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THREE SPOT GOURAMI (*Trichogaster trichopterus*) FOOD HABITS IN THE KOMERING RIVER'S DOWNSTREAM, SOUTH SUMATERA

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Abstract

*One of the downstream areas of the Komering River with potential for capture fisheries is Sungai Dua Village. One of the types of fish caught by fishermen in Sungai Dua is the three spot gourami (*Trichogaster trichopterus*). The three spot gourami fish is a type of freshwater consumption fish that has high economic value. But the fishes only rely on catches from nature. If the fishing is carried out continuously, without domestication and cultivation, it will cause a decline in the fish population. The research about the biological aspects of red-eye septic fish (*Trichogaster trichopterus*) which include food habits, relationship length and weight, condition factors and stomach fullness index. This research was conducted from April to June 2017. Sampling was carried out in the downstream waters of the Komering River in Sungai Dua Village, Banyuasin Regency, South Sumatra. Fish samples were analyzed at the Animal Taxonomy Laboratory, Department of Biology, Faculty of Mathematics and Science, Sriwijaya University. The determination of stations in sampling was carried out using multiple sampling methods, namely purposive sampling and quota sampling. The result of this research showed that (1) the Cyanophyta is the main food for the three spot gourami, Diatomae and Desmidiacae as a complementary food, while the additional foods are Rhizopoda, Chlorophyta, Ostracoda, and Entomostraca, (2) The growth pattern of red-eyed fish is negative allometric with a b value of -2 (b <3), the increase in length is faster than the weight gain, (3) The highest condition factor value is found in the size range 6.01-7.00 cm of 23.25 gr / cm and the lowest condition factor value is in the size range 5.01-6.00 cm of 0.62 gr / cm, and (4) The highest hull fullness index value of the red eye sepat fish hull is in the size range 7.01-8.00 cm at 32.86% and the lowest hull fullness index value at the size range 8.01-9.00 cm is 2.05% .*

Keywords: Hydrocarbon, Synergism, Rhizosphere

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1. Introduction

The river is a flowing water ecosystem. From an ecological point of view, a river basin is closely related to geomorphology condition, physiology, climate, flora, fauna, land use, and human activities. In general, humans use rivers to support all life activities such as household activities, agriculture, fisheries, and sources of livelihood. One of the downstream areas of the Komering River with potential for capture fisheries is Sungai Dua Village. The waters of the Duat River are located in Rambutan District, Banyuasin Regency, South Sumatra Province. The downstream waters of the Komering River in Sungai Dua Village still have a lot of natural vegetation, trees, residential areas, rice fields, and rice mills. Part of the community that lives around Sungai Dua Village is working in capture fisheries.

One of the types of fish caught by fishermen in Sungai Dua is *Trichogaster trichopterus*. *Trichogaster trichopterus* lives in swampy waters [1]. This species is among freshwater fish with high economic value. Three spot gourami is sold as fresh and salted fish to be

shipped to other places [2]. An increase in consumer demand accompanies the potential for three spot gourami to become consumption fish. To meet this demand, fishermen only rely on catches from nature. If the fishing is carried out continuously, without domestication and cultivation, it will cause a decline in the fish population. Based on the catch by local fishermen in the flooded swamp waters of Patratani, South Sumatra. Shows that the growth factor of sepat fish in 2017 grew slower than in 2010. Exploitation rate analysis shows fishing conditions indicate overfishing [3].

Bioecology of three spot gourami is important aspect for domestication and cultivation of this species. One crucial aspect of fish biology is their food habits. So, it is important to research about the biological components of *Trichogaster trichopterus*, including food habits, length-weight relationships, condition factors, and stomach fullness index.

2. Materials and Methods

2.1. Time and Location

This research was conducted from April to June 2017. Sampling was carried out in the downstream waters of the Komering River in Sungai Dua Village, Banyuasin Regency, South Sumatra. Fish samples were analyzed at the Taxonomy of Animal Laboratory, Biology Department, Mathematics and Natural Science Faculty, University of Sriwijaya.

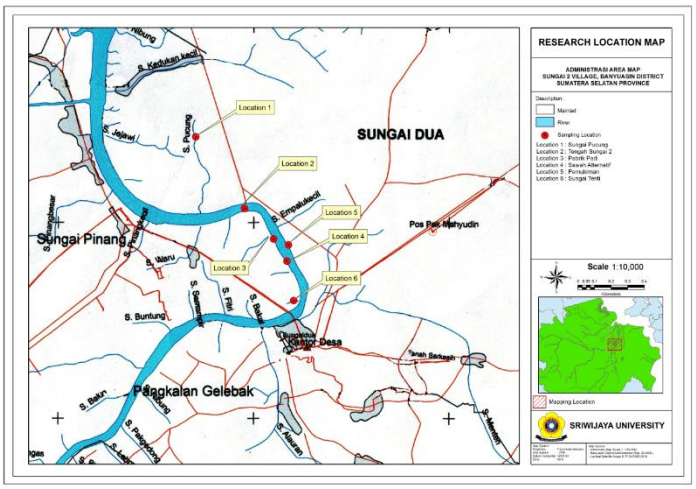

Fig 1. Location of Sampling.

2.2. Instrument and materials

This research using the instrument like surgical instruments, stationery, sample bottles, and DO meter. Other equipment were measuring glass, GPS, slide, cover glass, cloth, camera, microscope, pipette, boat, pH meter, Secchi disk, anco, mercury thermometer, and coolbox. The materials used in this study were aquades, three spot gourami fish (*T. trichopterus*), formaldehit 40% for preserve specimens of fish. Identification books [4];[5]; [6]; and [7].

2.3. Procedure

The determination of stations in sampling was carried out using multiple sampling methods, namely purposive sampling and quota sampling (Sugiyono, 2013). The purposive sampling method determines the sampling points, namely Pucung River, the middle of Sungai Dua, the waters around the rice mill, alternative rice fields, settlements, and rivers. Precise, while the quota sampling method with sampling met the desired amount. The coordinate of sampling points was plotted using GPS and was recorded.

2.3.1 Measurement of Aquatic Physical and Chemical

Observation and measurement of water physical and chemical parameters are carried out simultaneously with fish sampling. Measurement of physical parameters includes temperature and brightness, while chemical parameters include pH and dissolved oxygen. The temperature was measured using a digital thermometer, and water clarity using a Secchi disk, pH using pH meter, and DO using DO meter.

2.3.2 Sample Collection and Handling

The three-spot gourami (*T. trichopterus*) was caught using anco fishing gear. Fish samples were preserved in 40% formalin. After that, the fish samples were wrapped in a cloth and put into a coolbox. Fish sample identification was carried out at the Laboratory of Animal Taxonomy.

2.3.3 Analysis in the Laboratory

The three-spot gourami (*T. trichopterus*), preserved with 40% formalin, is unwrapped and washed under running water, after that are measured the length and weight. The measurement of the length of the fish using a caliper is shown in the picture (Figure 2), then the weight was measured using an analytical scale of 0.01 g. Furthermore, all fish samples were dissected to take their stomach. The stomach contents of the fish are weighed, then put into the sample bottle. The stomach contents of the food are

taken and tied with a string. The stomach contents were put into a measuring glass to measure the volume. The stomach, which removed its food contents, was diluted using distilled water, observed by using microscope, and identified of sample using the book of identification. The identification results were grouped according to the assault.

Figure 2. Three Spot Gourami/sepat fish.

2.4 Analysis of Data

2.4.1 Food Habits Analysis

The food habit of three-spot gourami was determined by weighting the stomach content and calculating the frequency of each item inside the stomach [9]. The type of food eaten by three spot gourami is shown descriptively and presented in tabular form.

2.4.2 Relationship of Length and Weight

The length weight relationship is calculated according to [10], which is as follows:

$$W = aL^b$$

$$r = \frac{\sum \text{Log Lx Log W}}{\sqrt{\sum(\text{Log L})^2 \text{ X } \sum(\text{Log W})^2}}$$

Information:
W = fish weight (gr)
L = fish length (cm)
a and b = constant

A value is the intersection point of the line of equation with the Y-axis, while b is the power value of the length and weight growth rate analyzed. It shall be shown in the formula that the pattern of growth of the length-weight of the fish is as follow. If the b value = 3 is obtained, the growth of fish is balanced between the length growth and the weight growth (isometric). However, if the b value ≠ 3 shows the growth pattern is an allometric. If the b value > 3 it mean the faster weight gain (positive allometric) and if the value of b <3 = faster length growth (negative allometric).

The b value was analyzed using a t-test. The t-test was performed to test the following hypothesis.

Hypothesis:
1. Ho: b value = 3 (growth pattern is isometric)
2. H1: b value ≠ 3 (growth pattern is allometric)

$$t-calculated = \frac{b_1 - b_0}{s\beta}$$

(sβ = standard deviation)

Where $S\beta_1$ is the coefficient deviation b, which can be determined from the model formula as follows:

$$S\beta_1 = \sqrt{\frac{KTG}{\sum (Xi - Xrata)}},$$

while KTG is obtained from covariance analysis.

According to [10], decision-making by comparing the t count with the value of t table at a 95% confidence interval. If the t count more t table value, its mean the decision is accept the alternative hypothesis, and if the t count lower than the t table, its mean the decision is to accept the null hypothesis.

To determine the close of the length and weight relationship, the r value is used with the formula:

$$r = \frac{\sum \text{Log Lx Log W}}{\sqrt{\sum(\text{Log L})^2 \text{ X } \sum(\text{Log W})^2}}$$

If the value of r close to 1 that indicates a strong relationship. If the value of r approaches 0, the relationship is weak [11].

2.4.3 Condition Factors

The formula was used for calculated the condition factor (K) according to [12].

$$K_n = \frac{W}{aL^b}$$

Information:

Kn = factor of relative condition for each fish
W = Fish Weight (grams)
L = total length of fish (mm)
adan b = constant
However, if b = 3, the analysis formula is:

$$K = \frac{W10^5}{L^3}$$

Information:
K = factor of condition
W = weight (gr)
L = length (mm)

2.4.4 Gastric Fullness Index

To determine the food habits of fish by using the calculating the index of stomach fullness. The index of stomach fullness aims to determine the percentage of sample fish feed consumption evaluated using the calculation formula according to [12], namely:

$$ISC\ (\%) = \frac{SCW}{BW} \times 100\ \%$$

Information:
ISC = Percentage of relative feed consumption (%)
SCW = weight of stomach contents (gr)
BW = weight of individual fish (gr)

3. Results and Discussion

Based on research carried out from April to June 2017, we collected 86 three-spot gourami samples. The variables consisted of food habit, feed composition, length-weight relationships, condition factor, the stomach fullness index of the three spot gourami, and the water physical properties.

3.1 Three Spot Gourami/Sepat Fish Food Habits

The food habits of three-spot gourami (*Trichogaster trichopterus*) are presented in Table 1.

Table 1. The food habits of three-spot gourami

Feed	April	May	June
Phytoplankton			
Cyanophyta	158	199	135
Chlorophyta	0	0	2
Diatomae	28	9	33
Desmidiacae	6	5	7
Zooplankton			
Rhizopoda	1	3	4
Ostracoda	0	1	0
Entomostraca	1	0	0

From April to June 2017, Sepat Mata Merah's feed composition consists of phytoplankton and zooplankton. The phytoplankton group is Cyanophyta with a composition ranging from 74.58-91.71%, Chlorophyta with a composition ranging from 0-1.11%, Diatomae with a composition ranging from 4.15-18.23%, Desmidiacae with a composition ranging from 2, 31-3.87%, zooplankton namely Rhizopoda with a composition between 0.5-2.21%, Ostracoda with a composition ranging from 0-0.45% and Entomostraca with a composition between 0-0.5%. Based on the composition of the food, it can be said that the three-spot goramy is a plankton-feeder. The food habits of the three spot gourami are similar to those of *Trichogaster pectoralis* [13] and also similar to the food habits of Lundu fish (*Mystus gulio*) [14].

The composition of natural food eaten by three spot gourami from April to June 2017 is mostly Cyanophyta, with a composition reaching 74.58-91.71%. This study shows that Cyanophyta is the dominant food. For domestication and cultivation of three-spot gourami, sufficient availability of Cyanophyta is required. Several factors that need to be considered in selecting natural feeds are the size that matches the mouth opening of the three spot gourami, easy to digest, non-toxic, easy to mass culture, and high nutrients [22].

3.2 The Length Weight Relationship

Data analysis of the length and weight relationship was used to determine the patternof growth the three spot gourami. The length-weight relationships can be seen in Figure 3.

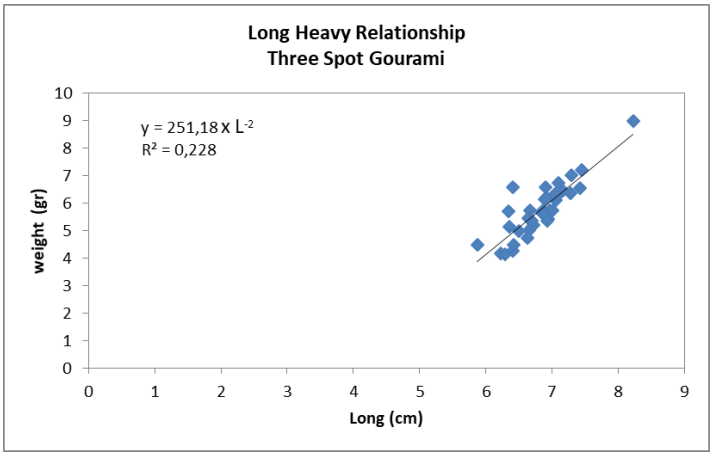

Figure 3. Graph of the relationship the length and weight of three spot gourami fish.

The relationship long and weight analysis of three spot gourami fish shows that y = 251.18 × L-2 with a b value of -2 (or less than 3). Based on the b value, it is known that three spot gourami/sepat fish have a the pattern of growth the negative allometric. Negative allometric means that the increase in the length of the three spot gourami is faster than the weight gain, which can be seen from age, sex, heredity, disease and parasites, water temperature, and food. This statement is emphasized by [9] and [15], where fish with a negative allometric growth pattern if the value of b <3.

The coefficient of determination (R^2) is 0.228. This value means that the variation in weight of three spot gourami that occurs due to changes in length and is explained by the formula is 22.8%. The factors of internal like heredity, gender, disease, hormones, and the ability to use the food, while the factors of external like food availability, competition in utilizing space, and water temperature [9].

3.3 Condition Factors of Three Spot Gourami

Factor of condition is defined as the condition or plumpness of fish shown in numbers based on the data of length weight. The factor of condition shows the fish condition, both in terms of the capacity of physical for reproduction and life [9]. Determination of the factor of condition based on size class (cm) is carried out to determine the physical condition of the fish at each different class size. The condition factor values based on the size class are presented in Figure 4.

Based on Figure 4, the highest condition factor value is found in the size range 6.01-7.00 cm of 23.25 gr/cm, and the lowest condition factor value is in the size interval 5.01-6.00 cm of 0.62 gr/cm. [9] states that the fluctuation in the average conditional factor value in each size class occurs due to the increase in fish body length and body weight and differences in age and diet during the growth process. The magnitude of the factors of condition depends on several things, including the present organism number, the condition of organism, the food availability, and the environment aquatic conditions.

Factors that influence the type and amount of food consumed by a fish species are age, place, and time. Food has an essential function in the life of an organism and is one of the factors that can determine the wide distribution of a species and control the size of a population. An organism can live, grow and reproduce because of the energy that comes from its food [16].

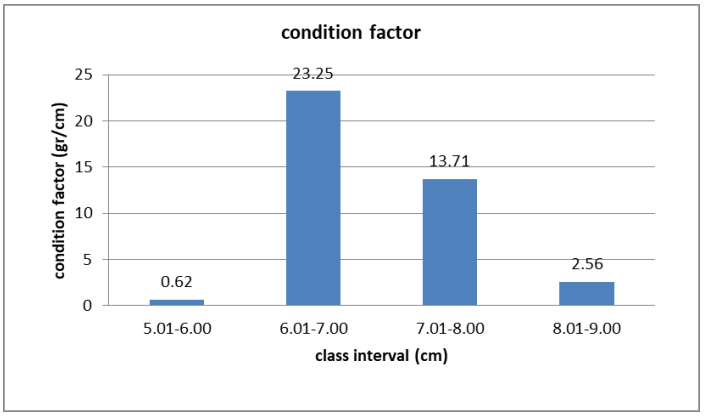

Figure 4: Graph of the condition factor values of three spot gourami.

Table 4. Measurement results for the physical and chemical properties of water.

Parameter	Unit	Location					
		Pucung River	Middle of River Dua	Rice Factory	Alternative Rice Fields	Settlement	The river Teriti
Brightness	Cm	30	45	25	20	34	45
Water temperature	^{0}C	31.3	33.6	32.2	33.1	32.5	31.8
pH	-	6.54	6.42	6.56	6.56	6.45	6.43
DO	mg/L	3.5	6.2	5.6	5.0	3.0	4.5

3.4 Three Spot Gourami Fish Stomach Fullness Index

The stomach fullness index was measured to determine the relative level of feed consumption.

Different sizes of the fish body reflect the consumption of food resources. Therefore, the stomach fullness index could also be seen based on the size class interval. The relative feed consumption rate values by size class are presented in Figure 5.

From Table 2, it shall be shown that the brightness was around 20-45 cm at sampling the three spot gourami. The water clarity determines the extent to which sunlight can penetrate the waters and the depth the photosynthesis process can take completely. The clarity that supports is when the plate Secchi disk is 20-40 cm from the surface [17].

The water temperature in Sungai Dua ranges from 31.3-36.6 ^{0}C. Temperature is a significant factor in chemical processes in the waters, and it directly affects the life processes of organisms and indirectly affects oxygen solubility [18]. The temperature increase can cause the metabolism rate and respiration rate increasing, and than the consumption of oxygen increasing too [19].

The waters of Sungai Dua have a pH range between 6.42-6.56. The degree of acidity is better known as pH, the logarithm of the concentration of H (hydrogen) ions released in a liquid. The pH value of water significantly influences the aquatic ecosystem itself [20]. Based on the Republic of Indonesia government regulation number 82 of 2001 [24], the value of pH is still in accordance with the class III quality standard for fisheries.

Dissolved oxygen in the waters of Sungai Dua ranges from 3.0-6.2 mg / L. Oxygen is a vital chemical element as the primary support for the life of various organisms. Dissolved oxygen in water comes from air diffusion and from the photosynthesis of chlorophyll. Organisms that live in water and are needed by organisms to oxidize the substances that enter their bodies [21]. Based on the Republic of Indonesia government regulation number 82 of 2001, the value of dissolved oxygen is still in accordance with the class III quality standard for fisheries. According to [23] that dissolved oxygen (DO) between 4.2 mg/L and 4 mg/L, fish in river waters can still live, but efforts to control activities in river areas are needed to improve water quality.

4. Conclusion

From the results and discussion above, it can be concluded as follows :

1. Cyanophyta is the primary food for three spot gourami, Diatomae, and Desmidiacae as complimentary food, while the other foods are Rhizopoda, Chlorophyta, Ostracoda, and Entomostraca.
2. The pattern of growth the three spot gourami fish is negative allometric with the value of a b is -2 or (the b value <3), the increasing in the length is faster than the increasing the weight gain.
3. The highest condition factor of three spot gourami was found in the range size between 6.01 and 7.00 cm (23.25 gr/cm), and the lowest value was 0.62 gr/cm in the range size from 5.01 to 6.00 cm.
4. The highest stomach fullness index of the three spot gourami on the range size from 7.01 to 8.00 cm was 32.86%, while the lowest value of 2.05% was observed in the range size between 8.01 and 9.00 cm 2.05%.

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