Asian Journal of Aquatic Sciences, December 2022. Vol 5, Issue (3) 388-394 e-issn: 2716-4608
p-issn: 2655-366X

THE EFFECT OF TURMERIC POWDER ADDITION TOWARD GROWTH AND SURVIVAL RATE OF *Cyprinus carpio*

Mastiur Afridayanti Simbolon[1*], Windarti[1], Herman Sarumaha[1]
[1]Aquaculture Study Program, Sekolah Tinggi Perikanan dan Kelautan Matauli
Jl. KH. Dewantara No.1, Sibuluan Indah, Kec. Pandan, Kab. Tapanuli Tengah, Sumatera Utara 22538
*mastiursimbolon07@gmail.com

ABSTRACT

Turmeric (*Curcuma longa* Linn.) is one of the natural sources that can be used to improve the appetizer of fish and this improve the growth of that fish. Research aimed to understand the growth and survival of *C.carpio* fed with turmeric-enriched pellets was conducted from March to May 2022. There were 4 different dosages of turmeric powder applied, namely T0 (Control), T1 (0.5 g/kg), T2 (1 g/kg), and T3 (1,5 g/kg). The fish was reared in a 25 L container completed with an aerator and filter. The density of fish was 15 fish/container, around 3 g BW and 6 cm TL. The fish was fed *ad-satiation*, 3 times/day and was reared for 49 days. Sampling was conducted once a week. Results showed that the survival rate of fish in all treatments was good, more than 95 %. The best growth was obtained in T3, as the fish achieved 6.29 g BW and 7.61 cm TL. While the fish of other treatments were lower, they were T0 (4.60 g; 6.72 cm), T1 (4.73 g; 6.85 cm), and T2 (4.99 g; 7.03 cm). The best FCR was also found in T3 (1.37) and the FCR of other treatments were T0 (2.28), T1 (2.10) and T2 (1.97) respectively. Data obtained indicate that the addition of turmeric powder improves the growth as well as the FCR of *C.carpio.*

Keywords: *Curcuma* sp, FCR, Growth, Survival Rate

I. INTRODUCTION

Common carp farming (*Cyprinus carpio*) has long been recognized and developed by the fish farming community. The development of common carp to date has been able to be well maintained in various types of aquaculture containers. In addition to its developed cultivation, common carp is also a freshwater commodity that is very popular with the public as a consumable fish. Common carp are believed to play an important role in meeting human nutritional needs [1].

People's needs for common carp commodities (*C.carpio*) show the importance of increasing common carp farming production in order to be able to meet the needs of the existing market. However, in the context of increasing common carp production, obstacles caused by various factors often experience it. The many problems of common carp farming often reduce the number of yields and even the failure of aquaculture activities. This actually causes the low availability of common carp commodity supply and triggers higher common carp prices.

Various obstacles that often cause low production of common carp farming, including relatively slow growth rates, pest and disease attacks and low dilution. In terms of increasing the effectiveness of cultivation, one of the things that are often done is the use of drugs and chemical supplements. However, the use of medicines and chemical supplements often has a negative impact on farmed fish and is relatively more expensive and the

Received : 19 October 2022
Accepted : 18 November 2022

availability of ingredients is limited in some areas. Continuous administration of antibiotics can cause diseases to become resistant (resistant) to these drugs, thus causing residues of drugs in the body of fish and the aquatic environment, eventually can harm the humans who consume them (Sugiyanti *in* [2]).

The use of natural ingredients has been widely used, one of which is turmeric, the natural ingredient has been tried but there is no information for common carp. Turmeric is a spice plant whose existence is abundant and easy to find and its price is affordable. Turmeric has oil substances, curcuminoids, proteins, phosphorus, potassium, iron and vitamin C and antibiotics. Curcumin as the main active substance of turmeric is efficacious as an antioxidant, prevents tissue damage, and is an appetite enhancer [3]. Based on the results of [4], giving turmeric curcumin extract at a dose of 0.7 g / L can increase the growth of striped catfish fish and can also be used to maintain the condition of the fish body from *Aeromonas hydrophila* infection seen from the fish dilution rate reaching 100%.

Curcumin can stimulate the walls of the gallbladder to expel bile fluid into the small intestine (Darwis *in* [5]). Thus increasing the digestion of fats, proteins, and carbohydrates that results in increased absorption activity of food substances. Turmeric contains essential oils that function to accelerate gastric emptying and trigger increasing eating behavior due to signals that enter the brain when the stomach is empty so that fish will experience an increase in feed consumption. Essential oils contained in turmeric can help digestion by stimulating the nervous system secretion so that gastric sap containing enzymes is then secreted into the stomach and intestines thus increasing the metabolism of food substances (Abbas and Lichtman *in* [6]).

Aquaculture production can be increased by providing quality feed ingredients, efforts to make feed by utilizing natural ingredients so that production costs decrease. Information regarding the use of turmeric in common carp does not yet exist, so this study aims to determine the effect and best dose of turmeric powder addition in feed on the growth and dilution of common carp (*C.carpio*).

2. RESEARCH METHOD

Time and Place

This research was carried out in March-May 2022 at the Marine Chemistry Laboratory of the Sekolah Tinggi Perikanan dan Kelautan Matauli

Method

The method used is an experimental method or direct observation of the research object with a Complete Randomized Design (CRD) using 1 factor, 4 levels of treatment and 3 tests. Common carp are kept in jars of 25 L with a water volume of 20 L. Each research container is filled with 15 common carp fry (2-3g, 5-6 cm TL). Fish were fed turmeric-enriched feed on *an ad-satiation* basis and kept for 49 days. The treatment used is:

P0 : Control (without turmeric powder)
P1 : Addition of turmeric powder to feed at a dose of 0.5 g / kg
P2 : dose of 1 g / kg
P3 : dose of 1.5 g / kg

Parameters

The observed parameters are as follows:

Absolute Weight Growth

The growth in the absolute length and weight of common carp during rearing can be calculated using the formula Effendi *in* [7], as follows:

$$W = Wt - Wo$$

Information:

W : Absolute Weight Growth (g)
Wt : Average weight of common carp fry at the end of rearing (g)
Wo : The average weight of common carp fry at the beginning of rearing (g)

Absolute Length Growth

$$L = Lt - Lo$$

Information:
L : Absolute Length Growth (cm)
Lt : The average length of common carp fry at the end of rearing (cm)
Lo : The average length of common carp fry at the beginning of rearing (cm)

Survival Rate

Survival rate can be calculated using Effendi's formula *in* [7], as follows:

$$SR = \frac{Nt}{No} \times 100\%$$

Information:
SR : Survival Rate (%)
Nt : Number of common carp fry at the end of the study (fish)
No : Number of common carp fry at the beginning of the study (fish)

Feed Conversion (FCR)

Feed conversion (FCR) is calculated using the formula Tacon (1987) *in* [8]:

$$FCR = \frac{F}{(WT+D)-WO}$$

Information:
FCR : Feed conversion ratio
F : The amount of test feed consumed during the study (g)
WT : Total weight of test fish at the end of maintenance (g)
D : Total weight of dead test fish (g)
WO : Total weight of test fish at the beginning of maintenance (g).

3. RESULT AND DISCUSSION

Absolute Weight Growth of Common carp

The results of a study conducted for 49 days showed an average growth in common carp weight as in Figure 1.

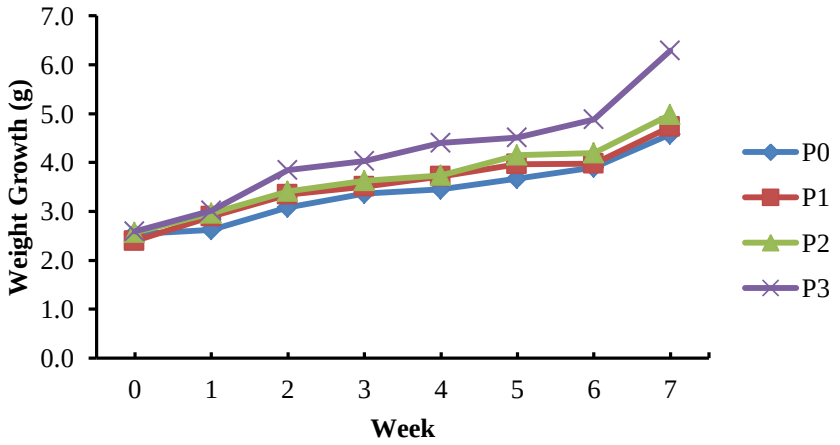

Figure 1. Common carp Weight growth

Fish growth on all treatments continued to increase from week 0 to 7. Fish grow quickly, then slow down at week 2 to week 6 and increase at week 6 to week 7. Based on the results of the study, the average initial weight of test fish for each treatment from a total of individuals was 2.50 g and at the end of the study observed the average weight in each treatment ranged from 4.60-6.29 g. The highest growth in absolute weight of common carp fry in the P3 treatment was 3.70 g, followed by the P2 treatment, which was 2.41 g, followed by the P1 treatment that was 2.33 g, then the lowest treatment in the P0 treatment was 2.04 g. The best result in the

P3 treatment with a dose of turmeric powder is 1.5 g, namely with an absolute weight of 3.70 g.

The results of the Anova Test showed that the treatment had a very noticeable influence on the growth of the absolute weight of common carp, namely P < 0.01 value (P = 0.00). From the results of the Anova Test, it is known that different doses of turmeric powder have a very noticeable influence on the absolute weight of common carp fry. After further testing using Student Newman keuls showed that the P3 treatment of 1.5 g/kg was significantly different from other treatments, such as P0, P1 and P2. Meanwhile, the P0, P1, and P2 treatments did not show a difference between their treatments of the absolute weight value of the fish.

The weight gain of fish is influenced by the protein content contained in the feed, because protein is the source of energy used by fish. The high low protein in the feed is influenced by the content of non-protein energy, namely those derived from carbohydrates and fats [9]. Turmeric contains curcumin, which can increase appetite, the addition of turmeric powder in the feed can increase the absolute growth of common carp.

Treatments with the addition of turmeric powder (P1, P2 and P3) tend to have higher growth compared to treatments without the addition of turmeric powder (P0). According to [11], the higher the dose given, the more the appetite of the fish increases and causes the increasing consumption of test fish feed. In this study, the highest dose of turmeric given was 1.5 g/kg of feed. This dosage gives the best results. The function of turmeric is to improve the work of the digestive organs that can help the absorption of food in the body, besides that it also serves to increase the body's resistance [11].

Absolute length growth of common carp

The results of the study showed data on the average growth of the absolute length of common carp during the study. Fish growth in all treatments showed the same pattern. At week 0 to week 2 the fish grows rather quickly, then slows down at week 2 to week 5. From the 5th to the 7th week it increases. The length growth chart can be seen in Figure 2 as follows.

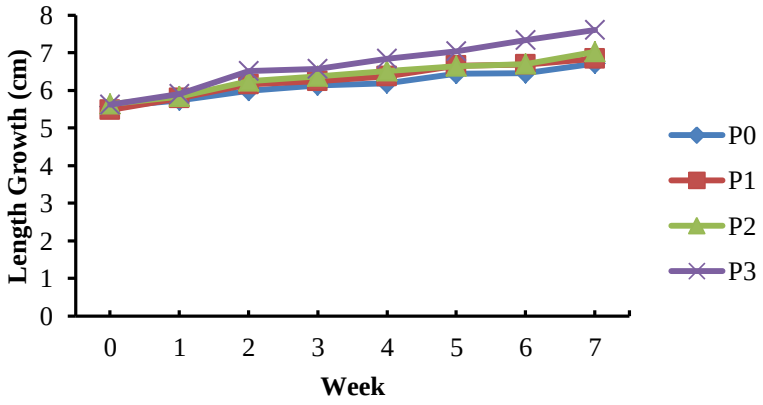

Figure 2. Common carp Length Growth

From the Anova Test conducted, it is known that turmeric powder exerts a very noticeable influence P < 0.01 (P = 0.00) on the absolute length of common carp fry. After further testing using Student Newman keuls showed that the treatment of 1.5 g / kg of feed (P3) was significantly different from other treatments, such as P0, P1 and P2. Meanwhile, the P0, P1 and P2 treatments showed no difference between

their treatments of the absolute length value of the fish.

From Figure 2, it can be seen that the absolute length of the highest common carp fry was found in the P3 treatment (1.5 g of turmeric powder) which was 1.99 cm. This is because turmeric powder has a maximum influence on fish so that it shows the highest length growth and the lowest is in the P0 treatment (0g of turmeric powder) with an absolute length of 1.15 cm fish.

The absolute length gain of the fish is in line with the absolute weight gain of the fish. The increase in appetite is triggered due to the addition of turmeric powder to the feed, which is able to stimulate the performance of digestive enzymes in absorbing nutrients or food substances. According to [12], the curcumin content in turmeric rhizomes can increase appetite and act as an antioxidant.

Survival Rate

The results of the study showed data on the survival rate of common carp during the study. The survival rate of common carp in all treatments showed the same pattern. In week 0 to 7 survival rate on each treatment is above 95%. The graph of survival can be seen in Figure 3 as follows:

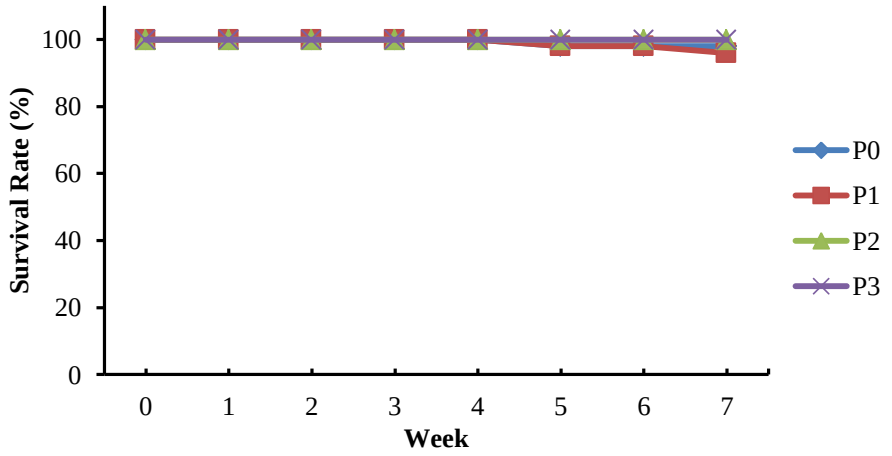

Figure 3. Survival Rate of Common carp

Based on the results of the study in Figure 3, it can be seen that the survival of fish from all treatments is relatively high, which is above 95%. In the treatment of P2 (1 g of turmeric powder) and P3 (1.5 g of turmeric powder) the survival is 100%. Meanwhile, in the P1 treatment (0.5 g of turmeric powder) the survival is 96% and P0 (0 g of turmeric powder) the survival rate is 98%. This high survival occurs, due to good environmental conditions and the fish get good food. According to [13], survival rates in fish are heavily influenced by environmental factors, such as water handling and quality. While the food given is commercial pellets enriched with turmeric. These commercial pellets contain 39-40% protein and the addition of turmeric will enrich the nutrition of the feed. Thus, the fish in this study live in a good environment and get good food so that the fish grow and survive well.

Feed Conversion (FCR)

The results showed common carp FCR data during the study. The FCR in each treatment is different. Along with the addition of turmeric powder, it shows that the FCR is decreasing. Feed conversion shows how much feed the fish consumes into the biomass of the fish body. The results showed the value of feed conversion in the treatment of P0 (2.28), P1 (2.10), P2 (1.97), and P3 (1.37). Feed conversion was highest at P0 treatment and lowest at P3 treatment. This shows that fish in the P3

treatment are most effective at utilizing the energy in the feed to grow. In this P3 study, 1.37 kg of feed produced 1 kg of fish biomass. FCR values can be seen in Table 1 as follows

Table 1. FCR common carp

No	Treatment	FCR
1	P0	2,28
2	P1	2,10
3	P2	1,97
4	P3	1,37

The results of this study are better than the results of the research of [14], which states that the best FCR in common carp raised with a recirculation system and fed with commercial pellet feed is 1.46. But the results in this study are lower than the results of the research of [13], which states that the best FCR of common carp given the treatment of flavoring is 1.22. Low FCR on

The research conducted was due to the addition of turmeric to the feed. The presence of curcumin increases the appetite of fish and improves digestion so that digestion is more efficient and fish can grow well. This is in accordance with the opinion of [15], which states that the administration of turmeric promotes fish growth. The lower the FCR, the more efficient the fish in utilizing the feed they consume for growth [17].

4. CONCLUSION

From the results of the study it can be seen that with the addition of turmeric powder exerts a very noticeable influence on the growth of the absolute weight of common carp (*C.carpio*), the growth of the absolute length of common carp and lowering the FCR. However, it has no noticeable effect on the dilution of fish. The best treatment is found in P3 (1.5 g/kg) with an absolute weight of 3.70 g, absolute length of 1.99 cm, survival rate of 100% and FCR of 1.37.

REFERENCES

1. Permatasari. (2020). *Penggunaan ekstrak kunyit (Curcuma sp.) terhadap pengendalian ektoparasit monogenea Dactylogyrus sp. pada benih ikan mas (Cyprinus carpio Linnaeus 1758). Skripsi.* Makassar. Universitas Hasanuddin.
2. Lubis F.A., Riauwaty, M., Syawal, H. (2014). *Histology of Liver and Kidney of Mystus nemurus that immersed with Curcuma xanthorrhiza, ROXB extract.* Pekanbaru. Universitas Riau.
3. Sinurat A.P.T., Purwadaria., Bintang, I.A.K., Ketaren, P.P., Bermawie, N., Raharjo, M., Rizal, M. (2009). Pemanfaatan kunyit dan temulawak sebagai imbuhan pakan untuk ayam broiler. *Jurnal Ilmu Ternak dan Veteriner.* 14(2): 90-96
4. Bertha, A. (2016). *Kelulushidupan Ikan Jambal Siam (Pangasius hypopthalmus) yang Diberi Kurkumin Kunyit (Curcumin domestica V.) dan diinfeksi Aeromonas hydrophila. Skripsi.* Pekanbaru. Universitas Riau.
5. Arifin, P.P. (2015). *Evaluasi Pemberian Ekstrak Kunyit Curcuma Longa Linn.pada Pakan Terhadap Enzim Pencernaan dan Kinerja Pertumbuhan Ikan Gurame Osphronemus gouramy. Skripsi.* Bogor. Institut Pertanian Bogor
6. Putri I.W., Mia, S., Dedi, J. (2016). Enzim Pencernaan dan Kinerja Pertumbuhan Ikan Mas, *Cyprinus carpio* Linnaeus, 1758) yang Diberi Pakan dengan Penambahan Tepung Kunyit *Curcuma longa* Linn. *Jurnal Iktiologi Indonesia.* 17(1): 11-20.
7. Windarto S., Sri, H., Subandiyono., Ristiawan, A.N. (2019). Performa Pertumbuhan Ikan Kakap Putih (*Lates Calcarifer* Bloch, 1790) yang Dibudidayakan dalam Sistem Keramba Jaring Apung (KJA). *Jurnal Sains Akuakultur Tropis,* 3(1)

8. Febri, S.P. (2016). Strategi Suplemen Pakan dan Waktu Adaptasi pada Penyesuaian Ikan Nila Merah (*Oreochromis* sp.). *Jurnal Samudra*,3(8): 1-10.
9. Magwa, J.R., Windarti., Riauwaty, M. (2020). Pengaruh manipulasi fotoperiod dan pakan yang diperkaya kunyit terhadap pertumbuhan ikan patin (*Pangasius hypophthalmus). Jurnal ruaya.* 8(2).
10. Santika, L., Diniarti, N., Astriana B.H. (2021). Pengaruh penambahan ekstrak kunyit pada pakan buatan terhadap pertumbuhan dan efesiensi pemanfaatan pakan ikan kakap putih (*Lates Calcarifer*). *Jurnal kelautan.* 14 (1): 48-57.
11. Pujianti, N.A., Jaelani, A., Widianingsih, N. (2013). Penambahan Tepung Kunyit (*Curcuma domestica*) dalam Ramsum Terhadap Daya Cerna Protein dan Bahan Kering pada Ayam Pedaging. *Jurnal Ilmu Pertanian,* 36 (1): 37-41.
12. Muchdar, F., Juharni. (2014). Penambahan Ekstrak Kunyit (*Curcuma Domestica*) Terhadap Pertumbuhan Benih Ikan Nila (*Oreochromis niloticus*). *Prosiding Seminar Nasional Kemaritiman dan Sumberdaya Pulau-Pulau Kecil.* 1 (1): 20-26.
13. Mustofa, A., Hastuti, S., Rahmawati, D. (2018). Pengaruh periode pemuasaan terhadap efesiensi pemanfaatan pakan pertumbuhan dan kelulushidupan ikan mas (*Cyprinus carpio*). *Pena akuatika.* 17 (2): 41-58.
14. Biduan, T.O., Salindeho, I.R.N., Sambali, H. (2020). Pertumbuhan benih ikan mas (*Cyprinus carpio*) yang diberi pakan dengan dosis berbeda dan frekuensi berbeda. *Budidaya perairan*. 8(1): 27-37.
15. Ashry, A.M., Hassan, A.M., Habiba, M.M., El-Zayat, A., El-Sharnouby, M.E., Sewilam, H., Dawood, M.A.D. (2021). The impack of dietary curcumin on the growth performance intestinal antihacterial capacity and haemato biochemical parameters of gilthead seabream (*Sparus aurata*). *Animal*. 1-12
16. Ranggayoni, N.P., Febri, S.P., Isma, M.F., Hasri, I. (2021). Pengaruh penambahan ekstrak kunyit (*Curcuma domestica*) pada pakan komersil terhadap pertumbuhan dan kelangsungan hidup benih ikan peres (*Osteochillus kappeni*). *Jurnal ilmiah program studi perairan.* 3(2): 75-81.