

## GROWTH OF GOLD FISH AND TAIWAN OYSTER CULTIVATED IN RECIRCULATION SYSTEM

### Pertumbuhan Ikan Emas dan Tiram Taiwan yang Dibudidayakan dalam Sistem Resirkulasi

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#### ABSTRACT

Intensive fish farming activities mean rearing fish with high stocking densities and providing artificial feed. This will have an impact on poor water quality and the growth of cultivated organisms. This research aims to measure the growth of goldfish and Taiwanese kijing that are reared in polyculture. The research used a Completely Randomized Design (CRD) consisting of stocking density of carp (*C. carpio*) 30 individuals and initial weight (20 gr) then stocking density of Taiwan kijing (*A. woodiana*) 0, 20, 40, 60 individuals with weight measurements initial 11 gr. The experimental container used was an aquarium with a length of 100 cm x width. The results of the research showed that there was an increase in the body weight of goldfish during different observations for each treatment. And good growth in treatments with high stocking densities, based on the results of analysis of variance, there were significant differences between treatments ( $P < 0.05$ ). For the growth of the Taiwanese kijing, it can be seen that there is an increase in body weight every week, and good growth in the treatment with a lot of fresh density. Based on the results of analysis of variance, there were significant differences between treatments ( $P < 0.05$ ). The conclusion of this research is that there is good growth of goldfish and Taiwanese kijing with high stocking densities.

#### ABSTRAK

Kegiatan budidaya ikan yang intensif berarti memelihara ikan dengan kepadatan tebar yang tinggi dan menyediakan pakan buatan. Hal ini akan berdampak pada buruknya kualitas air dan tumbuhnya organisme budidaya. Penelitian ini bertujuan untuk mengukur pertumbuhan ikan mas dan kijing Taiwan yang dipelihara secara polikultur. Penelitian menggunakan Rancangan Acak Lengkap (RAL) yang terdiri dari padat tebar ikan mas (*C.*

*carpio*) 30 ekor dan bobot awal (20 gr) kemudian padat tebar kijing Taiwan (*A. woodiana*) 0, 20, 40, 60 ekor dengan pengukuran berat awal 11 gr. Wadah percobaan yang digunakan adalah akuarium dengan ukuran panjang 100 cm x lebar. Hasil penelitian menunjukkan bahwa terdapat peningkatan bobot badan ikan mas pada pengamatan yang berbeda untuk setiap perlakuan. Dan pertumbuhannya baik pada perlakuan dengan padat tebar tinggi, berdasarkan hasil analisis varian terdapat perbedaan nyata antar perlakuan ( $P < 0,05$ ). Untuk pertumbuhan kijing taiwan terlihat adanya peningkatan bobot badan setiap minggunya, dan pertumbuhannya baik pada perlakuan dengan kepadatan segar yang banyak. Berdasarkan hasil analisis varians terdapat perbedaan nyata antar perlakuan ( $P < 0,05$ ). Kesimpulan dari penelitian ini adalah terdapat pertumbuhan ikan mas dan kijing Taiwan yang baik dengan kepadatan penebaran yang tinggi.

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**Keywords** *Pertumbuhan, Ikan Mas, Kijing Taiwan, Resirkulasi*

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## INTRODUCTION

Intensive fish farming activities mean rearing fish with high stocking densities and providing artificial feed. Apart from that, it requires quite a large quantity of water. This will have an impact on poor water quality and the growth of cultivated organisms.

According to Effendie (1978) fish growth is a change in size, both weight, length and volume over a certain period of time. Factors that influence growth rate are internal factors which include heredity, age and resistance to disease, as well as external factors which include water quality, food availability and living space.

Goldfish are a type of freshwater food fish that has been cultivated for a long time, the goldfish rearing business is increasingly developing, with the discovery of intensive rearing technology. Thus the need for seeds increases (Cholik et al., 2005). Cultivating goldfish (*Cyprinus carpio*), with high stocking densities and accompanied by intensive supplementary feeding, can pollute waters.

The Taiwanese kijing is known as a filter feeder, its high survival rate and abundant numbers of the kijing can be used to overcome water pollution due to pollutants including heavy metals, thus this animal can help in water purification efforts, the kijing can utilize leftover food that the fish have not had time to eat. When providing additional food and can be used as a Biofilter. Apart from that, kijing can be used as animal feed, in the button industry, and as a pearl producer (Prihartini, 1999).

Water quality is an important factor in cultivating Taiwanese musklings because it is needed as a living medium for Taiwanese musklings. Several physical and chemical parameters that influence the life of deer, are temperature, dissolved oxygen, pH, total suspended solids, organic matter, nutrients (Sime 2005).

A recirculation system can minimize water changes and maintain water quality. According to Ilyas (2014), the recirculation system is a cultivation system that can save water because it can reuse water that has been used through a filter. To overcome the problems faced, goldfish were cultivated with Taiwanese kijing using a recirculation system. This research aims to measure the growth of goldfish and Taiwanese kijing.

## RESEARCH METHODS

### Research procedure

The tool used is an aquarium measuring 100 cm long x 50 cm wide x 50 cm high, totaling 12 pieces. Each aquarium is equipped with an aeration and recirculation system, 3 reservoir tanks, 3 pumps (capacity 28,000 l/hour), PVC pipe, vernier caliper.

The material used is the test animal used is the Taiwanese kijing (*Anodonta woodiana*) with initial weight, (11 g) seeds obtained from wild catches. Each aquarium in the treatment was stocked with initial weight (20 gr) of Taiwanese deer (*A. woodiana*) and goldfish (*Cyprinus carpio*). Then it is adapted to the maintenance environment for several days. Next, maintenance is carried out for two months, the level of feeding with biomass (3-5%). Frequency of administration 3 times a day.

Treatment as follows:

Treatment A : 0 taiwan oyster (*A. woodiana*) + 30 individual goldfish (*C. carpio*)

Treatment B : 20 taiwan oyster (*A. woodiana*) + 30 individual goldfish (*C. carpio*)

Treatment C : 40 taiwan oyster (*A. woodiana*) + 30 individual goldfish (*C. carpio*)

Treatment D : 60 taiwan oyster (*A. woodiana*) + 30 individual goldfish (*C. carpio*)

### Research Parameters

The parameter measured is growth (GR) using the formula Kasim et al., (2017), as follows:

$$G = W_t - W_o$$

Note:

G = Average absolute growth (gr)

W<sub>t</sub> = Seedling weight at the end of the study (gr)

W<sub>o</sub> = Seedling weight at the start of the study (gr)

### Data Analysis Method

This research used an experimental design with a completely randomized design (CRD) consisting of four treatments and three replications. Next, analysis of variance (Anova) was carried out using the SPSS application.

## RESULTS AND DISCUSSION

The growth results of the goldfish can be seen in Table 1, then the analysis of variance is in Table 2. Meanwhile, the growth of the Taiwanese kijing can be seen in Table 3 and the basis of variance in Table 4 during the research.

Table 1. Average Daily Growth Rate of Goldfish During the Research

	Day-					
	10	20	30	40	50	60
A	0,459±0,36 <sup>b</sup>	0,210±0,07 <sup>b</sup>	0,214±0,13 <sup>b</sup>	0,525±0,41 <sup>b</sup>	0,580±0,48 <sup>b</sup>	0,780±0,8 <sup>b</sup>
B	0,578±0,28 <sup>ab</sup>	0,417±0,19 <sup>ab</sup>	0,463±0,06 <sup>ab</sup>	0,568±0,21 <sup>ab</sup>	0,774±0,25 <sup>ab</sup>	0,761±0,10 <sup>ab</sup>
C	0,615±0,68 <sup>ab</sup>	0,504±0,35 <sup>ab</sup>	0,636±0,50 <sup>ab</sup>	0,686±0,03 <sup>ab</sup>	0,796±0,02 <sup>ab</sup>	0,844±0,16 <sup>ab</sup>
D	0,726±0,61 <sup>a</sup>	0,740±0,18 <sup>a</sup>	0,767±0,06 <sup>a</sup>	0,787±0,07 <sup>a</sup>	0,835±0,09 <sup>a</sup>	0,884±0,09 <sup>a</sup>

Table 2. Results of Analysis of Varieties of Goldfish Growth

	Sum of squares	Df	Middle square	F	Significant (P)
Between groups	348747,792	3	116249,264	5,292	0,008
Within the group	439315,167	20	21965,758		
Total	788062,958	23			

Table 3. Average Daily Growth Rate of Taiwanese Kijing During the Study

	Treatment Day-					
	10	20	30	40	50	60
B	0,335±0,28 <sup>a</sup>	0,357±0,07 <sup>a</sup>	0,424±0,32 <sup>a</sup>	0,512±0,09 <sup>a</sup>	0,540±0,10 <sup>a</sup>	0,612±0,11 <sup>a</sup>
C	0,592±0,57 <sup>b</sup>	0,641±0,11 <sup>b</sup>	0,665±0,10 <sup>b</sup>	0,689±0,10 <sup>b</sup>	0,727±0,12 <sup>b</sup>	0,764±0,09 <sup>b</sup>
D	0,633±0,27 <sup>b</sup>	0,737±0,08 <sup>b</sup>	0,762±0,06 <sup>b</sup>	0,778±0,13 <sup>b</sup>	0,786±0,20 <sup>b</sup>	0,792±0,18 <sup>b</sup>

Table 4. Results of Analysis of the Growth Variety of Kijiang Taiwan

	Sum of squares	Df	Middle square	F	Significant (P)
Between groups	265009,333	2	132504,667	20,633	0,000
Within the group	96328,667	15	6421,911		
Total	361338,000	17			

Based on the results obtained in Table 1. The increase in body weight during observation is different for each treatment. So there is no competition in the use of space or food from carp or Taiwanese muskfish. And good growth in treatment D, based on the results of analysis of variance, there was a significant difference between treatments ( $P < 0.05$ ) which can be seen in Table 2. This means that the principle of managing water from fish farming waste is not only to speed up the process of oxidation of organic material, furthermore aimed at obtaining adequate water quality for cultivation purposes, good

water quality is a further input for the fish being kept, so that metabolic processes increase and produce energy which is obtained for maintenance and growth.

Growth can be influenced by food, room, temperature and several other factors (Effendie, 1978). Meanwhile, Wilburn and Owan (1964) stated that growth is influenced by the quality and quantity of feed, age and environment. Growth rate is influenced by food, environmental temperature, age and nutrient content in the water (Hickling, 1971).

Observing the growth of the Taiwanese Kijing is important to find out whether the test animals can be raised on a laboratory scale with a recirculation system, so that in the end they can be cultivated without depending on nature. Growth can be influenced by food, room, temperature and several other factors (Effendie 1978). Meanwhile, Wilburn and Owan (1964) stated that growth is influenced by the quality and quantity of feed, age and environment. Pennak (1953) said that the actual growth of deer is influenced by several factors, including temperature, food supply, water currents and certain chemical elements in the water.

Based on the data obtained in Table 3 for the growth of the Taiwanese kijing, it can be seen that there was an increase in body weight every week, and good growth in treatment D. Based on the results of analysis of variance, there was a significant difference between treatments ( $P < 0.05$ ) which can be seen in Table 4 For the growth of Taiwanese kijing, according to (Elyani 1990), kijing have a slow growth rate.

## CONCLUSION

Based on the research results, it can be concluded that there is good growth of goldfish and Taiwanese kijing with high stocking densities.

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