Morphology characteristics and length weight relationship of sucker barb fish (*Barbichthyys laevis* Valenciennes 1842)

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Abstract. Sucker barb fish is one of the potential of fish resources in Tasik river. This study aimed to determine the morphometric and meristic characteristics of the growth of sucker barb fish in the Tasik River. The method used in this study is a survey method using the fishing net and gillnet with mesh size 1.5 inches. The nets are placed in the afternoon, then lifted in the morning. This is done 3 times with a span of 2 weeks in the three research stations. The number of samples collected were 135 fish. The morphometric characteristics of sucker barb fish are bodyweight (BT) ranging from 9-85 g, total length (PT) ranging from 100-230 mm, standard length (PS) ranging from 75-176 mm, head length (PK) of 20-42 mm, snout length (PM) of 30 mm, the height of dorsal fin (TSP) of 40 mm, length of the base of dorsal fin (PPSP) of 15-30 mm, eye diameter (DM) of 10 mm, caudal peduncle (TBE) of 8-22 mm, body height (TB) of 17-40 mm, pectoral fin length (PSD) of 30 mm and pelvic fin length (PSP) of 25 mm. Meristic characteristics are the characteristics of counting the scales and fins of sucker barb fish. The number of scales in the lateral lines (LL) is 35-38, the body coiled scales (SMB) are 6, the scales around the pectoral fin (PF) P 10-14, anal fin (AF) A 8 and caudal fin (CF) C 18. The growth pattern of sucker barb fish in the Tasik River is allometric negative.

1. Introduction
Rivers are open channels that form naturally above the earth's surface, storing water and flowing it from upstream to downstream and to the estuary. A river can be defined as an open flow with geometric dimensions (latitude, longitudinal profile and valley slope) changing over time, depending on the discharge, bed and cliff materials, and the amount and type of sediment transported by the water [1].

The Tasik River is the Barumun watershed that flows along with the Panai Hulu District, Labuhanbatu Regency. Barumun River is a large river with a width of between 750 - 1050 m with a small river as a tributary/branch [2]. The mouth of the Barumun river is the Malacca Strait. One of the potential fish in the Tasik river is bentulu fish or sucker barb fish, that information we got based on communication with local fisherman.

Sucker barb fish is fish species that have economic value; sucker barb fish is fish consumption with low prices, and it does not taste good [3]. Now, sucker barb fish are classified as fish rarely found (based on communication with local society), so not many have done the research. This also occurs in
sucker barb fish in the Tasik river. The scarcity that occurs is thought to be due to the declining quality of the environment due to land conversion [4] one of them is conversion to oil palm plantations. In addition, overfishing by the community and the use of destructive fishing gear also cause a decrease in fish stocks, including Sucker barb fish [5]. Very minimal information about the existence of these fish is one of the obstacles in carrying out conservation efforts and the introduction of these fish species. The purpose of this study was to determine the morphometric and meristic characteristics of the growth of sucker barb fish in the Tasik River, South Labuhanbatu, North Sumatera.

2. Materials and Methods

2.1. Study site

The research was carried out for two months, from July - August 2020, in the Tasik River, South Labuhanbatu Regency, North Sumatera (figure 1). The research was carried out by taking 3 station points with different physical characteristics of the location. Station 1 is located downstream of the Barumun River with a depth of 0.5-2 m and has a strong current which is located at coordinates 0105641,1’LU 10000723,6’BT. Station 2 with a depth of 1-1.5 m with sandy mud substrate, this station is close to agricultural activities in the form of oil palm plantations located at coordinates 0105155,0’LU 10000649,3’BT. Station 3 with a depth of 1 m with muddy substrate, this station is close to agricultural activities in the form of oil palm plantations which are located at coordinates 0105058,5’LU 10000644,2’BT. The map of the research location can be seen in the image below.

![Map of the research location](image)

**Figure 1.** The map of research location (Station 1: 01\(^\circ\)56’41.1’LU dan 100\(^\circ\)07’23.6’BT; Station 2: 01\(^\circ\)51’55.0’LU and 100\(^\circ\)06’49.3’BT; Station 3: 01\(^\circ\)50’58.5’LU 100\(^\circ\)06’44.2’BT)

2.2. Procedures

The materials used in this study were sucker barb fish (*B. laevis*), 10% formalin solution, and label paper. The research procedure was carried out starting from sampling in the Tasik River. Fish are caught using nets. The nets are installed in the afternoon and removed the next morning. The stocking net was operated at 3 sampling stations, with 3 replications at each sampling station. Fish samples were taken 3 times in 2 months. The caught fish samples were photographed and labeled with the local name of the fish, location/station, date of collection, collector's name, and other necessary information and then put into a coolbox. The caught fish were preserved using formalin solution before being brought to the Biology and Aquaculture Laboratory. Faculty of Agriculture, University of Sumatera Utara for morphometric observations and measurements as well as meristic calculations.
The analysis of morphometric and meristic characters was carried out by direct calculations and measurements, and comparing the number and range of meristic, morphometric characters at each station. The results of the length and weight measurements are entered into the Ms Excel application to do data analysis in the form of length-frequency distribution, length-weight relationship and condition factor.

2.3. Data analysis
The analysis of morphometric and meristic characters was carried out by direct calculations and measurements, and comparing the number and range of meristic, morphometric characters at each station. The results of the length and weight measurements are entered into the Ms Excel application to do data analysis in the form of length-frequency distribution, length-weight relationship and condition factor.

2.3.1. Length frequency distribution

\[ n = 1 + 3.32 \log N \]

Where:
- \( n \) = number of size groups
- \( N \) = number of observed fish

2.3.2. Length and Weight Relationship. There are two types of growth patterns in fish, namely isometric growth (\( b=3 \)), if the length and weight gain of fish are balanced and allometric growth (\( b>3 \) or \( b<3 \)). \( b>3 \) indicates the fish is fat/plump, where the weight gain is faster than the increase in length. \( b<3 \) indicates a fish with a thin category, where the increase in length is faster than the increase in weight [6].

Weight can be thought of as a function of length. The relationship between length and weight can be known by the formula [7; 6]:

\[ W = a L^b \]

Where:
- \( W \) = Weight (grams)
- \( L \) = length (cm)
- \( a \) and \( b \) = Constant

2.4. Condition Factor. Condition factor is the condition or plumpness of the fish expressed in numbers to show the condition of the fish in terms of physical capacity to survive and reproduce. P growth sucker barb fish is allometric, i.e., the length and weight gain are not balanced [6]:

\[ K = \frac{W}{aL^b} \]

Where:
- \( K \) = Condition factor
- \( W \) = Weight of fish (grams)
- \( L \) = total length of fish (cm)

3. Result and discussion

3.1. Morphology of Sucker barb fish (Barbichthys laevis) in Tasik River
The morphology of sucker barb fish (Barbichthys laevis) in the Tasik River can be seen in Fig. 2 below.
The Tasik river has a lot of fish potential. One of them is bentulu fish. The Bentulu fish, the Labuhanbatu society, call it. Another name of bentulu fish is sucker barb fish. The results showed, for morphometric characteristics total length 100-230 mm, Standard Length 75-176, Head Length 20-42, Muzzle Length 30 mm, Dorsal Fin Height 40 mm, Back Fin Base Length 15-30 mm, Eye Diameter 10 mm, Tail Rod Height 8-22 mm, Body Height 17-40 mm, Pectoral Fin Length 30 mm, Abdominal Fin Length 25 mm. The results of the morphometric measurements are the same as those produced by [8,9].

As for the results of meristic measurements on sucker barb fish in the Tasik River, namely, the number of Linnea lateralis (LL) as many as 35-38, circular body scales (SMB) amounting to 6, caudal fin scales (SSBE) amounting to 6-8, dorsal fin (DF) amounting to D1.7-9, the ventral fin (VF) is 9, the pectoral fin (PF) is 10-14, the anal fin (AF) is eight and the caudal fin (CF) is 18. This is not much different from the research [10] conducted in the waters of Bukit Tiga Puluh with a value of D1.8, A 5; V 8; P 14; SMB 6.5 ; LL 36-37 scales.

Bentulu fish are classified into kingdom Animalia, phylum Chordata, class Actinopterygii, order Cypriniformes, family Cyprinidae, genus Barbichthys, species Barbichthys laevis. B. laevis has an elongated body shape, dark back colour and silvery ventral part. The dorsal fin is hard and lies in front of or coincides with the pelvic fin. Sucker barb fish has a widening of the bones under the eyes that almost cover the entire cheek. Sucker barb fish can reach a total length of 350 mm. There is a black line in the middle of the dorsal fin; Similarly, there is a black line on the top and bottom of the caudal fin. The black band running down the middle of the dorsal fin may be missing in large specimens. Sucker barb fish are found in the middle and upstream watersheds. It is a type of benthopelagic freshwater fish that lives in tropical waters with water temperatures between 23–26°C. Their diet consists of algae [3,8,9,11].

The distribution area of sucker barb fish covers Southeast Asia, which includes Thailand, Peninsular Malaysia, Sumatera, Kalimantan, Java, although one of the distribution areas of Ulubatu in Kalimantan is in the Barito River [11,3]. According [11], sucker barb fish has many regional names according to the location where the Sucker barb fish is found. The names are fish mandulah, pantaulu (Indragiri, Riau), bentulu, mentulu (Jambi), bakong and barakong (River Bo, Jombang), wadon gunung (Malaysia), santran (Sunda) and wader (Java).
3.2. Caught of Bentulu Fish (Sucker Barb fish, Barbichthys laevis, valenciennes 1842)

In general, freshwater is dominated by the family Cyprinidae fish species [12; 13]. Sucker barb fish is one of the Cyprinidae fish that is mostly found in the Tasik River. In Figure 3, it can be seen that the highest catch was found at station I, followed by stations II and III, where each had a value of 60, 41 and 34 fish. Catches Bentulu many rights as the income and consumption by residents.

![Figure 3. The caught of Sucker barb fish in research](image)

The difference in catches at each station is thought to be caused by each station's different conditions and characteristics. The largest population is a station I, the lower reaches of the Tasik river, the most downstream part compared to stations II and III, which have wide and deep water sizes, with muddy water bottoms. According to [14], in the river's waters, the more downstream the number of fish species gained more and more. The station I was also the location of the confluence of two rivers between Tasik and Barumun river. It is suspected that at this location, there is an abundance of nutrients that will result in the growth of plankton which is one of the foods for fish [15].

3.3. Length frequency distribution

The total of fish captured contained in the interval 134-150 mm totalling 35 fish, followed by the class interval 100-116 mm as many as 30 fish and lowest contained in the class interval 219-235 mm only one fish (Figure 4). The higher the class interval, the lower the population due to differences in the size of the fishing gear nets used and the water population [16,17]. Furthermore, [18] stated that this was due to fluctuations in water conditions and migration and mortality. At Tasik River, using gill nets with a mesh size of 1.25 inches to catch long-range tend to be smaller, and adult fish are not caught. According to [6] internal and external factors could cause the difference in the number of fish caught. Internal factors such as heredity, sex, age, parasites, disease, and external factors such as temperature and food.
3.4. Relationship Length Weight

The analysis of weight length relationship sucker barb fish in Tasik River obtained the following equation: \( W = 2E^{-0.07}x^{2.765} \) with b value of 2.765. This shows that the growth of sucker barb fish is negative allometric where the value of b < 3, which means the length increase is faster than the weight gain. Value \((R^2) = 0.953\) so the value of r is 0.976 (Figure 5). N use values of r show the strong influence of the length of the total body weight gain sucker barb fish.

![Graph of length weight relationship of sucker barb fish](image)

**Figure 5.** Graph of length weight relationship of sucker barb fish

The relationship between total length and weight shows that the regression coefficient (b) of sucker barb fish found in the Tasik River is 2.765. This means that sucker barb fish have a body shape that is at the limit of the body shape of fish in general. According [6], the range value b of 2.5 - 3.5. [6,19] the variation in the b value of each fish species is influenced by the fish species itself, water conditions, fish species, gonad maturity level, fish maturity level, season and time of catching.

3.5. Condition Factor

The average value of the condition factor of sucker barb fish in the Tasik River, the highest to the lowest, is at stations 1, 2 and 3 of 0.173, 0.090 and 0.058 (Table 1). The value of the condition factor can indicate the level of plumpness of the fish in the aquatic environment. One of the differences in the value of condition factors at each station can be environmental factors where the environmental conditions are suitable for sucker barb fish [12; 13]. The highest fact or condition value is found at a station I of 0.173. Stasiun I is the most suitable location for fish growth sucker barb; this is caused by the higher value of the condition factor of a fish, the more suitable the fish that with it environmental.[6] the magnitude of the condition factor depends on the number of organisms present, the organism's condition, the availability of food and the condition of the aquatic environment.
Table 1. The value of condition factor of sucker barb fish (*Barbichthys laevis*).

| Observed station | Number (n) | Average | Standar Deviasi |
|------------------|------------|---------|-----------------|
| Stasiun 1        | 60         | 0.173   | ±0.059          |
| Stasiun 2        | 41         | 0.090   |                 |
| Stasiun 3        | 34         | 0.058   |                 |

4. Conclusion
The total overall sucker barb fish caught during the study was 135 fish with the morphology of the body elongated, dark colour backs and silvery ventral section. The dorsal fin is hard and lies in front of or coincides with the location of the pelvic fins. The relationship between the length and weight of sucker barb fish shows a close relationship in which the increase in total length affects weight gain.

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