



# Comet Fish Production (*Carassius auratus auratus* L) And Water Quality in the Aquaponic System



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## INTRODUCTION



Comet fish is a decorative fish with attractive bright orange color, agile movement, and small body size, making it one of the most popular decorative fish.



However, rapid development rate that keeps increasing every year has led to decreased quality of the environment in the culture areas, including reduced land and water as the culture media for fish.



Based on this background, a study on the effect of aquaponics culture system on the growth and survival of comet fish (*Carassius auratus auratus* L) and the quality of the culture media water.



Aquaponics is one of the fish culture technology innovations that combines fish culture with plants (Diver, 2006). This technology is an applied land and water saving technology in fish culture.



Innovations in technology is needed to anticipate the reduction in aquaculture production due to reduced size of available land for fish culture and reduced quality of water.

## MATERIAL AND METHOD

This study was performed in March to June 2016 at the Fishery Culture Wet Laboratory, Ciparanje, Faculty of Fishery and Marine Science, Universitas Padjadjaran (FPIK UNPAD).

The treatments are :

A : Positive control using organic liquid fertilizer.

B : Negative control without liquid fertilizer.

C : Aquaponics drip irrigation with a water volume of 100 ml/day/plant.

D : Aquaponics drip irrigation with a water volume of 150 ml/day/plant .

E : Aquaponics drip irrigation with a water volume of 200 ml/day/plant .

F : Aquaponics drip irrigation with a water volume of 250 ml/day/plant .

## RESULT AND DISCUSSION

### Fish Growth

Based on the above chart, it is apparent that the comet fish experienced a relatively high weight gain during the period between the first and last week when compared to the total length and total tail growth. From the calculation using the formula of final weight - initial weight (W2-W1) of the fish, it is revealed that the absolute weight of the fish is 8.65 gram/fish while the specific growth rate is 2.73%.

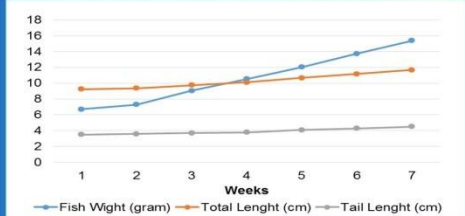


Figure 1. Comet Fish Growth

Reduction in fish appetite was seen in around week 4, 5, and 6. This is characterized with the rare appearance of fish on water surface that the feed was not consumed, which led to small increase in the weight gain.

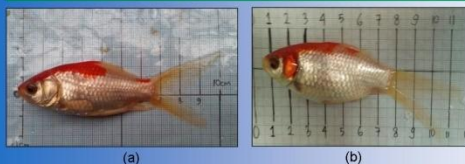


Figure 2. (a) Fish at the beginning of the study (b) Fish at the end of the study

In addition to water quality, the nutrition content in the feed also influences the growth of the comet fish. Appropriate nutrition contents will not only make the growth better but also improve the color of the fish, making the color brighter (Prayogo et al. 2012).

The figure above shows that during the fish culture, some changes were seen in the fish. The changes include brighter color and bigger posture at the end of this study, showing that the feed provided has affected the fish' condition.

### Survival Rate

- During the comet fish culture period of three months (14 weeks), the survival rate was 96%. Sixteen fish died during the study with most died in the early period of the study. This is suspected to be caused by the failure in adaptation to the water.
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## Water Quality

### 1. Ammonia

The results of study show that the ammonia value in the pond ranged between 0.0002 and 0.112 mg/L while the same value in the drip tap was between 0.0002 and 0.299 mg/L. These values are quite high. According to the Government Regulation (PP) no. 82, the maximal standard for ammonia that is allowed for fish culture is around 0.02 mg/L. However, in this study the ammonia level is higher than the standard in week 4, 5, 6, and 7.

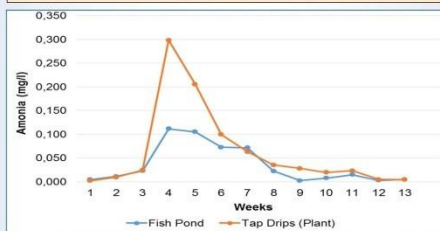


Figure 3. Ammonia Level during the Study

### 2. Nitrate

The results show that the nitrate level in the pond ranged between 0.027 and 0.421 mg/L while the nitrate content flowing in the drip tap ranged between 0.032 and mg/L. Pursuant to the Government Regulation (PP) No. 82 of 2001, the maximum nitrate level in the water should not be more than 10 mg/L. As such, when compared to the results of the study, the nitrate content is still in the safe limit.

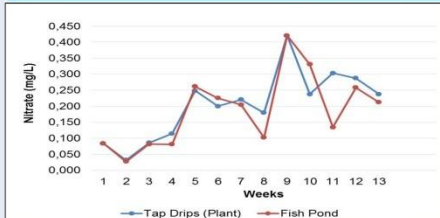


Figure 4. Nitrate Level during the Study

### 3. Phosphate

Phosphate content in the pond during the study ranged between 0.024 and 2.187 mg/L while in the drip tap, the content was between 0.077 and 0.797 mg/L. The highest increase of phosphate concentration was seen in Week 3, Week 7, and Week 10. It is assumed that it was due to the death phase of planktons

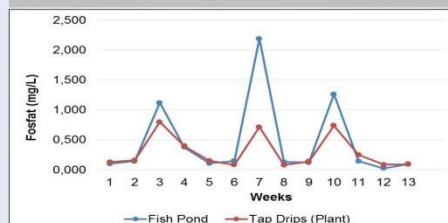


Figure 5. Phosphate Level during the Study

### 4. Dissolved Oxygen

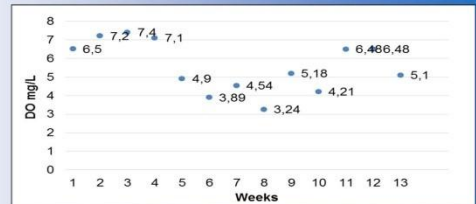


Figure 6. Dissolved Oxygen Level during the Study

### 5. Temperature

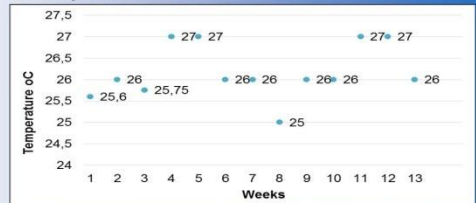


Figure 7. Temperature Level during the Study

### 6. pH



Figure 8. pH Level Changes during the Study

## CONCLUSION

- In this study, the absolute weight of the comet fish is 8.65 gram/fish with a specific growth rate of 2.73%, and survival rate during study of 96%.
- The levels of nitrate, dissolved oxygen, temperature, and pH produced during the study are still categorized as safe while the levels of ammonia and phosphate are exceeding the threshold for fish culture.

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