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Domestication of Nyalian Fish (Rasbora sp) as an Effort to Conserve Local Fish in Bali Province

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A B S T R A C T

The biodiversity of local freshwater fish native to Indonesia is very abundant but has not been widely used in aquaculture. Direct use is still within the level of capture in nature which is feared to endanger its population in nature. One alternative to prevention is to increase cultivation and reduce overfishing. Before carrying out fish farming first in domestication so that the fish are accustomed to living in a controlled environment. Feeding habits and growth *Nyalian fish* eat feed that floats or does not immediately sink to the bottom of the waters. It also corresponds to the position of his mouth looking up obliquely and his habits of life on the surface of the waters. The sampling method is *Nyalian fish* samples collected at two locations and data analysis on this research using SPSS. The growth of *Rasbora lateristriata* fish during domestication showed significant results, namely the absolute growth of the calculated t-test value of 16.948 with a significance level of 0.000. The growth of the total length with a calculated t-test value of 14.091 with a significance level of 0.000. Weight growth with a calculated t-test value of 9.045 with a significance level of 0.000. The relationship between length and weight shows significant results where the increase in standard length will be followed by weight growth. Water quality during the study, namely pH, DO and temperature is still following the life of Italian fish. The results of the study show that Nyalian fish can adapt to the artificial environment

1. INTRODUCTION

1.1. Research Background

Domestication is an attempt to enable animals, including fish, that are commonly wild-living to be viable and bred under controlled conditions. In this study, it was studied about the varieties of Nyalian fish found in public waters including rivers and lakes, adaptation to the environment and artificial feed, and their breeding. To elevate one local species to the national to a global market, domestication efforts [1–3] are needed, namely efforts to tame and adjust fish caught from their natural habitat to engineering containers of cultivation, to be subsequently used in aquaculture activities and ensure continuity of numbers and avoid extinction of these species. Domestication is needed to obtain the hatchery technology and environmental management efforts needed. Nyalian fish populations are currently difficult to find in public waters such as lakes and rivers in Bali Province. In the Sungi river area, Tabanan regency, especially in the upper reaches, there are very few Nyalian fish populations compared to the middle and lower reaches of the river. It is feared that Nyalian fish will become increasingly extinct due to overfishing. Nyalian fish is also widely used for religious events in Bali and there is no Nyalian fish farming in Bali Province. One way to reduce the extinction rate of tapah fish is by carrying out fish farming. before carrying out fish farming first in domestication so that the fish are accustomed to living in a controlled environment. There are two main reasons for the taming of wild creatures in nature, namely to cultivate for the sufficiency of food or human well-being, and the protection or fencing of these creatures. The domestication of fish is an attempt or process of raising wild fish from nature to tame and accustomed to its life in the human household environment. So it is indeed taming wild creatures from nature to the human environment so that the life of living things can be reasonably controlled. The size used as a sign of a living being is benign or 'domesticated', namely normal and calm behavior, willing to eat natural and artificial foods such as pellets, as a result of eating it grows reasonably; and there can be repeated spawning without certain treatments such as hormone injections. The same

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is true to establish whether or not the Nyalian fish (Rasbora sp) has been tame. Research on the domestication of Nyalian fish has been carried out in Sumatra but the treatment tested, for example by using different types of companion fish, has not observed behavior in nature and ponds, nor are there any artificial feed trials, growth measurements so that cultivation in the sense of taming is not complete, such as life behavior, and other requirements [4]. The purpose of this study was to domesticate Nyalian fish with the criteria put forward by Ahmad and Fauzi [5].

Nyalian fish is used as an alternative source of protein because the protein is quite high at 33.4 g / 100 g. The protein content of Nyalian is higher than the protein content of carp and whitefish, Nyalian also contains high flour and contains omega 3 [6]. While in other countries in Southeast Asia it is used as an ornamental fish [7]. Its delicious taste and high nutritional content make this fish in great demand by the public [8]. Wader stingrays are also an important economical fish in the watershed so the community makes it the main catch target.

The quality of river water that has been polluted can affect the diversity of fish in the river and if it is not preserved, it will cause endemic species to experience extinction such as the *Rasbora baliensis* species are no longer found in Beratan lake. Some studies suspect that *Rasbora baliensis* from Bali is similar to *Nyalian lateristriata* which comes from the eastern part of Java Island because it is very difficult to distinguish morphologically [9,10].

One alternative to maintaining the biodiversity of local fish native to Indonesia through species conservation at the farmer level (on-farm conservation) is to domesticate and cultivate them. The development of local fish-based farming can also be used as an effort to develop environmentally friendly cultivation, overcome poverty, and provide food for local communities [11]. Environmentally friendly cultivation in the sense of helping to maintain the ecosystem where local fish usually live which is generally always followed by local wisdom such as Nyalian fish. Aquaculture-based fisheries system is one of the things that is usually done with local fish as material for stocking in nature so that it can create additional livelihoods for the surrounding community which will indirectly be able to reduce poverty as well as as a source of animal protein needed by the community

1.2. Literature Review

In the natural living circles in the river, you can see the movements and behavior of Nyalian fish swimming agilely looking for food from plankton, small animals that fall on the surface of the water, as well as 'klekap moss' that is attached to the sand and rocks of the shallow river water bottom. In a cement bath, the normal state of movement is achieved after seven days, and eats pellets and is trapped in the walls and cement base after 10 days. On the 15th day when the behavior of the fish is observed, the situation remains reasonable and undisturbed. Thus, the two conditions for the tameness of fish-moving around naturally and eating artificial feed have been met by this observational experiment on the behavior of Nyalian fish. The condition of the tub water is not clear, although the bottom of the pool can be seen, the plankton is quite a lot so that a thin green color is visible, the water current is less than 10 cm/second, and the air temperature during the day is more than$^{30\ 0}$C and at night it is about 22^{0}C At the beginning of the experiment rains are rare but after that, in October and November, it rains frequently. During the rainy season, it was reported that there was a development of the gonads of the Nyalian fish (*R. trilineata*) during the rainy season (in October-December) [12]. Meanwhile, other studies reported that Nyalian fish (*R. latestriata*) in the Kampar river were found at a water temperature of 26-30 degrees C, a current speed of 1350cm/sec., a river water depth of 40-280cm, with a turbidity of 2.65-12.50NTU. While the pH of water is 5-6, dissolved oxygen is 6-7.6 ppm, and the free CO2 content is 3.1-4.2 ppm [13]. The state of the bottom of the Kampar river waters, where Nyalian fish live consists of gravel, sand, and mud, but the highest abundance is at the bottom of sand waters (91%), mud (8%), and gravel (1%). In Gombak river, peninsular Malaya, Nyalian fish referred to as Nyalian fish (*R. sumatrana*) live from the central part, and more than 10% of the fish caught in the hilir part, but do not include the estuary part of the river as Bishop reported [14].

Nyalian fish feed on feed that floats or does not immediately sink to the bottom of the waters. It also corresponds to the position of his mouth looking up obliquely and his habits of life on the surface of the waters. Its natural diet suggests a habit of planktivore, as plankton-eaters and larvae of other fish, small shrimps, insects and small animals are attached to sand and gravel in shallow water or float in the water or small animals fall from wood and grass plants on the banks of river cliffs. Nyalian fish (*R. latestriata*) is accustomed to eating Nyalian fish based on the analysis of the content of its stomach contents, namely *Chlorophyceae* (51.4%), *Myxophyceae* (11.5%), *Bacillariophyceae* (7.7%), *Custaceae* (7.0%) and *Protozoa* (0.4%) [13] . So more than 70% of the observed diet of Nyalian fish consists of phytoplankton, the rest are other small animals. In the rice fields and ponds, these fish also eat small worms. That is why the Nyalian fish breeders often give their fishing eyes to worms or insects that can be attributed. But by using bran mixed with fish heads and boiled so that it can be attached to the fishing rod or even rice is used to fish for Nyalian fish. Thus, Nyalian fish can also become omnivour by eating artificial feed in the form of a mixture of plants and binatang. In the maintenance of Nyalian fish in a cement bath for more than two months, this fish also ate artificial feed in the form of commercial pellets for catfish. Hasil experiments conducted by Mulyadi [15] gave pellets mixed with the hormone *thyroxine* at various levels, with the result of a positive effect on the growth of Nyalian fish. With the explanation above, it is clear that Nyalian fish eat pellet artificial feed and there is a positive (optimal) growth at thyroxin hormone levels of 4mg / kg pellets.

1.3. Research Objective

This study aimed to see the adaptation of the local fish, namely Nyalian fish (*Rasbora lateristriata*) to the artificial environment to develop local fish farming and fish conservation.

2. MATERIALS AND METHOD

2.1. Determination of sampling location

The sampling location is on the Sungi river of Tabanan Regency with coordinates 8°21.45'S-115°10.49'E and Tukad Wos of Gianyar Regency of Bali Province at coordinates 8º33'10.0"S 115º14'18.2"E. The tools used for catching fish are nets, buckets, and aerators The caught fish is put into 3 aquariums with a stocking density of 65 heads, 40 heads, and 66 heads. Feed

is given in the form of pellets as much as 5% of the total weight of the fish.

2.2. Parameter

The parameters observed are survival rate, total length, standard length and weight. Observations are carried out at the beginning and end of the maintenance of fish that is for 8 weeks. Water quality observations are carried out once a week, namely temperature, pH and DO parameters

2.3. Analysis

Data analysis using excel and SPSS programs to analyze length and weight growth, comparing the two locations and the relationship between length and weight during the domestication process. The survival rate calculation uses the formula:

SR=Nt/Nox100%

where,
N t= Initial number of treatments
No = sum at t time

3. RESULT AND DISCUSSION

3.1. Survival Rate

The highest survival rate is a sample derived from Sungao Wos Gianyar is 90.9% while the lowest is from the Sungi river at a stocking density of 65 heads which is 30.7% as in table 1. The low survival rate in samples from the Sungi River with a stocking density of 65 heads indicates that many of these Nyalian fish are unable to adapt to environmental changes such as water quality such as increased temperature and adaptation to artificial feed

Table 1. Chemical content of male quail meat from proximate analysis results

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No.	Stocking solid (tail)	Live	DienDays 1-6	Sr	Sampling location
1	65	20	45	30.7%	Sungi River, Tabanan
2	40	37	3	92.0 %	Sungi River, Tabanan
3	66	60	6	90.9%	Wos River, Gianyar
Total	171	117	54	54%	

3.2. Raw Length Growth

From the results of the ANOVA with SPSS, it can be seen the growth of the standard length between the 2 locations as in Table 2, The results above found that there was a significant difference in the raw length of fish in location 1 of Tabanan Regency with the standard length of fish in location 2 of Gianyar Regency. This result is based on a calculated t-test value of 16.948 with a significance level of 0.000.

3.3. Total Length Growth

From the results of the.ANOVA with SPSS, it can be seen that the growth of total length between 2 locations as in Table 3, The results above found that there was a significant difference in the total length of fish at location 1 (Tabanan Regency) with the total length of fish at location 2 (Gianyar Regency). This result is based on a calculated t-test value of 14.091 with a significance level of 0.000.

Table 2 Paired Samples Test of Standard Length Growth

		Paired Differences					t	Df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
					Lower	Upper			
Pair 1	Standard Length (Location 1) Standard Length (Location 2)	3.18367E1	10.28921	1.87854	27.99461	35.67872	16.948	29	.000

3.4. Weight Growth

The results above found that there was a significant difference in the weight of fish in the Tabanan Regency with the weight of fish in Gianyar Regency. This result is based on a calculated t-test value of 9.045 with a significance level of 0.000.

3.5. Relationship of Standard Length, Total Length With Weight in Tabanan Location

Based on the regression results, it was found that the standard length was related to the weight of the fish seen from the calculated t value of 3.385 with a significant level of 0.002. (Figure 1). While the total length is not related to the weight of the fish based on the calculated t value of -1.249 with a significance level of 0.222 (Figure 2)

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Table 3. Paired Samples Test of Total Length

		Paired Differences					t	Df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
					Lower	Upper			
Pair 1	Total Length (Location 1) Total Length (Location 2)	3.28933E1	12.78569	2.33434	28.11908	37.66759	14.091	29	.000

Table 4. Paired Samples Test of Weight Growth

		Paired Differences					t	Df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
					Lower	Upper			
Pair 1	Weight (Location 1) Weight (Location 2)	2.51333	1.52196	.27787	1.94502	3.08164	9.045	29	.000

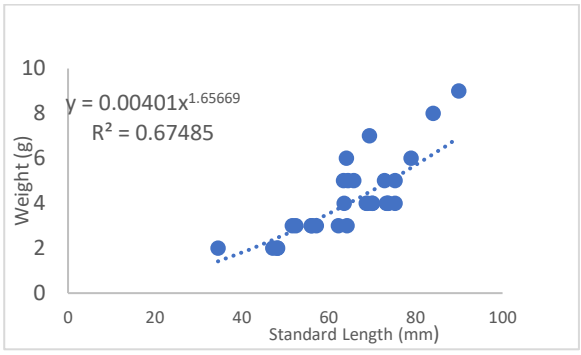

Figure 1. The Relationship between Standard Length and Weight of Nyalian Fish from Tabanan

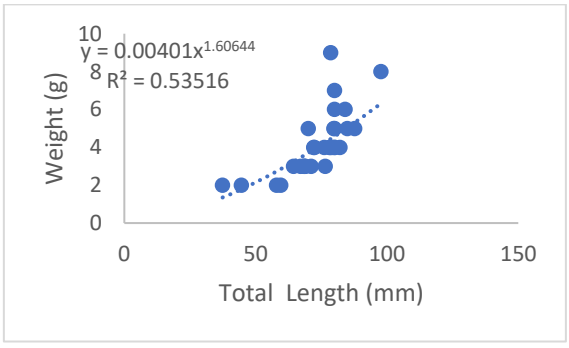

Figure 2. Relationship of Total Length to the Weight *of Nyalian Fish* from Tabanan

3.6. The Relationship Between Standard Length and Weight at the Location of Gianyar

Based on the regression results, it was found that the standard length was related to the weight of the fish seen from the calculated t value of 3.385 with a significant level of 0.002. (Figure 3).

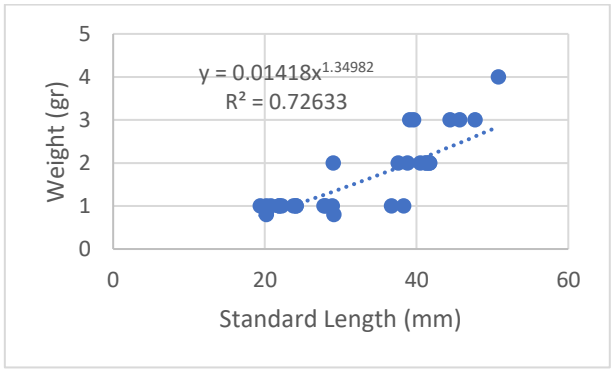

Figure 3. The Relationship Between Standard Length and Weight of *Nyalian Fish* from Gianyar

In the domestication study of Nyalian fish (*Rasbora lateristriata)*, the level of domestication achieved was rudimentary. The domestication of the Nyalian fish (*Rasbora lateristriata*) is said to be rudimentary, because it cannot be spawned yet and the success rate of spawning is still unknown. This is due to the short maintenance time of only 2 months, and the maintenance time to reach the size ready to spawn is also unknown. Based on Lisna's research [16], on the Reproductive Biology of Nyalian Fish (*Rasbora lateristriata*) in the Sungi river Tabanan Bali it is known that Nyalian fish (*Rasbora lateristriata*) will mature gonads after reaching a length of above 30 mm and weight above 7 grams. In the research of Sulistiyarto [17], it was known that the maximum length of the Nyalian fish (Rasbora lateristriata) was 104 mm, and the maximum weight was 13.6 grams.

3.7. Water Quality During Research

Measurements of water quality during the domestication process of Nyalian fish are carried out weekly for two months and can be seen in Table 5. The condition of the water as a living

medium for aquatic biota must be adapted to the optimal conditions for the biota that is maintained [18].

Table 5. Water quality parameters during domestication

No.	Parameters	Bulan April				May				Average
		1	2	3	4	5	6	7	8	
1	Temperature (°C)	28	29	29	29	29	29	29	29	28.85
2	Ph	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5
3	DO(mg/l)	8	8	8	8	8	8	8	8	8

The dissolved oxygen (DO) content based on the measurement results during the study is shown in Table 5, showing that do measurements look constant at 8 mg / l due to regular water changes. The DO range in Nyalian fish rearing pond water is 1.5–8.8 mg/L. the ideal water pH for aquatic organisms ranges from 7–8.5 and at this value fish growth is optimal [19]. The results of measuring the pH of water during the study were 7.5 which showed that the pH was above neutral From the results of the study, it was shown that the water temperature conditions of the Nyalian fish maintenance pond (*Rasbora lateristriata*) during the study averaged 28.8ºC, the water temperature of the study was quite high when compared to the temperature of the river water where this fish lived, which was 24-26ºC.

4. CONCLUSION

From the results of the studies that have been carried out, it can be known that the domestication of Nyalian fish *(Rasbora lateristriata*) is a rudimentary domestication. The adaptation of the Nyalian fish (*Rasbora lateristriata*) to the new environment and food is very fast, and the tolerance to changes in water quality parameters (DO, pH and temperature) is high enough that the as growth of standard length, total length and weight is significantly increased.

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