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POPULATION DIVERSITY BASED ON MORPHOMETRIC MERISTIC ENDEMIC BUTINI FISH (*Glossogobius matanensis*) IN LAKE TOWUTI, SOUTH SULAWESI

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Abstract

Butini fish is a resource wealth of fauna found only in the East Complex Malili Luwu, South Sulawesi. The necessary information about the morphological characters (morphometric and meristic) to determine the management of fish resources. The purpose is to assess the diversity of populations based on morphometric meristik. Sampling is based on descriptive methods and fish samples taken to determine the diversity of phenotypes based on the depth of each morphometric character. Calculating morphometric characters using the main component analysis to obtain the correlation between the character and the grouping of individuals based on morphometric characters. Calculation meristik characters include the number of fingers, the number of fins and scales, namely the number of fingers of the dorsal fin, anal fin radius, the radius of the ventral fin, pectoral fin radius, the radius of the caudal fin, scales on the rib line, scales above the rib line, scales below the ribs, scales in front of the dorsal fins, scales on the cheeks, around the body scales, scales around the tail shaft. The analysis showed that the first two principal components contained the greatest information, with a cumulative range of 80%. All the characters' morphometric first role is a major component. The character who plays the main component of the length of the head in front of the eyes, long upper jaw, lower jaw length, high cheeks, and the length of the radius of a weak base ventral fins showed great correlation to the diversity of forms. Main components analysis also showed that butini fish, at any depth, showed no grouping. This suggests that the fish species observed was one (one unit of population). In calculating the value of phenotypic diversity of each character, butini generally fish in the lake Towuti show morphometric characters with the highest diversity value and the lowest given by the total length and high under the eyes. In the calculation of the formula derived characters meristik flipper fingers that D1, V-VI. D2. I, 8-11; dan D1, V-VI, D2. I, 8-10.

Keywords: *Population, diversity, endemic butini fish, Towuti lake.*

INTRODUCTION

Butini fish is one of the wealth of fauna resources found in Lake Towuti. This fish is wild because it has not been cultivated and is part of Indonesia's fishery potential. Butini fish is a very valuable germplasm for the people around the lake because it is one of the fish that can be consumed as a source of animal protein and is also economically important.

Butini fish has a high potential for people's welfare. For the butini fish population to remain high, it

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is necessary to preserve the existence of this fish because the population level of a species can be determined by the ideal number of living species and environmental conditions such as food availability, predators, competition with living beings of the same species or other species and climate and climate. Disease.

The level of individual diversity within and between populations describes the status of the existence of these species in nature. Currently, the presence of butini fish is felt by local fishermen to decrease in number from year to year based on catches using salue/fishing line. Also, various human activities can damage the environmental conditions of butini fish resources and other fish species, causing a decrease in population and diversity. Low levels of diversity indicate a decrease in populations in nature due to inbreeding. Populations with high diversity have better life opportunities because they can better adapt to their environment.

Biological information, such as the genetic diversity of these fish, still needs to be improved. Even the genetic variation of a population has an essential meaning because this factor influences the population's response to natural and artificial selection by humans. Soelistyowaty (1996) states that loss or reduction of genetic diversity will be fatal in the development, growth, fertility and resistance to disease, which is an important process in life.

According to Al-Hassan (1984, 1987a, b), each fish population has different characteristics, and meristic characteristics and variations can be used to separate populations of different species (Seymour 1959; MacCrimmon and Clayton 1985; By taking into account the problem approach above, it is important to conduct this research to study population diversity based on meristic morphometrics of butini endemic fish in the Towuti Lake ecosystem as a basis for determining management policies and utilization of aquatic resources so that the sustainability of butini fish populations can be sustainable.

RESEARCH METHODS

The sampled fish is butini fish from Lake Towuti, located in East Luwu Regency, South Sulawesi. Sampling was carried out every month for 12 months with a descriptive method.

Based on the shape, topography and hydrology of Lake Towuti, the determination of research zones was based on the presence of inlets, outlets, near settlements, sawmill discharges, and depth. The study area was determined to be three zones, namely zone A stretching from the edge of the lake (Timampu). It is expected can represent areas with high community activity, namely saw mil (sawmills), fishery, irrigation and agriculture to Loeha Island (the island in the middle of the lake). Zone B extends near the inlet (Tominanga River from Lake Mahalona) to Loeha Island. Zone C stretches from Loeha Island to near the outlet (Hola-hola river), an overview of the location map and the determination of the sampling research zone can be seen in Figure 1.

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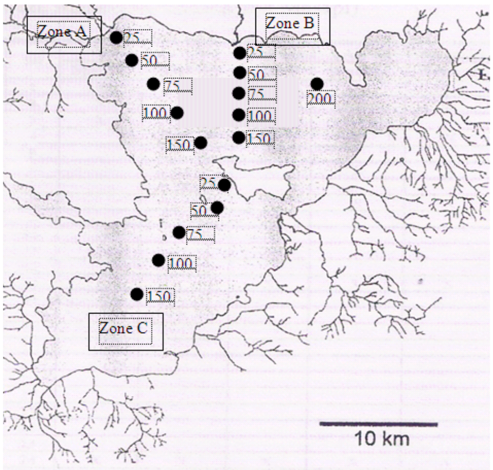

Figure 1. Map of research locations

Fish sampling is carried out monthly in each zone at depths of 25, 50, 75, 100 and 150 meters and 200 meters. Fish samples were obtained from catches using salue/longline (long line) of 5 (five) units with hook sizes Numbers 8, 10, 12, 14 and 16 each of 40 hooks. The distance between one hook and the hook is 5 m, a total of 200 hooks on one salue.

To determine the diversity of butini fish, measurements were made on the morphometric and meristic characteristics (Figure 2). Morphometrics are characteristics related to the size of the body or body parts of fish, and meristics are characteristics related to the number of certain parts of the fish's body. For the components of the morphometric test, refer to Cailet et al., 1985. Calculation of morphometric characters to obtain correlations between characters and individual groupings. Meristic character calculation includes the number of fin rays and several scales, namely the number of dorsal fin rays, anal fin rays, ventral fin rays, pectoral fin rays, caudal fin rays, scales on the lateral line (LL), scales above the lateral line (LL), scales below the lateral line, scales in front of the dorsal fin, scales on the cheeks, scales around the body, scales around the caudal fin.

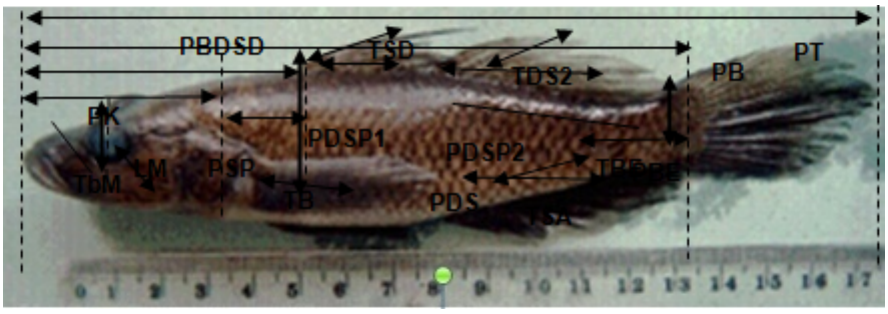

Figure 2. Morphometric and meristic characters of butini fish.

Data analysis

Analysis of the coefficient of diversity (CV) to see individual competition and adaptability possessed by the population based on the dispersion of morphometric and meristic values is calculated using the formula (Walpole, 1990): CV = St. Dev ⁄M x 100 %. Using the help of the SPSS 11.5 program

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RESULTS AND DISCUSSION

Butini Fish Catches.

The number of fish caught at each depth varies. As shown in Table 1.

Table 1. The number of butini fish caught based on depth during the research in Lake Towuti.

Depth (meters)	Number /depth (heads)	Total percentage (%)	Gender			
			Male	Percentage Total number(%)	Female	Percentage Total number(%)
25	252	11.481	155	7.06	97	4.42
50	357	16.264	250	11.39	107	4.88
75	434	19.772	302	13.76	132	6.01
100	498	22.688	309	14.08	189	8.61
150	422	19.226	265	12.07	157	7.15
200	232	10.569	120	5.47	112	5.10
Total number	2195 head	100 %	1401		794	

Butini fish life in the waters is not limited to a certain depth but occupies the entire depth. The male sex dominates the in-depth number percentage of sexes. According to Kreb (1985), fish distribution is influenced by several factors, including the behavior of fish in choosing a habitat and the relationship between fish and other organisms.

The availability of food materials in the form of worms, fish and crabs (Wirjoatmodjo, 2003) for butini fish in the aquatic environment and the low level of competition allows these fish to dominate the aquatic environment of the lake. Butini fish are classified as a group of carnivorous (meat-eating) fish, as also explained by Kottelat et al. (1993) that, in general, the Gobiidae family is a predatory fish.

Aquatic organisms live in an environment whose conditions often differ from their body environment. Even these environmental conditions often change from time to time. Changes often follow changes in environmental physical and chemical parameters in biological parameters, such as the diversity and abundance of aquatic biota.

Diversity based on morphometric characters

The number of samples used was 2195, consisting of 1401 males and 794 females obtained during the study at various depths. After morphometric measurements, there are variations in size. Morphometric diversity is expressed in terms of each population's coefficient of variation (CV) according to depth. The average coefficient of variation for all characters of butini fish (G. matanensis) can be seen in Table 2.

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Table 2. Coefficient of diversity of morphometric characters of butini fish (G. matanensis) during research at Lake Towuti.

Morphometric Characters	Depth CV					
	25 m	**50 m**	**75 m**	**100 m**	**150 m**	**200 m**
1	16.04	18.88	16.38	17.14	16.76	10.87
2	15.29	18.02	15.58	16.96	16.50	10.24
3	23.43	30.13	47.64	24.97	22.83	15.91
4	18.76	22.26	55.39	21.65	19.45	12.79
5	19.75	21.36	19.76	21.50	18.02	14.94
6	21.68	24.85	21.57	27.01	21.56	13.65
7	22.52	26.46	21.59	23.65	21.64	17.34
8	18.69	20.80	18.23	18.87	18.70	13.32
9	20.29	22.35	18.91	20.68	19.53	14.97
10	40.65	45.81	38.84	37.74	34.09	27.61
11	32.68	34.15	31.62	49.24	41.19	24.59
12	34.21	59.36	32.23	33.55	33.26	26.16
13	23.21	25.50	20.38	20.14	20.38	15.86
14	22.49	25.62	19.66	21.21	49.38	16.15
15	27.93	34.93	44.27	28.57	31.10	22.40
16	16.87	20.64	17.52	18.30	18.28	10.62
17	21.55	27.93	26.90	25.68	24.21	16.68
18	18.67	21.80	20.98	21.69	21.06	18.44
19	23.49	26.57	23.65	25.07	24.16	17.07
20	20.45	23.22	20.11	21.83	20.50	14.56
21	18.75	24.94	18.16	18.77	19.82	20.83
22	61.56	23.46	21.06	23.01	21.71	14.65
23	21.50	26.46	23.29	24.99	23.52	16.09

Information:
1 = total length (cm)
2 = standard length (cm)
3 = Body height (cm)
4 = Height of the tail (cm)
5 = tail length (cm)
6 = length in front of dorsal fin (cm)
7 = length of base of dorsal fin 1 (cm)
8 = length of base of dorsal fin 2 (cm)
9 = length of anal fin base (cm)
10 = Dorsal fin height 1 (cm)
11 = Height of dorsal fin 2 (cm)
12 = height of anal fin (cm)
13 = pectoral fin length (cm)
14 = pelvic fin length (cm)
15 = Longest dorsal fin radius (cm)
16 = Length of the head (cm)
17 = head width (cm)
18 = length in front of eye (cm)
19 = height under eye (cm)
20 = length between eyes and angle of front gill cover (cm)
21 = eye width (cm)
22 = Maxillary length (cm)
23 = Width of lower head (cm)

The lowest coefficient of variation is shown in the standard length of fish (character 2). At the same time, the highest on character 22, at a depth of 25 meters, is (61.56). The low coefficient of variation at standard length indicates that all fish at each depth have relatively the same size variations. At each depth, there is a difference in the standard length. There is suspected fish movement in these waters, so the results of standard length measurements can represent the entire fish population. The highest value in character 22 is thought to be related to the fish's mouth opening. Namely, at a depth of 25 meters, the fish will prey on the more significant food types available in these waters.

The largest average coefficient of variation at all depths (25 m, 50 m, 75 m, 100 m, 150 m, 200 m) is shown in character 10 (height of dorsal fin 1), ranging from 27.61 – 45.81 %. Meanwhile, the other

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characters show various variations in the coefficient of diversity. The high coefficient of diversity in character ten is thought to be influenced by environmental factors in the form of currents and water pressure which causes the height of the dorsal fin as a means of locomotion of fish to adjust to these conditions. The fins are used to swim and balance the body when current conditions increase. When there is a change in current conditions, the function of the fins is maximized so that the fish will try to develop the ability of this organ to maintain existence at each depth. Therefore the variation of the diversity coefficient on the fins is more significant than the other characters.

Overall, the variation in the value of the coefficient of diversity occurs at all depths and morphometric characters. This shows that water depth significantly affects changes in coefficients based on morphometric character values. Turan et al. 2004. found that phenotypic variations were due to environmental influences. A decrease in the coefficient of diversity was seen at a depth of 200 meters for all morphometric characters measured. The influence of depth is too deep and relatively stable, causing the variation to be smaller.

The coefficient of variation based on male and female sex results in the lowest diversity for male fish at a standard length (character 2) at all depths. This shows that the standard length measures are different, but the variations in standard length sizes in male fish are relatively the same for each depth.

The highest diversity coefficient for male butini fish was at a depth of 100 m with a value of 58.39% in the high dorsal fin character 2. However, there was a tendency in characters 10 to 12 to increase the coefficient of diversity. This is presumably due to the function of these organs in maintaining and controlling movement when changes in water currents and pressure occur. Fish must adjust their motion to the amount of current and pressure so that the dorsal fin, as a means of locomotion of the fish, is also growing.

The value of the coefficient of variation between characters at a depth of 25 tends to be higher than the others, especially the height of the dorsal fin. The height of dorsal fin 1 marks a depth of 25, and the depth of 100 is marked by the height of dorsal fin 2 (two). A depth of 150 is marked by the length of the base of the dorsal fin, the length of the pectoral fin, and the depth of 200 dorsal fin height and anal fin height. This shows that the character of the fins in fish varies greatly depending on the fish's presence and the aquatic environment's conditions because organs will develop according to their environment.

While the female butini fish's lowest coefficient value occurs at the standard length size except at a depth of 100 meters for the character height below the eye, this shows that the standard length and height under the eyes are relatively the same size (Table 2b.)

The morphometric character that has the smallest value at each depth is at a depth of 200 meters. Meanwhile, the highest coefficient of variation for each depth population was found in the high dorsal fin one character, respectively 39.59%, 36.11%, 29.45%, 31.94%, 25.76% and 25.32%. The coefficient of variation in the height of the dorsal fin one at a depth of 25 is greater than at a depth of 200. This difference can occur because, at a depth of 25 m, it is much influenced by the surface area where waves and waves and even currents often occur, so that fish at this depth must adapt to balance their bodies compared to

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depth—200, which is relatively stable.

This indicates that the butini fish (G. matanensis) population at a depth of 25 m has undergone a selection process to obtain a more diverse standard length compared to a more uniform depth of 200 m. Each population between depths has a close kinship shown by inter-populations that coincide. The distribution of the morphometric characters of butini fish is depicted on the canonical chart (Figure 3).

The distribution of male butini fish morphometric characters shows that the morphometric relationship between the six depth differences is quite close. The morphometric distribution of the six-length measurements coincides with the center distribution axis.

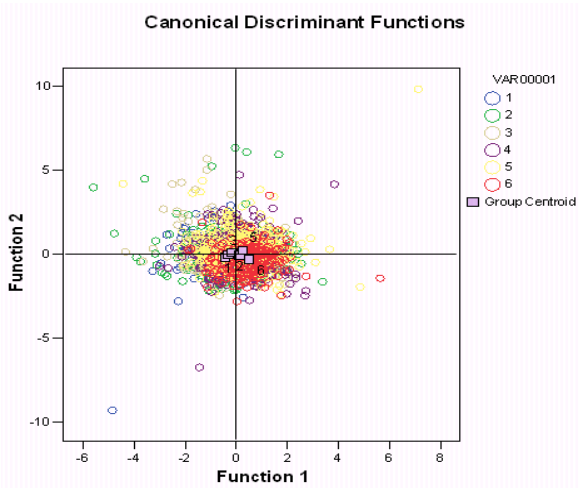

Figure 3. The distribution of fish butini morphometric characters (*G.matanensis*) is based on the deep discriminant analysis results in Lake Towuti.

The distribution of morphometric characters of female butini fish tends to spread at various depths (Figure 3). The morphometric characteristics of female butini fish are more diverse when compared to male butini fish. This is presumably because there are female butini fish in a mature gonad state, so they have various body sizes and vary from one another.

The closeness of the correlation between the characters of butini fish (G.matanensis)

Based on the correlation analysis needed to determine the degree of relationship between the existing variables. Statistically, according to Sudjana (1986), correlation analysis is carried out when the observed data consists of many variables. It is necessary to know how strong the relationship between the variables occurs.

In male butini fish, all variables have a positive correlation. The positive correlation value indicates a unidirectional relationship between the two characters. The highest positive correlation of butini fish is found in the total length and standard length characters of 0.97. The increase in the standard length is enormous on the increase in the total length of the butini fish because the correlation value between the two is almost close to one.

The highest correlation value of female butini fish of 0.97 is found in the character of the width of the head with the width of the lower head. This shows a very close influence relationship between the two.

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If you want to know the increase in the length and width of the butini fish's head, you can do it only by measuring the length and width of the bottom of the head.

To find out the total length can be seen from the estimating factor without measuring the total length of the population in Lake Towuti directly. At the same time, the lowest correlation value of 0.508% was obtained between maxillary length and anal fin height (Table 1).

Based on the statistical calculation table with a significant value of 0.05, the identifying characters of butini fish are obtained, namely total and standard length. Suppose one of the characters has an increase in length. In that case, the character that is positively correlated with that character will also increase in length, so if there is a reduction in the length of one of the characters, it will be followed by a reduction in the length of the character that is positively correlated with that character (Hadi, 1976).

The results of the morphometric characters at each depth form groups, namely the depths of 25 and 50 meters have the same character, and together with a depth of 75 meters, they form 1 group. The same is true for the 150-200 meter depth group, which forms almost the same character as the 100-meter depth. This shows that at depths of 25 and 50, the characters are almost uniform and slightly different from the characters at depth 75 but are still in the same group, as well as at depths of 150 and 200 meters, the characters are almost uniform and slightly different from the existing characters. At a depth of 100, but still in one group.

Based on an average value of 27,008 and ± SD of 1,051 for the total length and an average standard length of 22, 211 and ± SD of 0.697 in all populations at each depth, the same size is not significantly different. The size of the fish tends to be more profound the longer. Based on the value of sharing between low and high populations, all populations have a close kinship.

Body size similarity (Sharing component) Butini fish

The estimation of sharing components or similarity (index of similarity) can use discriminant analysis results based on the similarity of certain body sizes (Suparyanto et al., 1999). The closeness of all butini fish components between populations will be clearer by sharing the butini phenotype component from the population per depth (Table 5). The greatest similarity in body size to male butini fish is found at a depth of 200 m by 51.24% (Table 3a). This shows that most of the fish at this depth have the same size shape.

Table 3. Value of sharing component of butini fish (*G.matanensis*)

Depth	**25**	**50**	**75**	**100**	**150**	**200**	**TOTAL**
25	**38.1**	13.9	13.9	4.8	9.9	19.4	100,00
50	28.6	**24.6**	12.3	5.3	9.5	19.6	100,00
75	21.4	13.4	**20.7**	11.5	13.6	19.4	100,00
100	17.9	12.7	15.7	**14.9**	14.7	24.3	100,00
150	16.6	11.8	13.0	7.3	**24.6**	26.5	100,00
200	12.9	6.0	11.2	11.2	16.4	**42.2**	100,00

The most significant similarity in body size to butini fish is found at a depth of 200 m by 42.2% (Table 3). The body size similarity value of male butini fish based on depth is 51.24%. While the body size

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similarity of female butini fish based on depth is 51.57%. This causes the butini fish from deep water populations to have a more uniform body size on average.

Table 3a. Value of sharing component of male butini fish (G.matanensis).

Depth	**25**	**50**	**75**	**100**	**150**	**200**	**TOTAL**
25	**27,56**	26,28	22,44	7,05	2,56	14,10	100,00
50	9,20	**35,60**	18,40	8,00	10,40	18,40	100,00
75	6,93	17,49	**32,01**	10,89	13,53	19,14	100,00
100	4,21	21,04	16,18	**17,80**	18,77	22,01	100,00
150	5,66	14,72	15,09	9,81	**31,32**	23,40	100,00
200	3,31	9,09	11,57	9,92	14,88	**51,24**	100,00

The most significant similarity in body size to female butini fish is found at a depth of 200 m by 51.79% (table 3b). The body size similarity value of female butini fish based on depth is 51.79%. This causes butini fish from deep water populations to have a more uniform body size on average.

Table 3b. Value of sharing component of female butini fish (G.matanensis).

Depth	**25**	**50**	**75**	**100**	**150**	**200**	**TOTAL**
25	**42,97**	15,63	8,59	12,50	9,38	10,94	100,00
50	13,08	**33,64**	7,48	12,15	11,21	22,43	100,00
75	5,34	16,79	**35,88**	16,79	8,40	16,79	100,00
100	7,03	12,43	16,22	**24,86**	17,84	21,62	100,00
150	1,28	11,54	16,03	17,31	**27,56**	26,28	100,00
200	0,00	12,50	12,50	8,93	14,29	**51,79**	100,00

The similarity value of body size explains that there is a measurable mix between one population and another or that component is a trait (character of heredity) maintained or shared when gene flow occurs.

Based on the genetic distance of the largest male butini fish found between 25 m and 200 m depth, namely 0.98, the genetic distance between populations is very close, namely 25 to 50 depth of 0.01 or 99.9% similarity level. Judging from the distance between the depths of 25 m and 200 m, it is the farthest, so it is possible to have the most distant relationship. Environmental differences at depths of 25 m and 200 m also affect the genetic distance between individuals within them. The environment includes the availability of light, the availability of food, the mass pressure of water, turbidity and water currents and even dissolved oxygen. In addition, temperature and pH also affect the body's fish metabolism.

Table 4a. Kinship relationship between male butini fish (G.matanensis) between depths in Lake Towuti.

Depth	**25**	**50**	**75**	**100**	**150**	**200**
25	0,00					
50	0,01	0,00				
75	0,21	0,02	0,00			
100	0,60	0,35	0,08	0,00		
150	0,88	0,64	0,38	0,06	0,00	
200	**0,98**	0,77	0,47	0,08	0,04	0,00

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For female butini fish, the greatest genetic distance values were found at a depth of 25 m and 200 m of 0.98. This is the same as the genetic distance in male butini fish. Based on the very close genetic distance between populations, a depth of 150 to 100 of 0.11 or 89% level of similarity. This shows that the fish come from the same genetic character.

Table 4b. Kinship relationship between female butini fish (G.matanensis) between depths in Lake Towuti.

Depth	**25**	**50**	**75**	**100**	**150**	**200**
25	0,00					
50	0,17	0,00				
75	0,45	0,19	0,00			
100	0,60	0,38	0,12	0,00		
150	0,55	0,29	0,00	0,11	0,00	
200	**0,98**	0,78	0,52	0,32	0,47	0,00

Genetic distance measures genetic differences between populations calculated based on allele frequencies (Nei, 1987). Allele frequency deviations will result in shifts in the genetic balance due to reduced density in populations that separate from each other so that they combine to form new geographic areas.

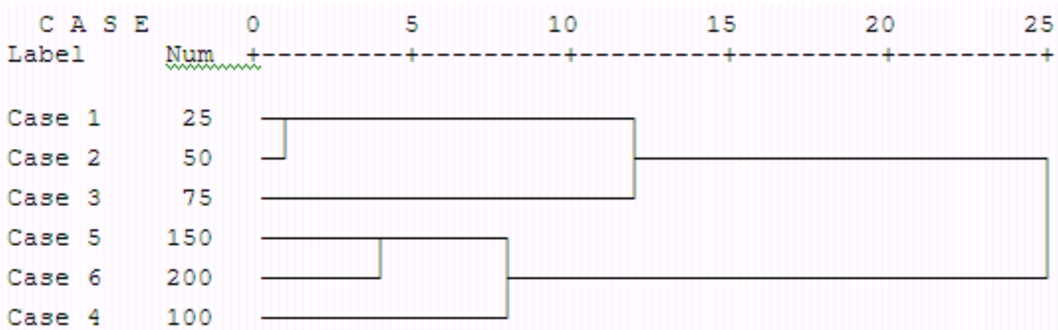

Figure 4. Dendogram of morphometric distances of butini fish (G.matanensis) based on the results of cluster hierarchical analysis in Lake Towuti.

The dendrogram of Figure 4 shows the existence of two kinship groups, namely depths of 25, 50 and 75 m which are group 1 and depths of 100, 150 and 200 m which are group 2. Group 1 has shallow water depths, while group 2 has deeper ones.

Diversity based on meristic characters.

Meristic characters calculated at ten character sizes in butini fish showed variations with changes in body size. The other five characters did not differ between size groups, namely the number of dorsal fins 1, the number of pectoral fins, the number of scales above the lateral line, the number of dorsal fins front scales, and the number of scales that surround the caudal peduncle (Table 5).

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Table 5. The range of meristic characters of butini fish by sex

No.	Meristic Characteristics	Fish sex	
		Male	Female
1.	∑ dorsal fin 1	D.I, V-VI	DI, V-VI
2.	∑ dorsal fin 2	D2, I, 8-11	D2, I,8-10
3.	∑ anal fin	A I, 9-10	A I,9-10
4.	∑ pectoral fin	14-18	14-18
5.	∑ scales LL	25-37	29-37
6.	∑ scales above LL	3-4	3-4
7.	∑ scales under LL	5-6	5-8
8.	∑ front scales of dorsal fin	23-30	23-30
9.	∑ scales encircling the tail	12-14	12-14
10.	∑ gill rakers in arch I	8-10	8-11

The table above shows the difference in the range of some of the meristic characteristics of butini fish in 10 different size groups. Differences in aquatic environmental conditions can impact adaptation patterns, between adaptations in body shape and size or a number of several body parts. Differences in meristic characteristics can also indicate the stability of the characteristics of a particular species, which may change due to habitat selection or management pressures on the aquatic resources.

Increasing the size of the fish causes changes in meristic characteristics, such as increasing the number of scales on some parts of the fish's body. According to Affandi et al., 1992 The difference in this comparison size can be caused by age, sex and living environments such as food, temperature, pH and salinity.

Statistically, there was no significant difference between each character and between characters in the population. Meristic differences between fish populations can be influenced by genetic or environmental factors, or both (Bailey & Gosline, 1955). Observing meristic variation in fish, significant differences occur between populations, usually on several measurements from among separate populations, as continuous changes tend to produce genetic differences in each individual. However, meristic characters may differ by a number of environmental differences during early development (Tanning, 1952). Natural selection will change characters, and when total separation occurs, genetic differences may occur according to timing and development between populations.

Specific genetic factors do not always govern meristic characters in some marine fish (Okamoto, 1988; Yokogawa & Taniguchi, 1988). Their report shows that meristic numbers usually correspond to genetic differences in some cases, whereas they are unrelated to genetic factors in other cases. Apart from the possibility of the heterogeneous origin of the fish stocks used in the aquaculture process in Libya, variations in environmental factors occurring on the Libyan coast and lakes under consideration cannot be discounted as causative agents for the meristic character of the variation of the fish species concerned.

Henderson (1985) states that various fish tend to seek natural habitats that are suitable and similar to their natural habitat. If the habitat environment changes from the original, the fish will try to find a habitat similar to their natural habitat, and if they are not found, the fish will try to adapt. If the environment or water quality continues to pressure the population, the abundance and distribution of fish will change.

According to Bailey and Gosline 1955, Laith (2001) states that meristic differences between fish populations can be affected by genetic or environmental factors or both. While Poulet et al. 2004, analysis performed on all meristic variables showed no significant differences between sites, sex or age.

Laith's (2001) main limitation of morphological characters at the intra-specific level is that phenotypic variation is not directly under genetic control but undergoes environmental modification. Specific genetic factors do not always govern meristic characters in some marine fish (Okamoto, 1988; Yokogawa & Taniguchi, 1988). Their report shows that meristic numbers usually correspond to genetic differences in some cases, whereas they are unrelated to genetic factors in other cases. Apart from the possibility of the heterogeneous origin of the fish stocks used in the aquaculture process in Libya, variations in the environmental factors occurring in the Libyan coast and lakes under consideration cannot be discounted as causative agents for the meristic character of the variations of the fish species concerned.

CONCLUSION

The level of diversity of the butini fish population is based on the value of the coefficient of variation (CV) based on morphometrics. There is no significant difference between the existing fish at each depth, so these fish are still classified as one population group.

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