured from the front to the back of the eyeball.
9.	Distance between two eyes (DBE)	The distance between two eyeballs in the eye socket outermost
10.	Fork length (FL)	The distance between the tip of the head to the bend of the tail fin branch

Meristic calculations through certain parts of the fish body are done manually using a magnifying glass. Fish sample materials to be identified, then sample the length of each fin,

the number of fin rays to the number of scales on the Senangin and measure 7 meristic characters in detail based on the survey method by making tables and graphs in the form of seven meristic characters (Haryono, 2001).

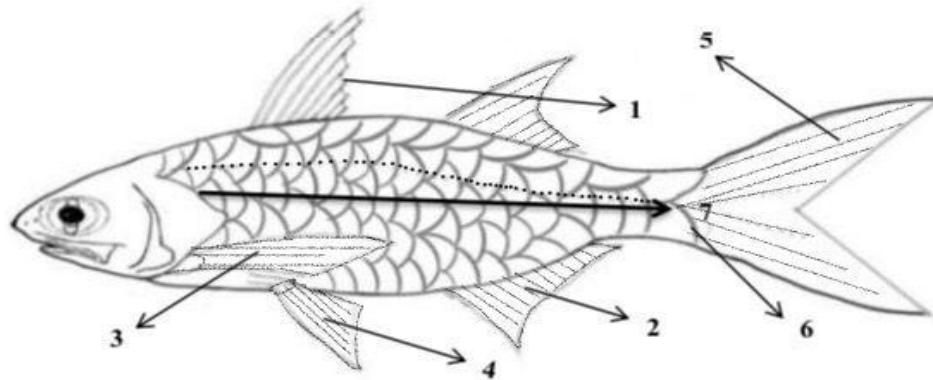


Figure 2. Meristics of Senangin

Table 2. Meristics of Senangin:

No	Meristic Description
1	Dorsal Rays
2	Anal Rays
3	Pectoral Rays
4	Ventral Rays
5	Caudal Rays
6	Scales on the tail stem (Caudal Peduncle Scale)
7	Lateral Line Scales (Linea Lateralis)

Data analysis used in this study is as follows:

1. Analysis of Morphometric Character Ratio

The measured morphometric characters are made into a comparative measure (rational morphometric). The ratio size analysis is carried out on the total length (TL) character against 10 other characters. The comparison of the morphometric character sizes of senangin fish is presented in table 3.

Table 3. Measured Morphometric Rationale

No	Ratio	Information
1.	SL : TL	Standard length : Total Length
2.	HL : TL	Head length : Total Length
3.	HH : TL	Head height : Total Length
4.	HW : TL	Height : Total Length
5.	TPH : TL	Tail base height : Total Length
6.	ML : TL	Snout length : Total Length
7.	ED : TL	Eye diameter : Total Length
8.	DBE : TL	Distance between two eyes : Total Length
9.	FL : TL	Fork length : Total Length

2. Linear Regression between Total Length (TL) and Other Characters

Regression is a measurement presented in the form of a linear regression equation. The formula is as follows:

$$Y = a + bX$$

Description:

Y: Dependent Variable (Bound Variable)

X: Independent Variable (Free Variable)

a: Constant (Value of Y when X=0)

b: Regression Coefficient (Positive or Negative Effect)

3. Coefficient of Determination

Test the coefficient of determination to determine the percentage of contribution of variable X to Y with the formula for the coefficient of determination is:

$$R^2 = 1 - \frac{\sum(y - \hat{y})^2}{\sum(y - \bar{y})^2}$$

The R^2 value criteria can be seen in table 4.

Table 4. R^2 Value Criteria

R^2 Value	Level of Influence
0,0 – 0.199	Very Low
0,2 – 0,399	Low
0,4 – 0,599	Currently
0,6 – 0,799	Strong
0,8 – 1,0	Very strong

RESULTS

Morphometric Characteristics of Senangin

The results of measuring morphometric characteristics of Senangin in the Mendahara Ilir waters can be seen in the following table 5.

Table 5. Morphometric Size of Senangin

Morphometric Characters	Min	Max	Average
Total Length	19.0	65.8	34.7
Standard Length	14.0	52.5	25.8
Fork Length	16.0	57.5	29.9
Head Length	3.0	17.0	7.7
Snout Length	2.0	7.5	4.2
Head height	3.0	14.5	6.0
Height	3.5	18.0	8.1
Tail Base Height	1.8	7.0	3.8
Eye Diameter	1.0	3.0	1.9
Distance between the 2 eyes	1.0	4.0	2.5

Relationship between Total Length and other characters

The relationship analysis of each morphometric character is determined by regression analysis. Linear regression analysis shows how much the length of one character increases by knowing the value of other morphometric characters.

Table 6. Coefficient of determination (R^2) Morphometric Characters of Total Length (TL)

Code	a + bx	R^2
Standard Length	2,73+ 1,23x	0,99
Fork Length	1,53 + 1,10x	0,99
Head Length	3,90 + 4,08x	0,97
Snout Length	3,05 + 7,59x	0,98
Head height	5,34 + 4,86x	0,95
Height	7,87 + 3,32x	0,99
Tail Base Height	4,45 + 7,89x	0,97
Eye Diameter	7,32 + 14,2x	0,81
Distance between the 2 eyes	- 0, 40 + 14,2x	0,92

Meristic Characters of Senangin

Meristic calculations on the fish body are done manually using a magnifying glass. The fish sample material to be identified using 7 meristic characters by counting the hard and soft rays.

The results of the measurements of the characteristics of Senangin originating from the Mendahara Ilir waters can be seen in the following table:

Table 7. Meristic Characters

No	Meristic Character	Results
1.	Dorsal fin rays	D. IV - X. 17-91
2.	Anal fin rays	A.II - VIII. 15-70
3.	Pectoral fin rays	P. II - VIII. 14-56
4.	Pelvic fin rays	V. II- VIII. 10-76
5.	Tail fin rays	C.II - VIII. 31-182
6.	Scales On Tail Stem	40. 136
7.	Lateral Line Scales	62. 170

DISCUSSION

Morphometric Characteristics of Senangin

Senangin in the Mendahara Ilir waters have the characteristic of an elongated and slightly flat body, and have large eyes. The pectoral fins, pelvic fins, dorsal fins consist of two parts, hard spines and weak fin rays. Senangin have a silvery body on the upper body and a cream-colored bottom. The dorsal and caudal fins are gray and slightly dark on the edges and the pectoral fins are yellow or orange.

The number of Senangin observed and measured for morphometric characteristics was 30. The morphometric characters of Senangin measured in this study were 10 characters. The fish measured were obtained from the Mendahara Ilir fishermen's fishing nets. Differences in the size of Senangin can be seen from the measurement of morphometric characters during the study.

From table 3, the total length obtained in this study was that the longest Senangin was 65.8 cm and the shortest was 19.0 cm. The average length of Senangin obtained was 34.7 cm. Dermawati *et al.* (2019) which states that the size of Senangin found in the waters of Maros Regency, South Sulawesi Province is long (16.2 - 22.7 cm). In a fish population, there can be

differences in morphometric size, this is caused by different geographical conditions so that it can cause condition factors that are used to compare species between populations which are also an indication of the physiological status of the fish. The physiological status of the fish itself is influenced by intrinsic factors such as gonad development, organic reserves, and the presence or absence of food in the waters. In addition, physiological status is also influenced by extrinsic factors such as food availability and is a response to the distribution and variation of morphometric size (Rodriguez *et al.*, 2017).

Relationship between Total Length and Other Characters

Based on the table above, the R^2 value shows that each character can be predicted based on total length or other characters obtained. Standard length 0.99, Fork length 0.99, Head length 0.94, Eye length 0.94, Head height 0.92, Body height 0.98, Tail base height 0.94, Body width 0.96, Eye diameter 0.23, Distance between the two eyes is 0.83.

The relationship between Total Length and other characters in table 4. It can be seen that each character has a very strong relationship with Total Length. The R^2 value ranges from 0.83-0.99, while the relationship between Eye Diameter and other characters has a low relationship with Total Length. The R^2 value ranges from 0.23-0.99. The results of the correlation are thought to be influenced by food availability. The food availability factor plays a very important role in the growth process. Chahyani (2016) stated that the morphometrics of each individual show different measurement results, some of the things that influence this are age, gender, food and living environment. According to Zuliani *et al.* (2016) stated that fish growth is influenced by several factors, namely external factors and internal factors. External factors include ecological factors that support fish growth, such as food, adaptation forms, reproduction and other limiting factors, while internal factors that affect fish growth, namely heredity (genetics), gender, parasites/diseases, fish size and gonad maturity.

Meristic Characters of Senangin

Based on table 5, Senangin have 2 hard dorsal fin rays, 17-91 soft fin rays, 2 hard anal fin rays, 15-70 soft fin rays, 2 hard pectoral fin rays, 14-56 soft fin rays, 2 hard pelvic fin rays, 10-76 soft fin rays, 2 hard caudal fin rays, 31-182 soft fin rays, 136 scales on the caudal peduncle and a minimum of 40, 170 lateral line scales and a minimum of 62. Wahyu research (2021), meristic calculations on Senangin found that there were 7 hard rays and 13 soft rays on the dorsal fin, and 12 rays on the anal fin. weak rays, on the pectoral fins there are 13 weak rays, on the pelvic fins there are 5 weak rays, the number of scales on the lateral line is 62 scales with a total length of 21.2 cm. The meristic characteristics of senangin in the Mendahara Ilir waters have almost the same characteristics. The shape and arrangement of fish meristics. Meristic characteristics such as the number of fin rays can vary depending on environmental conditions. Meristic traits can change due to habitat selection or resource management pressures (Sari *et al.*, 2020).

CONCLUSION

The results of the study showed that the length of the Senangin was 19-65.8 cm with an average length of the Senangin obtained being 34.7 cm. The determination coefficient of the Senangin from the morphometric character to the total length (TL) ranged from 0.83 - 0.99, indicating a very strong relationship with the Total Length (TL), while the relationship between DM and other characters had a low relationship with Total Length. The value ranged

from 0.23 - 0.99. The results of the correlation are thought to be influenced by the availability of food. The meristics of the Senangin are D.II; D17-19, A.II : A15-70, P.II : 10-76, C.II : 31-182, scales on the caudal peduncle with a total of 136 and a minimum of 40, lateral line scales with a total of 170 and a minimum of 62. From the morphometric and meristic data of Senangin in the Mendahara Ilir waters, its habitat in the Mendahara Ilir waters is still well maintained.

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