The 4th International Conference on Fisheries and Marine Sciences (INCOFIMS) Surabaya Indonesia, 29 September 2021

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The 4th International Conference on Fisheries and Marine Sciences (INCOFIMS) Surabaya Indonesia, 29 September 2021

International conference on fisheries and marine sciences (INCOFIMS) is an annual conference organized by Faculty of Fisheries and Marine Universitas Airlangga, Surabaya, Indonesia. The main aim is to provide a sharing platform that enables researchers, academics and practitioners from all over the world to share their most recent findings as well as to propose the best strategies to address issues and challenges which we have been currently facing in aquaculture and fisheries practices worldwide. The 1st INCOFIMS was held successfully offline in Surabaya in 2018, the second in 2019 and the third in 2020.

The 4th INCOFIMS was previously scheduled offline in Surabaya on 29th September 2021. However, due to the Covid-19 pandemic and travel restriction for foreigners come into Indonesia as well as traveling within the Indonesian islands, we had the 4th INCOFIMS in a virtual format with ZOOM on 29 September 2021, and hosted from Faculty of Fisheries and marine, Universitas Airlangga, Surabaya Indonesia. We were unable to postpone the event because INCOFIMS is our annual event and also most of the participants requested to have the conference in the virtual format (online)

The theme in the 4th INCOFIMS was “Interprofessional collaboration for enhancing the aquatic ecosystem sectors”. Technically, we had the conference divided into 2 (two) sessions in general: (1) keynote speaker session and (2) guest speaker session. In the keynote session, we had 4 (four) keynote speakers delivering a speech which were Prof Felipe Polivanov Ottoni, Ph.D.; Asst. Prof. Dr. Narongrit Muangmai and Dr. TB. Haeru Rahayu, A.Pi., M.Sc. Each keynote speaker had 1.5 hours for giving a presentation using ZOOM and 30 minutes for discussion in one virtual room. After the keynote speaker session, we proceeded to the guest speaker session in which all participants were divided into 7 (seven) rooms according to our subtopics for oral and poster presentations:

Room 1: Aquaculture technology
Room 2: Fish Nutrition
Room 3: Fish Diseases
Room 4: Marine and Aquatic Sciences
Room 5: Estuarine and Coastal Ecosystems
Room 6: Fisheries Management
Room 7: Fisheries Socio-economics

In this session, every speaker had 15 minutes for presentation and 5 minutes for discussion. Total participants joined in this conference was 225 participants from at least 6 different countries (Australia, Japan, Austria, Malaysia, Taiwan and Indonesia).

The conference was in general quite successful, acknowledging the number and enthusiasms of participants during the discussion sessions in both the keynote speaker session and guest speaker’s session. We thank all participants and organizing committee for their support to this conference and see you in the 5th INCOFIMS 2022.

Chairman
Veryl Hasan, Ph.D

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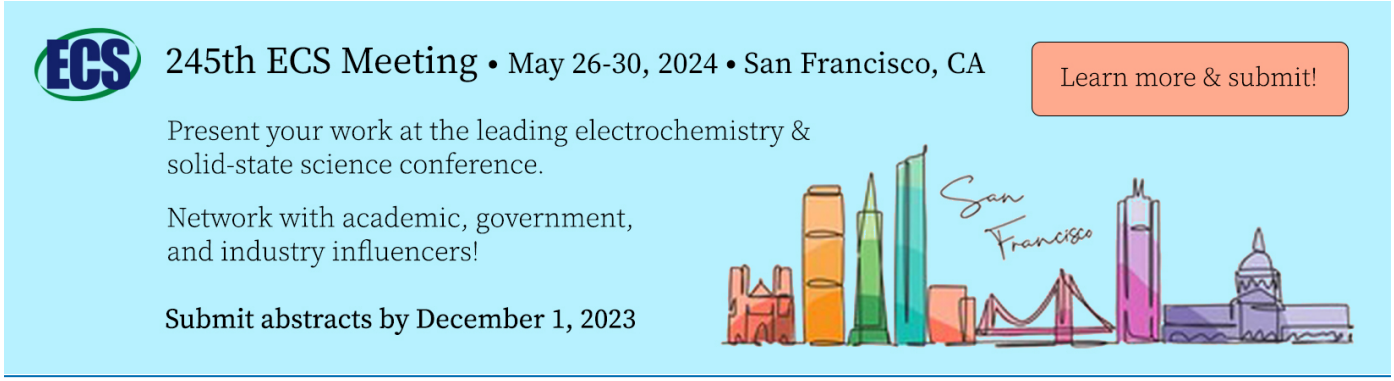

The effect of bromelain enzyme on pineapple core on the SR, SGR, and FCR in carp (*Cyprinus carpio*) infested with *Argulus japonicus*

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Abstract. Carp (*Cyprinus carpio*) is a freshwater fish that has several advantages such us fast growth, easy maintenance, good nutritional value and economic value. The demand for carp products is quite high. Based on data from the Directorate General of Aquaculture (2018), there was an increase in production of 33,954 tons from 2010 to 2017. According to Faroq (2020), feeding mixed with pineapple core enzymes can increase the highest daily growth rate and feed efficiency. A more efficient feed is expected for fish to survive more when infected with the *Argulus japonicus* parasite. The aim of this study was to determine the effect of bromelain enzyme on pineapple core on SR, SGR, and FCR in carp (*Cyprinus carpio*) infested with *Argulus japonicus.* This study used a factorial completely randomized design with of 4x2 treatments with bromelain enzyme doses of 0% and 2.25% and the degree of argulus infestation, it is mild, moderate, and severe. The results showed that survival rate (SR), specific growth rate (SGR) and feed conversion (FCR) were not significantly different from use bromelain enzyme in carp infested with *Argulus japonicus.*

1. Introduction

Carp (*Cyprinus carpio*) is a freshwater fish that is quite developed in Indonesia. Goldfish has several advantages compared to other types of freshwater fish, where it grows fast, is easy to maintain, has good nutritional value and has economic value. The demand for goldfish products is quite high. Based on data from the Directorate General of Aquaculture (2018), there was an increase in production of 33,954 tons from 2010 to 2017[1]. The increase in carp production results in the provision of sufficient and quality carp in the cultivation process.

The problem that is often faced in the cultivation of carp is the emergence of disease attacks that can cause a decrease in the level of fish production. Diseases in fish can be caused by infectious agents such as parasites, bacteria, fungi, and viruses [2]. One of the diseases that generally infest the culture of carp (*Cyprinus carpio*) is the attack of parasites. Parasites are organisms that live on the bodies of other organisms and generally cause negative effects on the host [3]. One of the parasites that attack goldfish is *Argulus japonicus*. *Argulus japonicas* has a predilection for body surfaces, fins, and gills [4]. This parasite sucks the blood of the host, causing thin fish and stunted growth. In addition, *Argulus japonicus* causes lesions on the skin, fins, head and body surface to cause death [6].

Prevention of *Argulus japonicus* can use natural ingredients that are more environmentally friendly, one of which is the addition of bromelain enzymes in feed. Bromelain enzyme is a protein-digesting enzyme (proteinase) or it can also be called a proteolytic enzyme that can accelerate the hydrolysis reaction of protein. The bromelain enzyme in pineapple hump has functions as an anti-inflammatory, analgesic, anti-fungal, and anti-bacterial agent [7]. Feeding mixed with pineapple weevil enzymes can increase the highest daily growth rate. High feed consumption indicates a more efficient use and utilization of feed, so that only a little protein is broken down to meet energy needs and the rest is used for growth [8]. With a more efficient use of feed, it is hoped that goldfish can survive more when infected with the *Argulus japonicus* parasite.

2. Materials and methods

2.1. Materials

The materials used in this study included carp (*Cyprinus carpio*) seeds with a body length of 7-10 cm, body weight ranging from 2-3 grams with a total of 48 carp and 180 *Argulus japonicus*. The feed material used for the study was commercial feed which was added with an enzyme from pineapple hump at a dose of 2.25%. The process of making pineapple weevil enzymes requires 70% alcohol and aquadest.

2.2. Methods

This research was conducted with 4x2 treatments and 3 replications. This study uses an experimental method. Carp rearing was carried out for 21 days which was fed pelleted feed mixed with bromelain enzyme in 2 doses, namely 0% and 2.25%. After 21 days, it was continued with artificial infestation for 7 days. *Argulus japonicus* infestations were divided into 4, namely control without *Argulus japonicus*, mild infestation with 5 *Argulus japonicus*, moderate infestation with 10 *Argulus japonicus*, heavy infestation with *Argulus japonicus* with 15 *Argulus japonicus*. Artificial infestation was carried out by placing *Argulus japonicus* and carp (*Cyprinus carpio*) into a 500 ml beaker containing 400 ml of water for 15-30 minutes. Prior to infestation, *Argulus japonicus* was fasted for approximately 2 hours to make it stick faster. The fish were put back into the jar after *Argulus japonicus* infested the goldfish. The total maintenance of carp from feeding mixed with bromelain enzymes and artificial carp infestation is 28 days.

2.3. Making Pineapple Hump Enzyme

The activities of making pineapple weevil enzymes are as follows: (1) Clean the pineapple hump and then cut it into small pieces, puree using a blender then filtered to obtain a clear liquid from the pineapple weevil juice, (2) Add 70% alcohol to the pineapple weevil juice in a ratio of 1: 4 (extract: alcohol) then let stand for 1 hour at room temperature so that the enzyme settles, (3) The enzyme is put in the refrigerator at 10oC for 1 day until a precipitate is formed, (4) The precipitate is centrifuged at 5000 rpm for 30 minutes after that the results The precipitate was dried in an oven at 40^{o}C, (5) The dried precipitate was then pulverized using mortar and pestle to obtain powdered crude bromelain enzyme [8].

2.4. Making Feed Treatment

The treatment feed consisted of control feed and commercial feed mixed with bromelain enzyme at a dose of 2.25%. The control treatment feed consisted of 100% commercial feed. Pellets with a bromelain enzyme dose of 2.25% consisted of 100 g of commercial feed then sprayed with 2.25 g of pineapple hump enzyme which had been dissolved in 10 ml of distilled water. The pellets are then aerated and kept out of direct sunlight. The dried pellets are stored in a dry place.

2.5. Parameter Check

In this study, the parameters used to see the growth rate of fish infected with Argulus japonicus were SR, SGR, and FCR. The data were taken based on observations of weight, length and feed consumption which were seen once a week.

2.6. Data analysis

Analysis of the data used in this study is Analyze of Variance (ANOVA) to determine the effect of the treatment given, if there are significant results then the calculation is continued with Duncan's Multiple Range Test (Duncan's Multiple Range Test).

3. Result and discussion

3.1. Survival Rate (SR)

Survival Rate (SR) It is the survival rate of a type of fish in a cultivation process from the beginning of the fish being stocked until the fish are harvested. The following are the results of observations of the survival of goldfish for 28 days of treatment.

Table 1. The results of the average Survival Rate in carp treated with pineapple core enzymes infected with *Argulus japonicus*

Treatment	Survival Rate
A0B0	$83{,}33^{a} \pm 28{,}8675$
A0B1	$83{,}33^{a} \pm 28{,}8675$
A0B2	$83{,}33^{a} \pm 28{,}8675$
A0B3	$83{,}33^{a} \pm 28{,}8675$
A1B0	$100^{a} \pm 0{,}000$
A1B1	$83{,}33^{a} \pm 28{,}8675$
A1B2	$83{,}33^{a} \pm 28{,}8675$
A1B3	$66{,}67^{a} \pm 24{,}0771$

The calculation result of Analysis of Variance (ANOVA) in the table shows that there is no significant difference ($p<0.05$) on the survival of carp. Carp treated with bromelain enzyme with argulus infestation showed the same results as goldfish treated with bromelIn enzyme without argulus infestation. This proves that the addition of pineapple weevil enzymes can affect the quality of feed and water quality so that the fish survive even though they are attacked by parasites. The survival of fish in a waters is influenced by various factors including density and water quality. Generally the survival rate of seeds is higher than that of larvae, because the seeds are stronger [9].

The lowest results were shown in A1B3 treatment where the treatment was given bromelain enzyme and heavily infested with Argulus. This may be due to disturbances in the physiological processes and behavior of fish which in turn can reduce health conditions. A further consequence of this process is a reduction in food utilization, growth and survival.

Fish mortality is caused by several factors, namely internal and external factors. Factors in the body of fish that affect mortality are differences in age and ability to adapt to the environment. External factors include abiotic conditions, competition between species, increased predators, parasites, lack of food, handling, catching and increasing the number of fish populations in the same space. Fish mortality can be caused by several factors including abiotic conditions, aging, predators, parasites, fishing and food shortages [10].

3.2. Spesific Growth Rate

The specific growth rate is the rate of growth over time [11]. The specific growth rate explains that fish are able to utilize feed nutrients to be stored in the body and convert them into energy [12].

Table 2. The results of the average specific growth rate in carp treated with pineapple core enzymes infected with *Argulus japonicus*

Treatment	Specific Growth Rate
A0B0	$3,1637^{a} \pm 0,2461$
A0B1	$3,0004^{a} \pm 0,1749$
A0B2	$3,0580^{a} \pm 0,4254$
A0B3	$2,8495^{a} \pm 0,3363$
A1B0	$3,0673^{a} \pm 0,2506$
A1B1	$3,1270^{a} \pm 0,2011$
A1B2	$3,1696^{a} \pm 0,1194$
A1B3	$2,8461^{a} \pm 0,1040$

The calculation result of Analysis of Variance (ANOVA) in the table shows that there is no significant difference ($p<0.05$) to the specific growth rate of carp. The lowest results were shown in the A1B3 treatment. This indicates that due to heavy argulus infestation, the protein that should be used as an energy source for fish growth is used more for self-defense. Fish growth is influenced by several things, including age, size, density and space for movement. Lack of feed will slow down the growth rate so that it can cause cannibalism, while excess feed will pollute the waters causing stress and become weak and appetite will decrease [13].

3.3. Feed Convertion Ratio

The use of feed can be determined by calculating the feed conversion ratio commonly known as FCR (feed conversion ratio), namely by comparing the amount of feed given to the amount of fish weight gain. Fish need adequate food to support their growth, development, and survival. The quality of feed is influenced by the digestibility or absorption of fish to the feed consumed. The smaller the feed conversion value, the better the feed quality, but if the feed conversion value is high, the fish feed is not good [14].

Table 3. The results of the average Food Conversion Rate in carp that were given the bromelin enzyme in pineapple core infected with *Argulus japonicus*

Treatment	Food Conversion Rate
A0B0	$1,6856^{a} \pm 0,0256$

A0B1	$1,7456^{a} \pm 0,0568$
A0B2	$1,8390^{a} \pm 0,2498$
A0B3	$1,7823^{a} \pm 0,1305$
A1B0	$1,7093^{a} \pm 0,1432$
A1B1	$1,7326^{a} \pm 0,1999$
A1B2	$1,6790^{a} \pm 0,0876$
A1B3	$1,8933^{a} \pm 0,1828$

The calculation result of Analysis of Variance (ANOVA) in the table shows that there is no significant difference ($p<0.05$) on the conversion of carp feed. From the table above, the results of the conversion of carp feed are quite good, this is in accordance with the value of a good feed conversion which is < 3, while it states that the conversion of gouramy feed that is kept in ponds is 1.5-2, meaning that to produce 1 kg of fish meat requires feed as much as 1.5 kg to 2 kg of feed. The highest results were shown in the A1B3 treatment which showed that the feed used was low so that the fish's ability to absorb the nutrient content in the feed was not optimal.

The results of the conversion of feed whose value is getting smaller means that the feed given is almost completely eaten and used for growth. However, if the lower the feed conversion value, the better the feed because the less amount of feed needed to produce a certain weight [15]

4. Conclusions

The results of statistical tests showed that there was no effect ($p>0.05$) between carp treated with bromelain enzyme on pineapple cob and *Argulus japonicus* parasite infestation on SR, SGR, and FCR. Growth parameters are influenced by several factors, namely feed quality, age of fish, and the ability of fish to adapt to the environment.

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