

## GROWTH RATE COMPARISON OF THREE COLOR MORPHS OF COMMON CARP (*Cyprinus carpio* L) : SEPARATE TESTING IN EXPERIMENTAL FLOATING NET CAGES

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### ABSTRACT

Detrimental pleiotropic effect of the growth of certain color morphs are reported in some previous papers. This study's objective is to elucidate relationships between color morphs and the growth of common carp in the nine experimental floating net cages. The color morphs in this study are green, blue and red, with standard length of 14 cm, density 3 kg/m<sup>3</sup> and daily fed 3% of body weight. Observation of growth was conducted on standard length and body weight every ten days during 50 days of rearing period. The results showed that blue color morph has tendency to be the best followed by green and red one. However, statistically they are not significant different ( $P > 0.05$ ).

### BACKGROUND

Genetic variation is the most important factor in fish culture stock. This factor reflected in appearance of growth performance which is different from genes that carried the spesific trait in a certain environment. Several previous experiments reported that several color carrying genes in fish have detrimental pleiotropic effect on the growth. One of them was reported by Moav and Wohlfarth (1968) where the blue common carp in Israel grew faster than green one. While Wlodek (1968) reported that blue common carp in Poland has better growth compare to green one. According to Falconer (1989) both different cases can be caused by interaction between genotype performance in different environments.

Katosonov (1974) who worked with common carp and Koi fish reported that there was pleiotropic effect from dominant gene L (light) and D (design) which controls specific coloring. In heterozygote condition, L gene can improve growth rate in the year of growth. But that gene can decreased fish production in the summer. While D gene has narrower spectrum compared to the L gene. Those genes has negative effect only in the winter.

Matricia (1990) compared growth rate of common carp with different color in Indonesia showed that there were growth variability between

different color due to environment condition where the fish are cultured. On the other study of growth rate of sword tail fish *Xiphophorus maculatus*, from Encino river in Mexico reported that there was significant different among three color morphs of that fish (Borowsky, 1984). Therefore, it is important to test the phenomena on common carp in the same environment. The objective of this experiment is to study the relationship between common carp growth with different phenotific color grow separately in experimental floating net cages.

### MATERIAL AND METHOD

The experiment was conducted in cages belong to RIFF in Cirata man-made lake using green, blue and red common carp. Nine cages of 1 X 1 X 1 m in size and the mesh size of of 1.5 inches were used to culture the fish, every cage is stocked with 60 fish with average size of 14 cm or average weight of  $46.68 \pm 7.83$  gram. The fish were aclimaticized for 1 week in the cages before they were stocked. Fed were given 3% of total body weight per day and adjusted every sampling time. Sampling was conducted every 10 days for 50 days. Length and weight of the fish were measured from 20 fish taken from every cage. Specific growth rate were calculated from length parameter using formula:

$$G_1 = \{L_1 (t_2) - 14\} / 50$$

Where:

$G_1$  = changes in length in m month<sup>-1</sup>  
unit

$L_{1(t_2)}$  = the length of the 1<sup>st</sup> fish at the  
end of observation

Specific growth rate data and total weight were analyzed using one way ANOVA from SYSTAT computer program (Wilkinson, 1989). The model used was :

$$\text{Growth} = \text{constant} + \text{color morph}$$

## RESULT AND DISCUSSION

The results showed that blue color morphs has the best specific length growth rate followed by green and red (Table 1). However, the growth were not strong enough to show any significant differences ( $P > 0.05$ ) (Table 2).

Table 1. Specific growth rate of length of three color morphs of common carp (m month<sup>-1</sup>) during 50 days rearing period in experimental cages at Cirata man-made lake

	Green	Blue	Red
Total fish	60	60	59
Average	3.01	3.23	3.02
SD	0.789	0.708	1.068

Table 2. Anova of specific growth rate of length of three color morphs of common carp during 50 days rearing period in experimental cages at Cirata man-made lake.

Source	SS	DF	MS	F	P
Between color	1.905	2	0.953	1.266	0.284
Within color	132.406	176	0.752		

The analysis of total weight showed that the data has the similar tendency to the growth rate of length (Table 3). The result showed that the blue common carp has the best growth

of total weight among the other color morphs. Data analysis was not significant different among the three color morphs ( $P > 0.05$ ) (Table 4).

Table 3. Total weight growth of three color morphs of common carp (kg) for 50 days rearing period in experimental cages at Cirata man-made lake

Cage	Green	Blue	Red
1	4.6	4.6	4.0
2	4.4	4.8	4.4
3	4.0	5.0	4.4
Average	4.33	4.80	4.27
SD	0.31	0.20	0.23

Table 4. Analysis of variance of total weight growth of three color morphs of common carp in experimental cages at Cirata man-made lake.

Source	SS	DF	MS	F	P
Between color	0.507	2	0.253	4.071	0.076
Within color	0.373	6	0.062		

Based on the results, in general the dark color of common carp (blue and green) has a better growth compare to light color morph (red). This result was not differ with the communal test in commercial floating net cages done by Gustiano (2004). Both rearing practice showed an indication that there was no environmental factor in term of competition of feed which influenced the growth refer to the color morphs. Therefore their differences was solely caused by positif pleiotropic effect from dark color morph carrying gene dominated to light color (Gustiano, 1993; 1994).

On the other hand, several experiments reported reverse result, e.g. Barlow (1973) reported that midas fish (*Cichlosoma citrinellum*), yellow color, has faster growth compare to the greyish green color when they are reared together in one place. But they will grow the same when reared separately. It can be concluded that the difference caused by competition factor in term of feed (environmental factor) between yellow and greyish green color. The same case was also reported by Phang and Doyle (1989) in guppy.

### CONCLUSION

Dark color fish has a tendency to be better in term of growth compare to light color. In common carp found positif pleiotropic effect of dark color carrying character gene to growth.

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