

FOOD HABITS AND LENGTH-WEIGHT RELATIONSHIP OF LUKAS FISH (*Labiobarbus leptocheilus Valenciennes*) IN GAJAH MUNGKUR RESERVOIR CENTRAL JAVA

Moh. Rasyid Ridho¹⁾, Enggar Patrino¹⁾, Agus Djoko Utomo²⁾, Siti Nurul Aida²⁾

¹⁾ Biology Department, Faculty of Mathematics and Natural Sciences, Sriwijaya University

²⁾ Research Institute for Inland Fisheries, Research Centre for Fisheries Management and Conservation, Mariana, Palembang

Email: rasyid_mr@yahoo.com

Received on 15th August 2017 and Accepted on 20th November 2017

ABSTRAK

Penelitian tentang kebiasaan makanan dan hubungan panjang berat ikan Lukas *Labiobarbus leptocheilus Valenciennes* dilakukan dari bulan Mei sampai September 2010. Tujuan penelitian ini adalah untuk mengetahui kebiasaan makanan dan menganalisis pola pertumbuhan *Labiobarbus leptocheilus Valenciennes*. Pengambilan sampel ikan dilakukan pada bulan Mei 2010 di Waduk Gajah Mungkur, Jawa Tengah. Pengambilan sampel ikan dilakukan dengan survei di tempat pelelangan ikan (TPI Mina Tirta). Metode analisis kebiasaan makanan dengan menggunakan indeks preponderen. Hasil penelitian diperoleh 19 sampel ikan *Labiobarbus leptocheilus Valenciennes*, panjang antara 15-20 cm, dengan berat antara 40-90 gram. *Labiobarbus leptocheilus Valenciennes* memiliki pola pertumbuhan alometrik negatif ($b < 3$). Analisis laboratorium terhadap kebiasaan makanan menunjukkan bahwa kebiasaan makan *Labiobarbus leptocheilus Valenciennes* adalah detritus dengan indeks preponderen (IP) 82,95% dan plankton dengan IP 17,05%.

Kata kunci: makanan, kebiasaan, panjang-berat, hubungan, *Labiobarbus leptocheilus*

ABSTRACT

The Research about the food habits and length-weight relationship of *Labiobarbus leptocheilus Valenciennes* was conducted from May to September 2010. The aims of this research were to find out the food habits and to analyze the growth pattern of *Labiobarbus leptocheilus Valenciennes*. The sampling of fishes was conducted on May 2010 in the Gajah Mungkur Reservoir, Central Java. The sampling of fishes was conducted by using survey on the landing place of fishes (TPI Mina Tirta). The methods of analysis of food habits by using the Index of preponderance. The results of this research obtained were 19 samples of *Labiobarbus leptocheilus Valenciennes*, the length between 15-20 cm, with the weight between 40-90 grams. *Labiobarbus leptocheilus Valenciennes* had the negative allometric growth pattern ($b < 3$). The laboratory analysis of food habits showed that the food habits of *Labiobarbus leptocheilus Valenciennes* were detritus with Index of Preponderance (IP) 82.95% and plankton with IP 17.05%.

Keywords: food, habits, length-weight, relationship, *Labiobarbus leptocheilus*

INTRODUCTION

Public waters has the potential and important role in various fields of activity. In the field of fisheries, public waters are natural resources for fishing, such as fish consumption ornamental fish, fish fry, fish mains and a place for fish cultivation. The role of public waters is directed to increase fish production through aquaculture several species of fish that have prospects for development, based on the biological aspects and economic aspects. One type of public waters which can be used as a reservoir aquaculture.

Dam water has different characteristics from other waters such as rivers, swamps, lakes, dams and others. According Suwignyo (1990) in Barus (2002) reservoir formed from dibendungnya streams, by having open areas deep enough, the large number of bays, with a long coastline, extensive rain catching area. Jubaedah (2006) adds that the reservoir is formed from dibendungannya watershed has the characteristics of the river system that flows (riverine) and reservoir systems are flooded (lacustrine).

One of the existing reservoirs in Indonesia, a reservoir Elephant Mungkur. Gajah Mungkur is the largest reservoir in Indonesia. Gajah Mungkur began operations in 1981 to provide multipurpose benefits. However it is known that any problems in the reservoirs Gajah Mungkur namely sedimentation problems. According Sukresno et al. (2002) sedimentation rate is quite high, so the lifetime of the dam Gajah Mungkur originally planned 100 years with the standards of the sedimentation rate of 1.2 mm / year, with a sedimentation rate of 5.3 mm / year with probably only 27 years old. The condition affects the lives of organisms in aquatic environments Gajah Mungkur reservoirs, one of which is a fish.

According Dharyati et al., (2009) one of the fish contained in the reservoir Gajah Mungkur is fish Lukas (*Labiobarbus leptocheilus Valenciennes*). Communities around the Gajah Mungkur utilize Lukas fish as fishing resources and one of the economically important fish for consumption as a source of animal protein.

One of the factors that affect fish populations Luke in a body of water is the nutritional factor (quality and quantity of food). Nutrients derived from food necessary for growth and replace damaged cells, energy sources, reproduction, and to support the health of the fish. According Utomo et al., (2010) the sedimentation problem in Elephant Mungkur reservoir will affect the life of the fish, which have an important role to maintain the ecological balance in the food chain. Effendie (1979) adds that the food is a controller that is important in generating a number of fish in the waters for food are the factors that determine the growth of individual fish populations and fish.

It can be found by studying the food habits and weight of the fish long relationship, where the study of food habits is to determine the types of fish food fish weight while long relationships to determine the pattern of growth of the fish.

According Effendie (1979) that the basic study of food habits is to study the contents of the digestive system of fish so that the fish are known including planktivor, herbivore, carnivore, detritvor, or others.

Fish grew continuously throughout their lives, so that growth is an important biological aspects are studied in fish life. The growth of the fish to be an indicator for the health of individuals and populations that are good for the fish. The larger the fish the better the growth of the health conditions of individuals and populations of a species of fish, as well as when rapid growth, suggesting that the abundant food conditions once the appropriate environmental conditions for fish life. The growth of individual fish can be defined as a change in length and weight of the fish at a time, while the growth of the fish population as a change in the number of fish (Effendie, 1979). The fish Lukas is a type of fish that have

prospects for dikeembangkan as fish farming fish in reservoirs Gajah Mungkur, where fish is consumed by the public and the commercial fish species. For that we need their efforts to conserve fish with a study on the biological aspects of fish Lukas. Some studies need to know is the food habits of the fish and heavy long relationship.

RESEARCH METHODS

Time and Location

The research was conducted in May to September 2010. The research was conducted in two phases of work that was worked in the field and in the laboratory. Fish sampling was conducted in the Gajah Mungkur reservoir, Wonogiri, Central Java. Figure 1 is identify the types of food eaten by the Lukas fish performed at the Laboratory of Zoology, Biology Department, Faculty of Mathematics and Natural Sciences, Sriwijaya University, Indralaya, South Sumatra

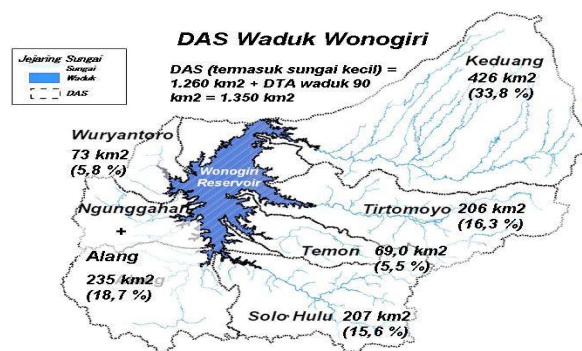


Figure 1. Location of Lukas fish sampling

Tools and Materials

Tools used in the research was the stationery, dissecting sets, ice box, camera, clear plastic bag or jar (sample pack), ruler, measuring cups, sitting scales, filter paper, microscopes, Sedgewick Rafter Counting Cell. Materials used was *Labiobarbus leptocheilus* Valenciennes, 10% alcohol and distilled water (aquadest).

Procedure

Fish Sampling

Fish sampling were conducted with survey method. Sampling was carried out at fish landing stations around the Gajah Mungkur reservoir. Generally, Fish samples are caught with gill net size of 1.5 inches.

Fish Length-Weight Relation

Fish are measured by length of total length. Fish weight measurement scales used a tool of sitting scales.

Fish Food Habits

Fish was dissected and be taken his digestive apparatus. Fish digestive tracts includes the esophagus to the intestine. Fish digestive tracts, and then, were put in a solution of 10% alcohol. Fish samples were washed with running water, after that, the samples were dried on filter paper so that the water is absorbed out. The food in the digestive tracts were taken using the dissecting set. To determine the foods, it was used the volume of water removal techniques (Effendie, 1979), by put the foods into a measuring cup containing 10 ml of distilled water (aquadest). The increase of volume in the measuring cup was the volume of foods. Then the foods were dissolved in 10 ml of the distilled water (aquadest). Calculation and identification of the type of fish foods were found observed under a microscope using a Sedgewick-Rafter Counting Cell, with three replications.

Data Analysis

Fish Length-Weight Relation

According to Effendie (1979), the fish length-weight relation was analyzed by equation of Hile as follows:

$$W = a L^b$$

Where:

W = fish weight (g)

L = fish total length (cm)

a and b = Constants regression of total length-weight relation of fish

According to Ricker (1973) in Ridho et al. (2010), there are three criteria for fish growth, namely:

1. The value of $b < 3$, then the weight gain is not as fast as the length (allometric growth-thin or negative allometric),
2. If $b = 3$, then the length and weight gains is balance (isometric-ideal growth or isometric),
3. If $b > 3$, then the gain in length of the fish is not as fast as weight gain (allometric-plump growth or positive allometric).

Fish Food Habits

Determination of the food habits of the fish was done with the results of the combined method of frequency of occurrence and volumetric methods proposed by Natarajan and Jhingran, 1961 (Effendie, 1979) that is Index of preponderance (Greatest Section Index) with the following formula:

$$IP = \frac{Vi \times Oi}{\sum Vi \times Oi} \times 100\%$$

Where:

V_i = percentage of the food volume

O_i = percentage of occurrence frequency of one type of food

$\sum V_i \times V_i =$ number of $V_i \times O_i$ of all types of foods

IP = index preponderance

RESULTS AND DISCUSSION

Length-Weight Variation of Lukas Fish

Length-weight variation of Lukas fish gained in the Gajah Mungkur can be seen in Table 1.

Table 1. Length-Weight Variation of Lukas fish obtained

Nr	Sampling Date/Location	Total Length (cm)	Weight (gram)
1	27 May 2010/TPI Minatirta	19,5	70
2	27 May 2010/TPI Minatirta	20	70
3	27 May 2010/TPI Minatirta	18,5	65
4	27 May 2010/TPI Minatirta	15,5	50
5	27 May 2010/TPI Minatirta	17	50
6	27 May 2010/TPI Minatirta	19,5	70
7	27 May 2010/TPI Minatirta	19,5	70
8	27 May 2010/TPI Minatirta	17	60
9	27 May 2010/TPI Minatirta	17	50
10	27 May 2010/TPI Minatirta	19	80
11	27 May 2010/TPI Minatirta	20	90
12	27 May 2010/TPI Minatirta	18	65
13	27 May 2010/TPI Minatirta	20	80
14	27 May 2010/TPI Minatirta	19,5	80
15	27 May 2010/TPI Minatirta	15	40
16	27 May 2010/TPI Minatirta	18	70
17	27 May 2010/TPI Minatirta	15,5	50
18	27 May 2010/TPI Minatirta	19	80
19	27 May 2010/TPI Minatirta	16,5	55

Based on Table 1 that the number of Lukas fish samples (*Labiobarbus leptocheilus* Valenciennes) obtained from the Gajah Mungkur is 19 tails. This fact is because the sampling is done in the dry season in May. According to local fishermen, catching the Lukas fish will be mostly found at the start of the rainy season, that is in September and October, but catches of Lukas fish will be less on the dry season. This is consistent with the results of research Dharyati (2009) that the Lukas fish is the dominant fish in the reservoir Gajah Mungkur in the rainy season.

Total catches of Lukas fish different in the dry and rainy season because at the beginning of the rainy season is a time for Lukas fish spawn. Lukas fish, in which will migratory fish to the edge of the reservoir so easily caught by fishermen. Whereas in the dry season, Lukas fish back to the mid-section to above the bottom of the water reservoir. The fish migratory to spawn is happening at the beginning of the rainy season where the dam during high tide or high water. Lukas fish will migrate in order to survive, therefore, the Piranha fish are potamodromus (Anonymous, 2010).

The availability of food is a factor affecting the availability of fish. In feeding activity, the fish often do migrate to the area where there were lots of food, which can be daily migrate

or seasonal, vertically or horizontally. Changes in the environment, the amount of fishing effort, the success rate of fishing operations and the presence of fish in a body of water can affect the fish catch.

Food Habits of Lukas Fish

Based on analysis of the digestive tract, food habits of obtained Lukas fish are in the form of detritus and plankton. The food composition of obtained Lukas fish can be seen in Figure 2.

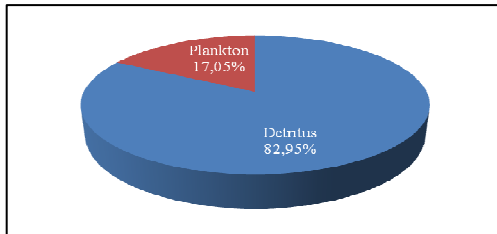


Figure 2. Food Composition of Lukas fish (*Labiobarbus leptocheilus Valenciennes*)

Food composition of Lukas is known based on the index of preponderance or IP (greatest portion index). According to Nikolsky (1963) in Effendie (1979) that is based on the largest portion index, the food is divided into a main food with IP value of more than 40%, the supplement to the value of the IP between 40% - 4%, the food additional with IP value of less than 4 %.

Based on Figure 2, noted that the largest share index on the Lukas fish dominated by detritus with IP value 82.95%. Therefore, the detritus is the main food of Lukas fish. While plankton have IP value amounted to 17.05% thus classified as plankton in the food supplement. In this study, no additional food is founded because there is no food organisms that have an IP value of less than 4%.

Based on observations, detritus is a major food fish Luke, the IP value is 82.95%. That's because Luke fish habitat near the bottom waters (benthopelagis) were found in a layer that lies at the foundation. Luke fish are found in the middle of the base to a depth of a body of water. Lukas fish is a fish-eating detritus, litter plants, phytoplankton, periphyton, zooplankton and insect larvae (Anonymous, 2010).

Lukas fish complementary foods are plankton with IP value amounted to 17.05%, which is composed of several classes (Figure 3).

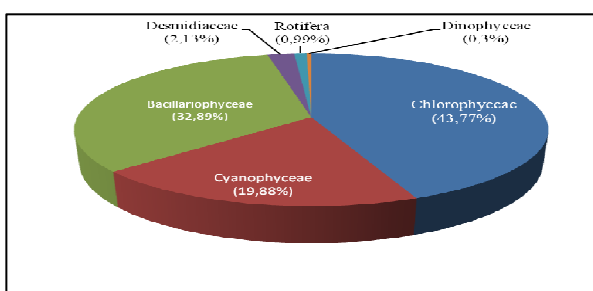


Figure 3. Plankton found in the digestive tract of Lukas fish (*Labiobarbus leptocheilus Valenciennes*)

Based on Figure 3, known that Chlorophyceae (green algae) are plankton which are found in the digestive tract of Lukas fish with the percentage of 43.77%. Bacillariophyceae ranks second, as a plankton found in the digestive tract or fish by as much as 32.89%,

followed Cyanophyceae as much as 19.88%, Desmidiaceae as much as 2.13%, Rotifera as much as 0.99%, and 0.3% Dinophyceae,

The food percentage eaten by the fish relating to the availability of food groups in the reservoir water Gajah Mungkur. Chlorophyceae is a dominant plankton group eaten by Lukas fish compared to other groups of plankton in reservoir waters Gajah Mungkur. It can be seen from the water that looks greenish color in general in reservoir waters Gajah Mungkur. According to Utomo et al. (2011) Chlorophyceae has a highest abundance of plankton in the reservoir waters Gajah Mungkur.

Based on these results, the type of fish food of Lukas fish in the form of detritus as a main foods, and plankton as complementary foods may indicate that Lukas fish classified as detritivore fish. According to Dharyati (2009) on Lukas fish foods in the reservoir waters Gajah Mungkur that Lukas fish foods includes periphyton, detritus and plankton.

According to Sutardja (1980) that the Lukas fish foods in reservoir waters Jatiluhur West Java are pieces of detritus and parts of plants as a main foods, while insect larvae, Bacillariophyceae, and particles in the water as a supplement foods. Meanwhile, the additional foods are Chlorophyceae, zooplankton, thus Lukas fish is classified as an omnivorous fish. Kusumasari (2007) in Sunatyo (2009) adds that the research of Siambut fish (*Labiobarbus leptocheilus*) in the Musi River on the composition of foods obtained the litter as its main foods.

The difference in food habits of fish is caused by differences in environmental conditions and food availability in reservoir waters Gajah Mungkur. The availability of foods in the waters is affected by the conditions of biotic and abiotic factors. Biotic factors include the quantity and quality of food available, easy or not getting the foods, the intensity of taking foods by fish in the population, while the abiotic factors such as temperature, light, space and surface area contained in the aquatic environment.

Length-Weight Relationship of Lukas Fish

The observation results of Lukas fish in reservoir waters Gajah Mungkur shows that Lukas fish length between 15-20 cm and weight between 40-90 grams. Based on the length-weight, noted the growth pattern of individual Lukas fish in the reservoir waters Gajah Mungkur through the straight line equation and the regression equation. The relations Log L (length) and Log W (weight) of Lukas fish is expressed as a straight line equation (Figure 4).

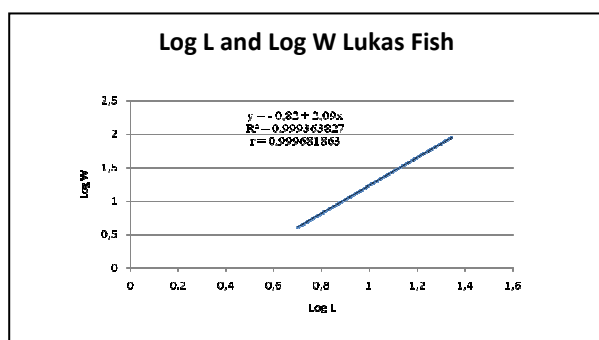


Figure 4. The straight line equation based on the relationship Log L (length) and Log W (weight) of Lukas fish (*Labiobarbus leptocheilus* Valenciennes)

Caption:

— = Equation of a straight line

Log L = X (Log length)

Log W = Y (Log weight)

Based on Figure 4, the length-weight relationship of Lukas fish with the straight line equation, where $Y = - 0.82 + 2,09X$, known that Lukas fish in the reservoir waters Gajah Mungkur has a negative allometric growth patterns. It is seen from different b values by 3 after t test, namely $b = 2.09$. According to Ricker (1973) in Febyanty and Syahailatua A. (2008) found a negative allometric growth pattern gives the sense that weight gain is not as fast as the length of fish (skinny). This means that obtained Lukas fish has a flat body size.

The results of this research is different from the results of Sutardja (1980) on Lukas fish in the reservoir, sampling from September to December, where the pattern of growth in the Jatiluhur reservoir fish Lukas is an isometric ie weight balanced growth with the growth of fish length. While Kartamiharja (1987) states that the sampling in August, fishes are allometric growth pattern. The difference of the individual growth patterns of these fish for their influencing factor. According Effendie (1979) that the factors affecting growth are external factors (food and environmental conditions) and internal factors (heredity, sex, parasites). Lumbanbatu (1979) in Sutardja (1980) added that the cause of this difference is the habitat, the maturity of gonads, the season and the degree of fullness of the stomach. In addition, the length that determines the weight of the fish is a genetic trait of the fish itself.

Lukas fish length-weight relationship of the fish can also be expressed in the regression equation is $W = 0,14L^{2,09}$ (Figure 5).

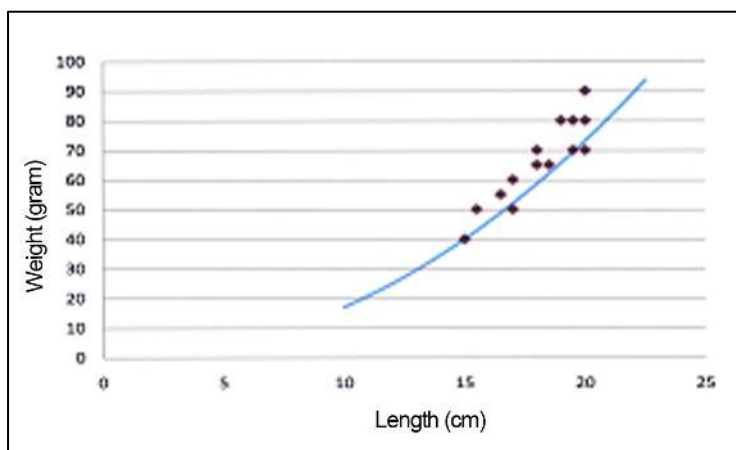


Figure 5. Regression equation of Length-weight relationship of Lukas fish (*Labiobarbus leptocheilus* Valenciennes)

Caption:

- = Regression equation
- = Length-weight relationship of Lukas fish based on the length and weight of samples obtained in the reservoir waters Gajah Mungkur

Figure 5 shows the length-weight relationship of Lukas fish (*Labiobarbus leptocheilus* Valenciennes) very closely. This is indicated by the magnitude of the correlation value is close to 1. In this research, the value of the correlation coefficient (r) of 0.9996. Furthermore, based on analysis of length-weight relationship values obtained coefficient of determination (R^2), which describes the influence of the length of the weight of the Lukas fish. Generally the Lukas fish, the total length of the body can be explained by the body weight of 99.93%.

CONCLUSION

Based on the results of this study concluded the following, namely;

1. Fish Luke (*Labiobarbus leptocheilus Valenciennes*) in the Gajah Mungkur, Central Java detrivor classified nature where its main food detritus.
2. Fish Luke (*Labiobarbus leptocheilus Valenciennes*) in the Gajah Mungkur, Central Java has a negative allometric growth pattern.

ACKNOWLEDGEMENTS

Thanks are to the person and institution: Taufik Hidayat, Lilya Anggraini, Uni Setiati for field assistances, and Research Institute for Inland Fisheries, Research Centre for Fisheries Management and Conservation, Mariana, Palembang for research funding.

REFERENCES

- Anonymous. 2010. *Labiobarbus leptocheilus Valenciennes*. [http://www.fishbase.org/Summary/SpeciesSummary.php? ID = 25 195 and AT = Umbu-umbu](http://www.fishbase.org/Summary/SpeciesSummary.php?ID=25195&AT=Umbu-umbu) 23 September 2010.
- Barus, F.Y. 2002. Introduction to Limnology. Biology Department, Faculty of Mathematics and Natural Sciences, USU. Medan. 163 pp.
- Bold, H.C. & J.W. Michael. 1985. Introduction to the Algae (Structure and Reproduction). Second Edition. Prentice-Hall, Inc., Englewood Cliffs, New Jersey.
- Dharyati, E., A.D. Utomo., S. Adjie., Asyari., D. Wijaya, 2009. Bio-Ecological and Fisheries Resource Potential in Kedung Ombo and Gajah Mungkur Central Java. The final report of the year. Research Institute for Inland Fisheries. Palembang.
- Effendie, M.I. 2002. Fisheries Biology. Revised Edition. Yayasan Pustaka Nusatama. Yogyakarta. 163 pp.
- Effendie, M.I. Method. 1979. Fisheries Biology. Yayasan Dwi Sri. Bogor. 112 pp.
- Febyanty, F & A Syahailatua. 2008. Food Habits of Flying Fish, *Hirundichthys oxycephalus* and *Cheilopogon cyanopterus* in the Makassar Strait. Jurnal Penelitian Perikanan Indonesia. 14(1): 115-122.
- Jubaedah, I. 2006. Reservoir Management for Sustainable and Biodiversity of Fish. Jurnal Penyuluhan Pertanian. 1(1): 42-47.
- Kartamiharja, E.S. 1987. Some Biological Aspects of The Predominat Fish Species in The Jatiluhur, West Java, Indonesia. Reservoir Fishery Management and Development in Asia. Proceedings of a Workshop Held in Kathmandu, Nepal, November 23 to 28. Editor: Sena S. De Silva
- Ridho, M.R., M.F. Rahardjo, A.Y. Franata. (2010). "Feeding Habits and Length-Weight Relation of Senangin Fish (*Eleutheronema tetradactylum* (Shaw) Caught in Breech Waters, South Sumatra". In Prociding International Seminar-Workshop on Integrated Lowland Development and Management. Faculty of Agriculture, Sriwijaya University, Palembang.
- Sukresno et al. 2002. Evaluation of Water System in Water Catchments Gajah Mungkur, Wonogiri. Proceedings Exposure BP2TPDAS-IBB Surakarta, Wonogiri. 12 pp.
- Sutardja, O.S. 1980. Some Biological Aspects of Lalawak, *Puntius bramoides* (Cuvier & Valenciennes) in Reservoir Jatiluhur West Java. Thesis. Faculty of Fisheries. Bogor Agricultural Institute. Bogor. 56 pp.

- Utomo, A.D, M.R. Ridho, D.A. Putranto, E. Saleh. 2010. The Water Quality Assessment at Gajah Mungkur Reservoir. In: Proceedings of the International Conference on Indonesian Inland Waters II. Research Institute for Inland Fisheries, Research Centre for Fisheries Management and Conservation, The Agency for Marine and Fisheries Research and Development, Palembang.
- Utomo, A.D., M.R. Ridho, D.A. Putranto, E. Saleh. 2011. Biodiversity Aquatic Plankton and Fertility Rate in Gajah Mungkur. *Bawal*. 3(6): 415-422.