

## The Effect of Feeding Natural Feed of *Daphnia* sp. Enriched with Viterna on the Growth of Gourami Fry (*Osphronemus gouramy*)

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### ABSTRACT

#### Keywords:

*Daphnia* sp;  
enrichment;  
gourami fish;  
growth; viterna

This study aimed to determine the growth performance of gourami fish (*Osphronemus gouramy*) fed with *Daphnia* sp. enriched with Viterna at different doses. The research used an experimental method with four treatments and three replications. The treatments consisted of P1 (0 ml/L as control), P2 (10 ml/L), P3 (20 ml/L), and P4 (30 ml/L) of Viterna enrichment. Data were analyzed using Analysis of Variance (ANOVA) followed by Duncan's Multiple Range Test to determine significant differences among treatments. The results showed that Viterna enrichment significantly affected absolute length growth, absolute weight growth, and daily growth rate ( $P < 0.05$ ), but had no significant effect on survival rate ( $P > 0.05$ ). The highest absolute length growth was observed in P4 (1.79 cm), which was not significantly different from P3 (1.39 cm), while the lowest was found in P1 (0.35 cm). The highest absolute weight growth was also found in P4 (1.91 g), which was not significantly different from P3 (1.64 g), while the lowest was in P1 (0.69 g). The highest daily growth rate was recorded in P4 (3.20%), which was not significantly different from P3 (3.13%), while the lowest was in P1 (2.46%). Based on the results, the enrichment of *Daphnia* sp. with Viterna at a dose of 20 ml/L (P3) is considered the most effective treatment for improving the growth of gourami fish.

### INTRODUCTION

Gouramy (*Osphronemus gouramy*) is a cultivated fishery commodity that lives in freshwater and is classified as calm waters, such as lakes, reservoirs, and swamps (Sulastris and Muchlin, 2012). This fish has a high protein content, dense flesh, and has a relatively stable and high selling price compared to other freshwater fish species, ranging from IDR 35,000 to IDR 40,000 per kilogram. Gouramy is considered a prospective commodity because almost all sizes, from broodstock, eggs, fry, fry from nursery, and consumption sizes, have good selling value (Iskandar *et al.*, 2022). In line with the development of increasingly extensive gourami cultivation business areas, the need for broodstock and fry is also increasing. Good and correct seeding methods can be implemented as an effort to increase seed production so that seed needs can be met (Pratama *et al.*, 2018).

*Daphnia* sp. is a natural food used in freshwater fish hatcheries. *Daphnia* sp. are small, freshwater-dwelling fish often referred to as water fleas. The advantages of *Daphnia* sp. as a natural food include its ease of digestion by fish fry, its non-degradation of water quality, its adequate nutritional content, and its easy availability. The nutritional content of *Daphnia* sp. includes 4.58% protein, 0.41% fat, 1.06% carbohydrates, and 0.05% ash (Lestari, 2020).

Preliminary research showed that after 4 hours of enrichment, the intestines of *Daphnia* sp. were completely filled with Viterna, with an increase in *Daphnia* sp. population, particularly at doses of 10 ml and 50 ml (Yusri, 2020). Enrichment involves adding nutrients to feed to

increase its nutritional content according to the fish's dietary needs and promote growth. Enrichment of *Daphnia* sp. can utilize several nutritional sources, such as fish oil, vitamin C, vitamin B, and probiotics. Probiotics used to enhance the nutritional value of *Daphnia* sp. can be applied using Viterna.

Viterna is a feed supplement containing minerals, vitamins, amino acids, probiotics, and fatty acids (aspartic acid and glutamic acid) in a single product to increase nutritional content and accelerate growth. Viterna can function to stimulate digestive enzymes, inhibit pathogens, and improve feed digestibility, thereby influencing metabolic processes in the body (Khoiriyah, 2022). Based on this description, the use of natural feed *Daphnia* sp. enriched with Viterna is considered to have the potential to improve the growth of gourami (*Osphronemus gouramy*).

However, previous studies have not specifically examined the optimal enrichment dose of *Daphnia* sp. using Viterna and its direct effect on the growth performance of gourami fry. Most studies only focus on general enrichment techniques without evaluating the effectiveness of short-term enrichment. Therefore, this study provides novelty by analyzing the effect of enrichment doses of *Daphnia* sp. using Viterna on improving its nutritional quality and its impact on gourami fry growth.

This study aims to determine the effect of enrichment doses of *Daphnia* sp. using Viterna on its nutritional content and to evaluate its effectiveness in supporting the growth of gourami (*Osphronemus gouramy*) fry.

## **METHOD**

### **Time and Place**

The research was conducted for 40 days, namely from May to July 2024. This research took place at the Tebing Tinggi Fish Seed Center Technical Implementation Unit (UPTD-BBI), North Sumatra.

### **Tools and material**

used in the research were jars, digital scales, rulers, blowers, styrofoam, thermometers, pH meters, DO meters, stationery, viterna, and gourami seeds.

### **Experimental Design**

This research used a Completely Randomized Design (CRD), with 4 treatments and 3 replications. The treatment applied is: P1 : Control, without enrichment with viterna. P2 : Administration of *Daphnia* sp. enriched with Viterna 10 mL/L. P3 = Administration of *Daphnia* sp. enriched with Viterna 20 mL/L. P4 = Administration of *Daphnia* sp. enriched with Viterna 30 mL/L.

### **Research Procedures**

Preparation of containers prepare 12 25L jars. The first step in preparing the containers is to sterilize the jars by rinsing them with clean water. Then, dry the jars in the sun and let them dry. Next, fill the jars with 12 liters of water and let them aerate for 24 hours. The jars to be used for enrichment are cleaned with clean water and dried. Next, fill the jars with 1 liter of water and set up the aeration.

*Daphnia* sp. enrichment is carried out by soaking *Daphnia* sp. in Viterna solution for 4 hours. *Daphnia* sp. was put into each enrichment container in the form of a jar containing 1 L of water and had been mixed with Viterna according to the treatment dose, then for each treatment, *Daphnia* sp. was put in. Then, 600 *Daphnia* sp. were soaked for each treatment. Then left for 4 hours, after 4 hours of soaking, the *Daphnia* sp. were filtered and rinsed with clean water to be given to the gourami fry.

Pisciculture the gourami fry used were 2-3 cm in size. The number of fry used was 120. The stocking density of the gourami fry was 10 per tank, which were maintained for 40 days. Feeding was done using the ad libitum method. Feeding was done three times a day at 07.00 WIB (morning), 12.00 WIB (noon), and 18.00 WIB (evening). During maintenance, siphoning was carried out once a day in the maintenance tank, namely cleaning feces and leftover food.

Water changes of 70% of the tank volume were carried out, along with water changes carried out every three days. Weighing of the test fish was carried out every 10 days to determine the weight and body length of the fish.

Culture techniques the 1,000 *Daphnia* sp. used in this study were then recultured using an aerator and two Styrofoam containers, two pipe tubs, and two buckets. The *Daphnia* sp. were cultured using catfish pond water, which was supplied periodically twice daily, in the morning and evening.

Sampling was conducted at the beginning of maintenance (H0), (H10), (H20), (H30), and the end of maintenance (H40). Parameters measured during sampling included weight growth, length growth, specific growth rate, and survival. Water quality parameters measured were temperature, pH, and DO. Water quality parameters were measured every 7 days throughout the study.

### Tested Parameters

#### Absolute length growth

was calculated using the formula (Effendi et al., 2006) as follows:

$$PPM = L_t - L_0$$

Description:

PPM : Absolute length growth (cm)

L<sub>t</sub> : Final length (cm)

L<sub>0</sub> : Initial length (cm)

#### Absolute weight growth

in this study can be calculated using the formula (Wibowo, 2017):

$$PBM = W_t - W_0$$

Description:

PBM: Absolute weight gain (g)

W<sub>t</sub>: Biomass weight at the end of the study (g)

W<sub>0</sub>: Biomass weight at the beginning of the study (g)

#### Specific Growth Rate

According to Abdel-Tawwab et al. (2010), the specific growth rate can be calculated using the following formula:

$$LPS = \frac{\ln W_t - \ln W_0}{t} \times 100\%$$

Description:

LPS : Specific growth rate (% per day)

W<sub>0</sub> : Average fish weight at the beginning of the study (g)

W<sub>t</sub> : Average fish weight at the end of the study (g)

T : Maintenance time (days)

#### Survival Rate

To calculate the survival rate, the formula proposed by (Effendi et al., 2006) is used as follows:

$$KH = \frac{N_t}{N_0} \times 100$$

Description:

KH : Survival rate (%)

N<sub>t</sub> : Total number of live fish at the end of the study (fish)

N<sub>0</sub> : Total number of live fish at the beginning of the study (fish)

#### Water Quality

During the study, the water quality parameters measured were temperature, pH, and DO. Measurements were conducted every seven days for the 40-day study period.

#### Data Analysis

Data obtained during the study were analyzed using ANOVA with a 95% confidence

level to determine the effect of all treatments. If a significant difference was found, Duncan's exact test was performed to determine differences between treatments. Water quality parameters were presented in tables and analyzed descriptively.

## RESULT AND DISCUSSION

### Absolute Length Growth

The results showed that enrichment of *Daphnia* sp. with Viterna had a significant effect ( $P < 0.05$ ) on the absolute length growth of gourami fish. The data are presented in Table 4.1.

Table 4.1. Absolute length growth of gourami fish fed natural food *Daphnia* sp. enriched with viterna.

Treatment	Initial Length (cm)	Final Length (cm)	Growth Absolute Length (cm)
P1: 0 ml control	3,06	3,41	$0,35 \pm 0,24^a$
P2: 10 ml viterna	3,01	3,98	$0,97 \pm 0,35^b$
P3: 20 ml viterna	3,00	4,40	$1,39 \pm 0,29^{bc}$
P4: 30 ml viterna	3,03	4,75	$1,72 \pm 0,28^c$

Note: Numbers followed by the same letter indicate a treatment effect that is not significantly different ( $P < 0.05$ ). The data listed are the average and standard deviation values.

Based on Table 4.1, treatment P4 (30 ml Viterna) resulted in the highest absolute length growth ( $1.72 \pm 0.28$  cm), followed by P3 ( $1.39 \pm 0.29$  cm), P2 ( $0.97 \pm 0.35$  cm), and P1 ( $0.35 \pm 0.24$  cm). Duncan's multiple range test indicated that P4 was significantly different from P1 and P2, but not significantly different from P3.

Protein is a macronutrient that is essential for fish, in addition to carbohydrates and fat, to support growth. High and low protein levels in feed affect growth rates and feed consumption (Yulisman, 2012). However, excess protein and fat can cause fat accumulation and lack of appetite, which can inhibit growth in fish (Aprilia *et al.*, 2018).

The higher the protein content of the feed, the higher the growth rate. If the feed provided is of good quality, in sufficient quantity, and under favorable environmental conditions, the fish can be guaranteed to grow rapidly as expected. Conversely, if the feed provided is of poor quality, in insufficient quantity, and under unfavorable environmental conditions, fish growth will certainly be stunted (Amri and Khairuman, 2002).

### Absolute Weight Growth

The results showed that enrichment of *Daphnia* sp. with Viterna significantly affected ( $P < 0.05$ ) the absolute weight growth of gourami fish (Table 4.2).

Table 4.2. Absolute weight growth of gourami fish fed natural feed of *Daphnia* sp. enriched with viterna.

Treatment	Initial Weight (g)	Final Weight (g)	Growth Absolute Weight (g)
P1: 0 ml control	0,38	1,07	$0,69 \pm 0,18^a$
P2: 10 ml viterna	0,34	1,39	$1,05 \pm 0,09^b$
P3: 20 ml viterna	0,38	2,03	$1,64 \pm 0,20^c$
P4: 30 ml viterna	0,39	2,30	$1,91 \pm 0,05^c$

Note: Numbers followed by the same letter indicate a treatment effect that is not significantly different ( $P < 0.05$ ). The data listed are the average and standard deviation values.

Treatment P4 produced the highest absolute weight growth ( $1.91 \pm 0.05$  g), followed by P3 ( $1.64 \pm 0.20$  g), P2 ( $1.05 \pm 0.09$  g), and P1 ( $0.69 \pm 0.18$  g). Statistical analysis showed that P4 was significantly different from P1 and P2, but not significantly different from P3.

Meanwhile, the lowest absolute weight gain was seen in the control P1, at  $0.69 \pm 0.18$  g. The low weight gain in P1 was due to the absence of *Daphnia* sp. enrichment with Viterna, as in P4, P3, and P2. Enrichment of *Daphnia* sp. with Viterna accelerated the absolute weight gain of

gourami fry. Setiawati et al., (2013), explained that fish will grow if the feed nutrients digested and absorbed by the fish's body are greater than the amount needed to maintain its body. Cortez-Jacinto et al., (2005), explained that growth rate and specific growth rate are closely related to body weight gain derived from the feed consumed.

### Specific Growth Rate

The results showed that enrichment of *Daphnia* sp. with Viterna had a significant effect ( $P < 0.05$ ) on the specific growth rate of gourami fish (Table 4.3).

Table 4.3. Specific growth rate of gourami fish fed natural *Daphnia* sp. feed enriched with Viterna.

Treatment	Specific Growth Rate (%/day)
P1: 0 ml control	2,46±0,15 <sup>a</sup>
P2: 10 ml viterna	3,02±0,09 <sup>b</sup>
P3: 20 ml viterna	3,13±0,18 <sup>b</sup>
P4: 30 ml viterna	3,20±0,10 <sup>b</sup>

Note: Numbers followed by the same letter indicate a treatment effect that is not significantly different ( $P < 0.05$ ). The data listed are the average and standard deviation values.

The highest SGR was observed in treatment P4 ( $3.20 \pm 0.10\%/day$ ), followed by P3 ( $3.13 \pm 0.18\%/day$ ), P2 ( $3.02 \pm 0.09\%/day$ ), and P1 ( $2.46 \pm 0.15\%/day$ ). Duncan's test showed that P1 was significantly different from P2, P3, and P4, while P2, P3, and P4 were not significantly different from each other.

According to Lumuan *et al.* (2020), protein and fat are digested, absorbed, and metabolized, after which they are converted into usable energy. Cortez *et al.* (2005) explain that daily and specific growth rates are closely related to the weight gain of fish derived from the feed consumed. Gourami require energy for growth, and this energy is obtained from the food consumed. If the energy from the feed exceeds the energy requirements, the fish utilize it for growth.

Enriching *Daphnia* sp. with viterna can increase nutritional content, such as protein, vitamins, minerals, and amino acids, consistent with the content of viterna. According to Hardianti (2016), individual growth can occur when there is excess energy and protein from food, which the body uses for basic metabolism, movement, body maintenance, and the replacement of damaged cells. Good nutritional feed plays a crucial role in maintaining fish survival and accelerating growth (Fратиwi *et al.*, 2018).

### Survival Rate

Based on the ANOVA test, the results of the research on enrichment of *Daphnia* sp. with viterna survival showed a significant effect ( $P > 0.05$ ) on the survival of gourami fish. The survival is presented in Table 4.4.

Table 4.4 Survival of gourami fish fed natural *Daphnia* sp. food enriched with Viterna.

Treatment	Survival Rate (%)
P1: 0 ml control	76,66± 5,77 <sup>a</sup>
P2: 10 ml viterna	76,66± 5,77 <sup>a</sup>
P3: 20 ml viterna	83,33± 5,77 <sup>a</sup>
P4: 30 ml viterna	83,33± 5,77 <sup>a</sup>

Note: Numbers followed by the same letter indicate a treatment effect that is not significantly different ( $P > 0.05$ ). The data listed are the average and standard deviation values.

Based on the table above, the results of Duncan's further test on the survival of gourami fry indicate that the enrichment of *Daphnia* sp. with Viterna did not significantly differ between treatments. Survival determines the success of gourami fry cultivation. Overall, survival during the study was considered good, ranging from 76% to 83%.

Fadilah and Salam (2020) stated that survival is categorized as good if the SR value is  $> 70\%$ . Biotic factors influence survival, including competitors, population density, age, and

environmental adaptability (Abrar, 2019). Fish mortality occurs due to stress, which affects metabolic rates and the inability to utilize available feed optimally. According to Salamah (2020), fish survival is greatly influenced by the availability of good food and proper water quality management. Food availability and environmental water quality, such as temperature, dissolved oxygen, pH, and ammonia, can affect survival.

### Water Quality

Water quality is a crucial factor in fish farming. Water, the fish's habitat, significantly influences the survival of gourami. High or low water quality affects the survival rate of gourami fry. Water quality in the rearing medium is measured as supporting data, including pH, temperature, and dissolved oxygen. The results of water quality measurements during the study are presented in Table 4.5.

Table 4.5 Water Quality Measurements During the Research

Treatment	Water Quality Parameter		
	Temperature (°C)	pH	DO (mg/l)
P1 : 0 ml kontrol	29,1-29,3	7,3-7,6	5,8-6,0
P2 :10 ml viterna	29,3-29,6	7,3-7,5	5,7-6,1
P3 :20 ml viterna	29,0-29,4	7,2-7,4	5,8-6,1
P4 :30 ml viterna	29,3-29,5	7,1-7,3	5,7-6,0
Baku Mutu	25-30 °C	6-8	4-6 mg/l
	(Handaryono, 2015)	(Mahyuddin, 2007)	(Rasmawan, 2010)

The results of water quality measurements for each treatment tested indicate that the water quality during the gourami culture period remained within the optimum range and was able to support the growth and survival of the gourami.

The temperature during the culture period ranged between 29.1 and 29.6°C. This indicates that the temperature remained optimal for gourami fry. This situation aligns with Handaryono's (2015) opinion, stating that temperature is an abiotic factor that significantly influences other parameters. Furthermore, temperature also affects fish metabolism, with high metabolic rates disrupting growth. The optimal temperature for gourami fry cultivation ranges from 25 to 30°C.

The DO during culture period ranged from 5.7 to 6.1. According to Nirmala & Rasmawan (2010), the optimal dissolved oxygen (DO) content for gourami cultivation is between 4 and 6 mg/L. The pH during culture period ranged from 7.1 to 7.6. This was also confirmed by Mahyuddin (2007), that the optimal pH for the growth of gourami fish is around 6-8.

The results of this study indicate that enrichment of *Daphnia* sp. with *Viterna* improves the growth performance of gourami fish, including length, weight, and specific growth rate. Among all treatments, P4 (30 ml *Viterna*) consistently showed the best results.

The higher growth in P4 is likely due to better nutritional content provided by the enrichment process. Adequate nutrients, especially protein and lipids, play an important role in supporting fish growth and metabolism.

Although P4 showed the highest values, the results were not significantly different from P3 in several parameters. This suggests that both 20 ml and 30 ml doses provide relatively similar nutritional benefits, although the higher dose (P4) tends to give optimal results.

These findings are supported by previous studies. According to Lumuan et al. (2020), protein and fat are essential nutrients that are digested and converted into energy for growth. Similarly, Cortez et al. (2005) reported that growth rate is closely related to feed intake and nutrient utilization.

In addition, good water quality conditions during the study also contributed to optimal fish growth, as environmental factors influence metabolic processes and feed efficiency.

### CONCLUSION

The enrichment of *Daphnia* sp. with *Viterna* significantly affected ( $P < 0.05$ ) the growth

performance of gourami fish, including absolute length growth, absolute weight growth, and specific growth rate (SGR). Treatment P4 (30 ml Viterna) consistently produced the highest growth values in all observed parameters. However, in several cases, the results were not significantly different from treatment P3 (20 ml Viterna), indicating that both doses provide relatively similar effects on fish growth. Overall, the enrichment of *Daphnia* sp. with Viterna improves the nutritional quality of natural feed, which in turn enhances the growth performance of gourami fish. Therefore, the use of Viterna at a dose of 30 ml is recommended as the optimal treatment, although a dose of 20 ml can also be considered effective.

## REFERENCES

- Abrar, W. A. N. A. P. dan I. P. (2019). Pengaruh Penambahan Probiotik dalam Pakan terhadap Laju Pertumbuhan dan Kelulushidupan Ikan Bawal Air Tawar (*Colossoma macropomum*) dengan Sistem Bioflok. 24(1), 32–40.
- Amri K, Khairuman. (2002). Membuat Pakan Ikan Konsumsi. Jakarta: Agro Media Pustaka.
- Aprilia, P., Sofyatuddin, K., dan Siska, M. (2018). Penambahan Suplemen Viterna Plus Pada Pakan Benih Ikan Patin (*Pangasius* sp.). *Jurnal Ilmiah Mahasiswa Kelautan Dan Perikanan Unsyiah*, 3(1), 66–75.
- Cortez-Jacinto, E.H., Villarreal-Colmenares, L.E., Cruz-Suarez, R., Civera-Cerecedo, H., Soria, N. and Hernandez Llamas, A., (2005). Effect of different dietary protein and lipid levels on growth and survival of juvenile Australia Red Claw Crayfish (*Cherax quadricarinatus*). *Aquaculture nutrition*, 11, pp.283-291.
- Fadilah, R., & Salam, I. (2020). Pengaruh Pemberian Viterna dengan Dosis Berbeda Pada Pakan Terhadap Pertumbuhan dan Sintasan Benih Ikan Nila (*Oreochromis niloticus*). *Jurnal Ilmu Perikanan*. 9(2), 98–102.
- Fратиwi, G., Dewiyanti, I., & Hasri, I. (2018). Aplikasi probiotik dari bahan baku lokal pada pakan komersial terhadap pertumbuhan dan tingkat kelangsungan hidup benih ikan depik (*Rasbora tawarensis*). *Jurnal Ilmiah Mahasiswa Kelautan Perikanan Unsyiah*, 3(1).
- Hardianti, Q., Rusliadi, and Mulyadi. (2016). Effect Of Feeding Made with Different Composition On Growth and Survival Seds of Baranmundi (*Lates calcarifer*, Bloch). *Jurnal Online Mhasiswa Fakultas Perikanan dan Ilmu Kelautan Universitas Riau* 3(2) : 1-10.
- Handaryono, P. S. (2015). Pengaruh Suhu Media Pemeliharaan yang Berbeda terhadap Kelangsungan Hidup dan Pertumbuhan Benih Ikan Gurame (*Osphronemus gouramy*) Skripsi (pp. 1–51).
- Iskandar, A., Pinem, R. T., Darmawangsa, G. M., Hendriana, A., Astiyani, W. P., dan Muslim, M. (2022). Budidaya Ikan Gurami *Osphronemus gourami*: Teknis Pembenuhan dan Analisa Kelayakan Usaha. *Jurnal Akuakultur Sungai Dan Danau*, 7(1), 39. <https://doi.org/10.33087/akuakultur.v7i1.121>.
- Khairuman dan Amri, 2003. Buku Pintar Budidaya 15 Ikan Konsumsi. AgroMedia. Jakarta.
- Khoiriyah, N. Y. (2022). Efektivitas Pemberian *Daphnia* Sp. Yang Diperkaya Dengan Viterna Untuk Meningkatkan Pertumbuhan Benih Ikan Manfish *Pterophyllum scalare* (Schultze, 1823). *Skripsi*, 4–6.
- Lestari, T. A. (2020). Effectivity Of Feeding Fish Flour On *Daphnia* Sp. To Increase Growth Performance And Survival Rate Gouramy Larvae (*Osphronemus gouramy*). *Berkala Perikanan Terubuk* Vol 48 No 1 Februari 2020. Journal homepage: <https://ejournal.unri.ac.id/index.php/IT>
- Lumuan, A., Agustina, S. S., & Wuniarto, E. (2020). Penambahan Probiotik Viterna Pada Pakan Komersial Terhadap Pertumbuhan dan Rasio Konversi Pakan Benih Ikan Nila (*Oreochromis niloticus*) Addition of Viterna Probiotics in Commercial Feed to Growth and

- Feed Conversion Ratio of Tilapia Seed (*Oreochromis n.*) Zona Akuarik Banggai, 1(1), 32–39.
- Pratama, B. A., Susilowati, T., dan Yuniarti, T. (2018). Pengaruh Perbedaan Suhu terhadap Lama Penetasan Telur, Daya Tetas Telur, Kelulushidupan dan Pertumbuhan Benih Ikan Gurame (*Osphronemus gouramy*) Strain Bastar. *Jurnal Sains Akuakultur Tropis*, 2(1), 59–65.
- Rasmawan, N. K. D. (2010). Kinerja Pertumbuhan Ikan Gurame (*Osphronemus gouramy*) yang dipelihara pada Media Bersalinitas dengan Paparan Medan Listrik. *Jurnal Akuakultur Indonesia*, 9(1), 46-55.
- Sulastri, R. & Muchlisin, Z. A. (2012). Pembesaran Ikan Gurami (*Osphronemus gouramy*). *Jurnal Ilmiah Mahasiswa Kelautan dan Perikanan Unsyiah*, 1–10.
- Salamah, Z. (2020). Pemberian probiotik pada pakan komersil dengan proteinyang berbeda terhadap kinerja ikan lele (*Clarias sp.*) menggunakan sistem bioflok. 7(1), 21–27.
- Yusri, A. Z. dan D. (2020). Pengkayaan *Daphnia* Sp. Dengan Viterna Terhadap Kelangsungan Hidup Dan Pertumbuhan Larva Ikan Lele Dumbo (*Clarias gariepinus*). *Jurnal Ilmu Pendidikan*, 7(2), 809–820.
- Yulisman,(2012). Peningkatan Pertumbuhan Dan Efisiensi Pakan Ikan Gabus (*Channa sriata*) Melalui Optimasi Kandungan Protein Dalam Pakan. *Berkala Perikanan Terubuk*, 40(2), 47-55. <https://terubuk.ejournal.unri.ac.id/index.php/JT/article/view/1772>.