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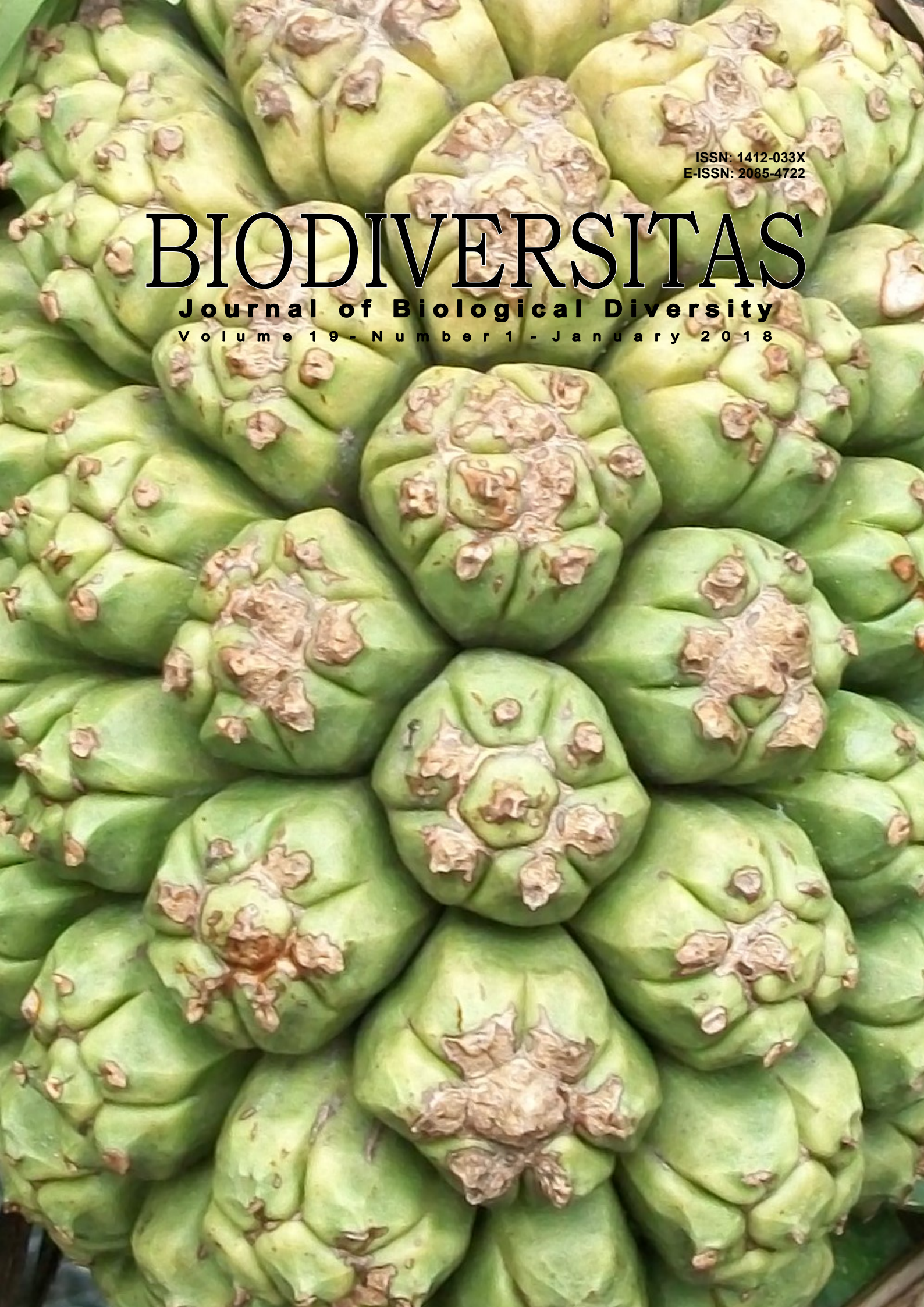

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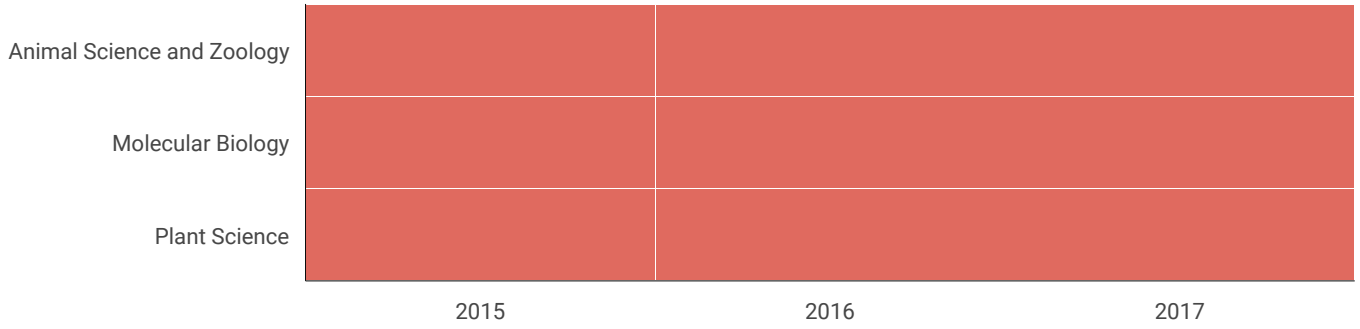

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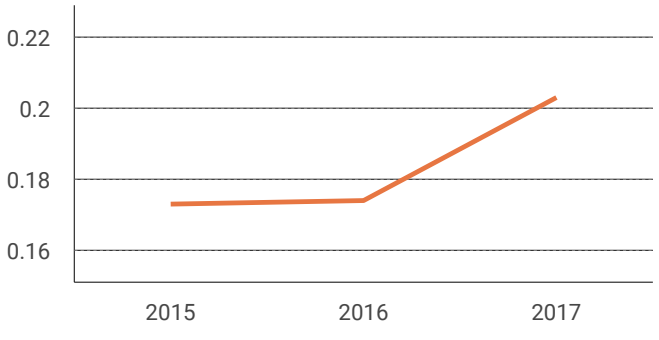

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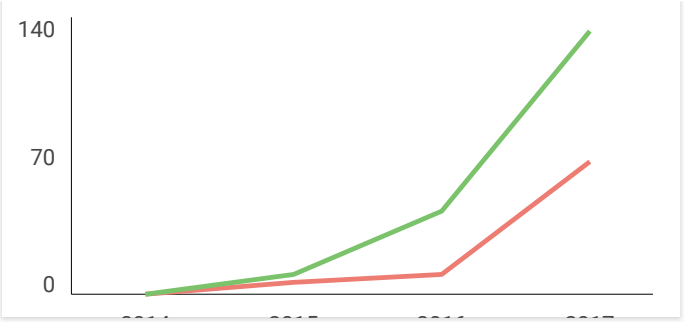

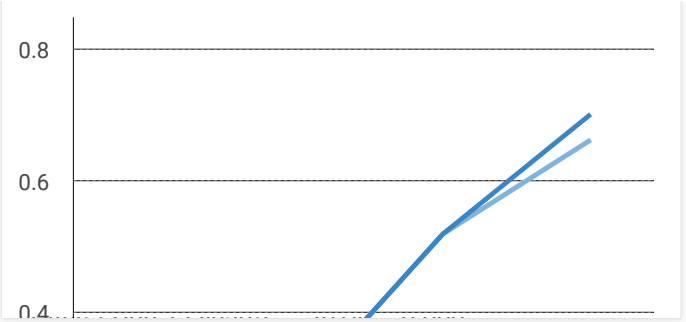

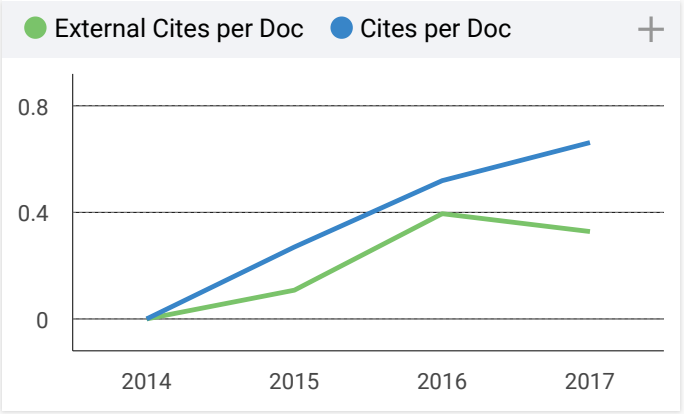

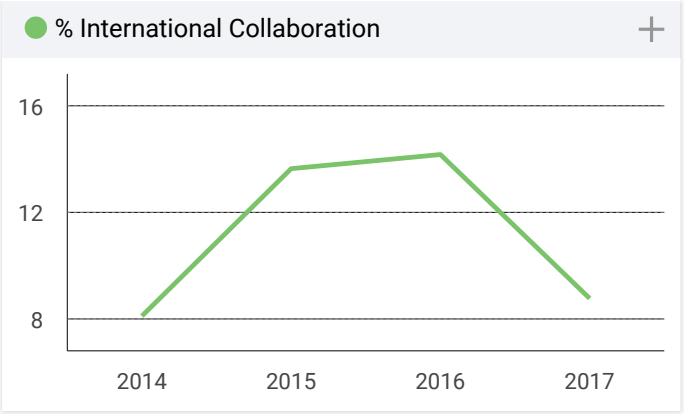

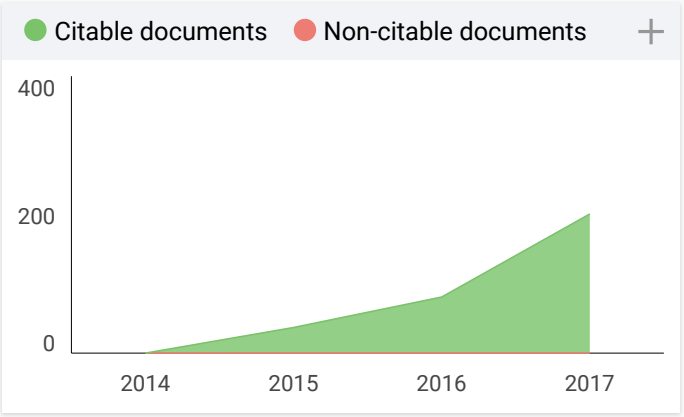

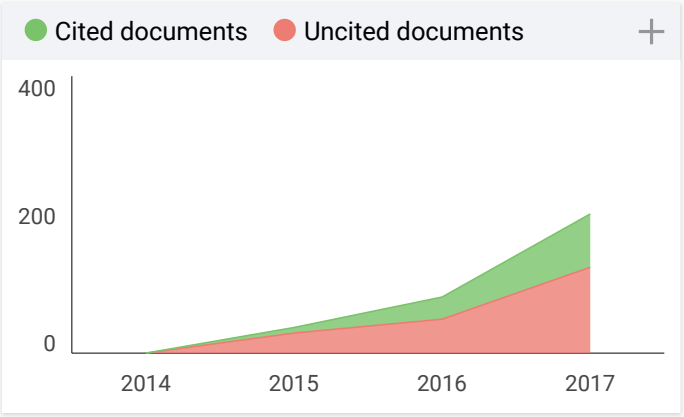

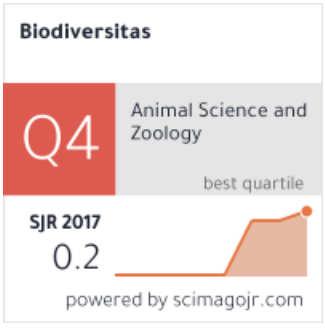

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Short Communication: Introduction of study domestication of manggabai fish (*Glossogobius giuris*) in different environment

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Abstract. *Koniyo Y, Juliana. 2018. Short Communication: Introduction of study domestication of manggabai fish (*Glossogobius giuris*) in different environment. Biodiversitas 19: 260-264.* Manggabai fish (*Glossogobius giuris* (Hamilton, 1822) is one of the fish species that have good economic value, so its sustainability needs to be maintained. Manggabai fish population in nature continues to decline; this is due to environmental changes. Environmental changes that occur in nature is very difficult to be controlled so a method is required to preserve the manggabai fish that exist in the natural environment. Domestication is one of the methods used to maintain organisms that lives in a natural environment with an artificial (controlled) environment. This study aims to determine the difference of natural and artificial environment as a basis for conducting domestication on manggabai fish. The research method is an experimental method which is used in the cultivation of fish in natural and artificial environment. Manggabai fish cultivation in the natural environment uses a floating net cage system with volume of 1 m3, while cultivation in a controlled environment uses a pool of 1 m3 of concrete. Manggabai fish uses ± 10 cm of depth of pool with a density of 100 individuals/m3. The study was conducted for 3 months and feeding was only given to cultivation in controlled environment by 20% with a frequency of twice/day. The research variables consist of growth and survival of manggabai fish. The data analysis used descriptive analysis to determine the difference of growth and survival of manggabai fish kept in natural environment and in controlled environment. The results show that there is a difference in the growth and survival of manggabai fish kept in different environments. The highest growth and survival was obtained in the natural environment of KJA by 87%, whereas in the controlled environment, i.e. in the survival pool, it was only 74%. The absolute longest growth and the highest weight growth was obtained in the controlled environment in the pool by 2.07 cm and 4.62 g, whereas in the natural environment in KJA, the growth of the length and the absolute brat of 0.83 cm and 2.33 g. The results showed that the quality of environmental maintenance is a factor that affects the success of manggabai fish domestication.

Keywords: Environment, growth rate, manggabai fish, survival rate

INTRODUCTION

Bareye Goby (*Glossogobius giuris* (Hamilton, 1822) is a freshwater fish with a wide distribution, covering East Africa, Southeast Asia, South Asia, northern Australia, Papua New Guinea, China and Taiwan (Kottelat 2013; Larson et al. 2016). Globally, there is no major threat to sustainability and IUCN categorizes in Least Concern (Larson et al. 2016), but in some places its existence is threatened locally due to habitat change and over fishing.

Glossogobius giuris or locally known as *manggabai fish* (by Gorontalonese, an Indonesian ethnic of Sulawesi) is one of the freshwater fish species which a few years earlier is quite commonly found in Limboto Lake, Gorontalo District, Gorontalo Province, Indonesia. This fish is one source of livelihood for the community around the Limboto Lake because it is one of the favored species and has a pretty good economic value. Manggabai fish population since 2005 until now began to decline both in the number of catches and size of fish. This provides evidence that the availability of manggabai fish in Limboto Lake is beginning to decline due to catching and the environment that does not support the life of species that live naturally in these waters. Marine Fisheries Department of Gorontalo reported that in 2005 manggabai fish catch reached 84.70 tons/year, in 2007 reached 19 tons/year, and in 2008 reached 13.6 tons/year.

Limboto Lake as a natural habitat of various fishery species continues to decrease its water quality and quantity, thus affecting the survival of the species including manggabai fish. Limboto Lake has become silted due to floods and other activities that occur around the lake (Krismono dan Kartamihardja 2010). Based on preliminary observation data, mangabai fish is marketed far from its source and it show the difference of size from time to time, and it is currently only 1.15% decreases from 20.79%. On the other hand, consumer's demand for manggabai fish has increased by 20-30%, and it brings implications to the demands of its development. Therefore, for the utilization of mangabai fish resources can continue and be sustainable, it is necessary to conserve the fish by way of arranging fishing and mass production of fish, among others through mangabai fish cultivation in a controlled manner.

Limboto Lake as a manggabai fish habitat is one of the important factors for the sustainability of this commodity. One effort that can be done to overcome the decline of

water quality in Limboto Lake is to conduct a controlled cultivation or make natural commodities become aquaculture commodities. This can also be done to avoid extinction of natural organisms that exist in water such as Limboto Lake. Manggabai fish as one of the natural commodities found in Limboto Lake waters will be extinct if not prevented as early as possible.

One of the activities that can be done is the controlled manggabai fish farming through domestication. Domestication is done by conducting trials of various environments, to obtain an optimal environment for growth and survival of manggabai fish. The condition of the maintenance environment can represent the natural environmental characteristics to support the living needs of cultivating organisms. Manggabai fish is one of the endangered fishery commodities due to environmental degradation in Limboto Lake, and it causes the need for research on domestication as the first step to conduct manggabai fish farming in a controlled manner.

MATERIALS AND METHODS

The tool used in this research was a concrete pool with floating net cage (KJA) with volume of 1 m^3 as maintenance container, analytical scale, Water quality checker, blower, aeration hose, aeration faucet, and aeration stone. The materials used during the research were manggabai fish seed, F-999 fish feed, and fresh water. Research was experimental with Completely Randomized Design (CRD) consisting of two treatments and three replications of each treatment. The treatmentwas the maintenance of manggabai fish which was controlled by using concrete pond and KJA. The seeds used in this research are manggabai fish seeds originating from catching in Limboto Lake, Gorontalo District, Gorontalo Province, Indonesia totaling 600 individuals with ± 10 cm long and ± 35 grams per individual. The density of fish was as much as 100 individuals/container. Feeding is given as much as 5% of biomass weight with feeding frequency as much as 2 times a day i.e., morning and evening.

Manggabai fish seed maintenance is done for 8 weeks. Measurement of length and weighing of manggabai fish seeds was done by sampling technique that took 20% samples from total seeds in each container and done once a week. Survival is obtained by calculating total live manggabai fish. Water quality measurement is done once every week and observed parameters are temperature, pH, and DO.

Research variables

Absolute growth

The growth rate of fish seed of manggabai measured in this study was the absolute length growth and absolute weight of fish seed of manggabai.

Absolute length growth

Calculation of absolute length growth of fish seed of manggabai according to Effendie (1997) are as follows:

$$L = Lt - Lo$$

Where:
Lt = length of fish at time t (cm)
Lo = length of fish baseline (cm)

Absolute weight growth

Calculation of absolute weight growth of fish seed of manggabai according to Effendie (1997) are as follows:

$$W = Wt - Wo$$

Where:
W = weight gain of fish seed (g)
Wt = weight of fish seed at t time to the end-t (g)
Wo = Initial weight of fish seed (g)

Survival rate

Survival or the survival rate (SR) is the percentage of organisms that live at the end of a certain time. Calculation formula of survival rate according to Goddaard (1996) is as follows:

$$SR = \frac{N_t}{N_0} \times 100\%$$

Where:
SR = Survival Rate (%)
Nt = Number of fish at time t (individual)
No = number of fish baseline (individual)

Data analysis

The data included the growth of absolute length and weight and the survival of manggabai fish kept in a natural environment and in controlled environment. The data were analyzed using descriptive analysis and shown in the graph. The data analyzed were data of absolute length growth, absolute weight growth and survival rate of manggabai fish seeds that were kept for eight weeks.

RESULTS AND DISCUSSION

Growth is an increase in length, weight, or volume in a certain time. Growth can be used as one of the indicators to look at the physiological conditions of individuals or populations. Absolute growth consists of two namely growth of length and growth of weight. The variables measured in this study consisted of the length and weight growth and survival of manggabai fish kept in different environments and maintenance containers. Observations and measurements made during maintenance are the growth and survival of manggabai fish kept in natural environments using floating net cage (KJA) and controlled environments in concrete pools.

Absolute length growth

The absolute length growth of manggabai fish seeds maintained at floating net cage (KJA) and at concrete ponds for eight weeks showed that the highest length growth was

obtained on maintenance using KJA containers. While manggabai fish seeds taken care in concrete pond maintenance containers produced lower length growth. The absolute length growth value of manggabai fish seeds in KJA and in concrete ponds can be seen in Figure 1. The absolute length gained was 2.07 cm during eight weeks maintenance in a controlled environment, while the absolute length in the natural environment was 0.83 cm.

Absolute weight growth

The results of measurements on absolute weight growth indicated that manggabai fish seeds kept in concrete pond containers were higher than those kept in natural KJA. These results indicated that weight growth is affected by different types of maintenance containers. The highest absolute weight growth in fish seeds kept in concrete ponds was 4.62 grams and the lowest in the natural environment of KJA was 2.33 g. The value of the absolute weight growth in both containers can be seen in Figure 2.

Environmental quality in the maintenance of aquaculture organisms is a major factor affecting organisms cultivated in natural environment and controlled environment. The quality of the maintenance environment greatly affects the growth and survival of an organism. Different environmental qualities will also affect the quality and quantity of organisms cultivated on the environment. The quality of the environment as a living medium of manggabai fish during maintenance will also have an effect on the space for fish to obtain feed. Growth is influenced by environmental differences, also the environment will affect the success of domestication of wild species. Domestication will succeed if the controlled environment can replace or correspond to the natural habitat of a species, because if there were significant differences, they will affect the ability of adaptation of species to be domesticated.

In addition to environmental factors, feed is also one of the most important factors in the success of species domestication. Lack of feed will slow the rate of growth of fish, since the ability of fish to obtain the feed is influenced by the availability of feed and space. With a large enough space, a quite large fish can move maximally to find the available feed on the environment. This opinion is in accordance with the opinion of Rinandha (2014), saying that in the artificial environment, fish will restrict to get food because it depends only on the feed given, so that will affect the growth rate of related fish. The feed is one factor that plays a role in the growth of manggabai fish. The more varied and higher nutrient content of the feed will be good for the growth of fish. According to Sulistiono (2012), protein plays an important role in the preparation of tissues and organs of animals, including fish. The nutrient content of feed given during fish maintenance should match the needs of the domesticated fish. Protein is one of the most important ingredients in fish feed, protein content in the feed should be available in sufficient quantities. Low feed protein levels will lead to slow growth. Controlled environment can give a good enough effect if the given feed can meet the needs of life. The feed should meet the quantity and quality required to increase the growth and survival of the domesticated organism.

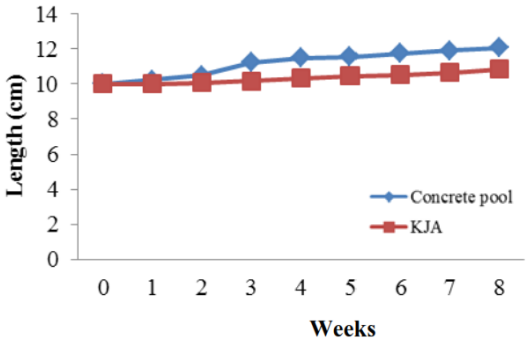

Figure 1. The absolute growth of manggabai fish in Limboto Lake, Gorontalo, Indonesia

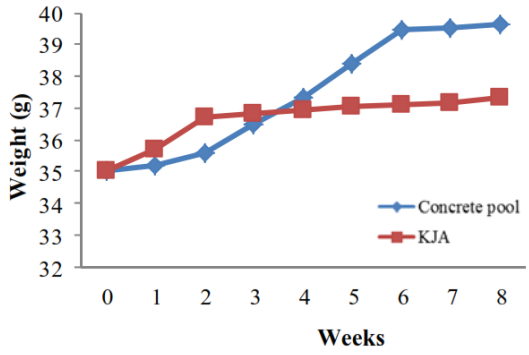

Figure 2. The absolute weight of manggabai fish in Limboto Lake, Gorontalo, Indonesia

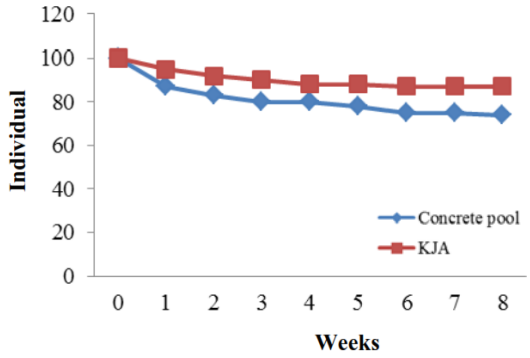

Figure 3. The survival rate of manggabai fish seeds in Limboto Lake, Gorontalo, Indonesia

Survival rate

The survival of fish is percentage of the number of fish that still live from the number of fish kept in one container. Survival is shown by mortality (death). After the research, the average data on the survival rate of manggabai fish is shown in Figure 3.

The figure shows that the percentage of survival rate of Manggabai fish seeds maintained in different environments gives different survival values. Survival is also affected by the environments and feed quality available to the environment. One effort to overcome the low survival of

the organism is by maintaining the fish on appropriate environmental quality and also paying attention to proper feeding both in size, amount and nutrient content of the feed to be provided during the maintenance process (Hasmaradi 2002).

Based on the results of this study, it can be concluded that the highest survival is obtained in natural environment by using KJA namely 83%, while in controlled environment using survival concrete pool, it is equal to 74%. The quality of the environment will affect the growth and survival of the fish to be cultivated. This is because the environment can affect the availability of feed naturally. In a controlled or artificial maintenance environment, feed cannot be obtained naturally, but must come from the feed given during the maintenance process (Tarigan 2014).

Feed that has good nutrition is instrumental in maintaining the survival and accelerate the growth of fish. In addition, feeding does not damage water quality and does not leave any residual feed as in the provision of pellets, on granting water pellet maintenance media more quickly dirty. This is in accordance with the opinion of Rao et al. (2001) which states that the survival of fish seeds is determined by the quality of water. During the maintenance of several fish deaths in all treatments, it is more common for the first week until the second week of maintenance, presumably because the fish have not been able to adapt to new maintenance containers.

The adaptability of organisms is also a very important factor in the survival of the organism. Adaptability at the start of the transfer of fish to be domesticated is usually very fragile since early adaptation will require far more energy than older fish that have been adapted for a longer time. In the early adaptation process, usually, the fish will experience a high enough death due to the use of energy to adapt to the new environment. This leads to the need for gradual adaptation of fish or species to be domesticated. The natural environmental quality of living fish to be domesticated must be known so that the contiguous environment to be used for the domestication process should be similar to the natural environment of the fish. The quality of the controlled environment is made equal to the natural environment, especially in terms of quality, so that fish do not require excessive energy for the initial adaptation process. The appropriate environment will also have a good effect on the survival of the fish to be domesticated. The results showed that the first week of manggabai fish maintained in the controlled environment experienced the greatest decrease in survival compared to maintenance in the second week to eight weeks. This proves that early adaptation is very important to the survival of fish to be domesticated.

Water quality

Water quality is a very important factor in the cultivation of fish because it is needed as a medium of life. The result of water quality measurement during manggabai fish seed maintenance can be seen in Table 1.

Some environmental factors in the water that affect the life of fish are temperature, degree of acidity (pH), dissolved oxygen (DO) and so forth. The water temperature during the study ranged from 26.83-27.19°C. It indicates that the maintenance mediums are in accordance with Tamsil's opinion (2000), which states that good water temperature for manggabai fish maintenance ranges from 26-30°C. The relationship between temperature and fish growth according to Sulistiono et al. (2007) is that there is little or no growth at all below a certain temperature (20°C). Further growth increases with increasing temperature until it reaches its maximum point (30°C), and decreases again or even becomes negative (lethal) at a temperature above the maximum point (33°C). In general, the amount of water pH to be used as a maintenance medium for manggabai fish seed must be in accordance with its natural habitat in nature, which is from 6.5-8.5. The non-conformity of water pH with the living conditions of manggabai fish seed will result in the basic development and growth of fish. Based on the results of water pH measurements during the study ranging from 7.17^{o}C to 7.41^{o}C, the water pH range during the study strongly supported the growth of Manggabai seed fish.

In addition to both the temperature and water pH factors above, oxygen is an important element in the life of the organism. The oxygen in water is called dissolved oxygen (DO). The result of measurement of dissolved oxygen value in research media ranged from 5.55-6.45 mg/L. The ups and downs of the oxygen value are related to the water temperature values. The range of dissolved oxygenin the research media is considered still feasible in supporting the growth of manggabai fish seed. According to Islam (2004), the best dissolved oxygen content for manggabai fish maintenance is above 3 ppm.

Based on the results of research on growth and survival of manggabai fish seed (*G. giuris*) maintained in different containers, it can be concluded that: (i) Growth and survival of manggabai fish seeds maintained on different types of containers show different results. (ii) The highest growth and weight is obtained on maintenance by using concrete pond container that is equal to 2.07 cm in length and 4.62 g in weight. While the lowest length growth and the lowest weight growth is obtained in the container maintenance using KJA with 0.83 cm in length and 2.33 g in weight. (iii) The highest survival is obtained in concrete pool KJA namely 87%, while the lowest is obtained at KJA controlled concrete pool namely 74%.

Table 1. Water quality of Limboto Lake, Gorontalo, Indonesia

Treatment	Parameter		
	Temperature	pH	DO
KJA	26.83-26.93	7.17-7.22	6.00-6.45
Pond	26.85-27.19	7.18-7.41	5.55-6.04

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***Front cover: Pandanus odoratissimus* L.f**
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