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Evaluation of Applications Floating Net Cage Aquaculture Systems *Integrated Multi Trophic Aquaculture* (IMTA) and Monoculture an Based Growth Rate Silver Pompano (*Trachinotus blochii*, Lacepede)

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Sea Farming is a part of the KepulauanSeribu region where aquaculture activities are officially permitted by local government. The purpose of this study is to assess the growth rate of silver pompano (*Trachinotus blochii*, Lacepede) and examines the physical and chemical parameters and their relationship to Integrated Multi-Trophic Aquaculture (IMTA) and monoculture farming systems. This research was conducted in the area of the Sea Farming KarangLebar of the KepulauanSeribu, in two main locations. i.e., Site A was a fish farming area of IMTA system, growing up silver pompano (*Trachinotus blochii*) and tiger grouper (*Epinephelusfuscoguttatus*, Forsskal), and Site B was the area of monoculture, growing up silver pompano (*T. blochii*). Biotic data was analyzed using the growth rate of the fish, whilst abiotic data was analysed using two-way ANOVA test. The results of the study in both locations showed the growth rate of the fish with a pattern of *positive alometric* ($b > 3$) indicating faster in the growth rate of fish weight than those in length. The physical and chemical factors indicated within the normal range of water quality criteria for marine life.

Keywords: Floating Net Cage, IMTA, Monoculture, Silver Pompano (*Trachinotus blochii*).

1. INTRODUCTION

Aquaculture is one of the important efforts to increase fish production, especially for economically valuable animals. One of farming system which recently considered effective because it does not require a land is floating net cage (FNC) system. Types of fish that are cultivated with FNC system is pompano (*Trachinotus blochii*) and grouper (*Epinephelusfuscoguttatus*). Factors influenced the growth of farmed fish is feeding. Good quality feed is an important factor determining the success of such intensive fish farming in the system FNC. Analysis of a length relationship with aims to determine the weight of the fish growth patterns by using the length and weight parameters. Weight is considered as a function of the length. The values obtained from the calculation of the length with a weight can be used as an estimate of the weight of the lenght. Information about growth, weight, and environmental change on fish can be seen Effendie.[2] Integrated multi-trophic aquaculture (IMTA) is a method for optimizing the utilization of the fishery through farming system with a natural approach to marine ecosystems so optimizing the result, feed efficiency and product diversification. According to Barrington[1] Work Permit System is a farming practice with more than one cultivar or poly which have a mutualistic relationship ecologically as a food chain in the area or the same system at the same time. IMTA began to be applied as a solution to mitigate the waste produced in mariculture, due to increased efficiency of feed so it does not pollute the environment. IMTA can be used in almost all container farming, both sea and land since the concept of ecosystem balance is applied.[5]

2. EXPERIMENTAL DETAILS

This study was conducted in the area of the Sea Farming KarangLebar of the KepulauanSeribu, in two main locations. i.e., Site A was a fish farming area of IMTA system, growing up silver pompano (*Trachinotus blochii*) and tiger grouper (*Epinephelusfuscoguttatus*, Forsskal), and Site B was the area of monoculture, growing up silver pompano (*T. blochii*). Biotic data was regularly checked by measuring weight and length of 20 fish for every two weeks (biweekly) over 6 month study period. The data

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was thus analyzed using the growth rate of the fish, whilst abiotic data (physical and chemical parameters) was analysed using two-way ANOVA test. Weight can be considered as a function of the length. Relationship between length and weight can be determined by the formula:[2]

$$W = aLb$$

where W is the weight of fish (g), L is the total length of the fish (cm), a, b are constants. If the general formula is transformed by logarithms, it will get the equation line or straight line equation as follows:

$$\text{Log } W = \log a + b \log L$$

Analysis of a long relationship with heavy aims to determine patterns of growth using fish length and weight parameters.[2] To get the parameters a and b, regression analysis with $\log W$ as a 'y' and Log L as 'x', then obtained a regression equation:

$$y = a + bx$$

To test the value of $b = 3$ or $b \neq 3$-t test (partial test), with the hypothesis

HYPOTHESIS 1 H0. *$b = 3$, a long association with weight is isometric.*

HYPOTHESIS 2 H1. *$b \neq 3$, a long association with weight is allometric, namely: Allometric positive, if $b > 3$ (gain weight faster than on the length) and, allometric negative, if $b < 3$ (Added length faster than weight gain), (Steel and Torie, 1993 in Effendie[2]).*

3. RESULTS AND DISCUSSION

3.1. Growth Analysis Length and Weight Fish

The growth rate of pompano and grouper taken from measurements of total fish length and weighing fish, can be seen in Figure 1. The growth of pompano increased in line with the time over the study period. The highest lenght of the fish was 33.23 cm (grown up in monoculture), whilts the lowest length was 23.53 cm (grown up in IMTA).

From the Figures 1 and 2 above it can be seen that the growth of long-pompano and grouper, have increased continuously over 6 months measurements. The highest weight of silver pompano was 439.00 g (grown up in monoculture), followed by tiger grouper exhibited 441.90 g; meanwhile, the lowest weight was 334.00 g (grown up in IMTA).

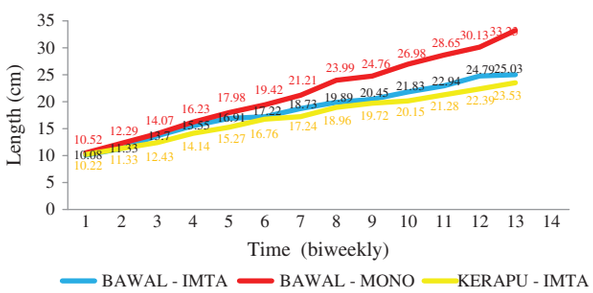

Fig. 1. Growth of silver pompano and groupers based length (cm) with time (every two weeks).

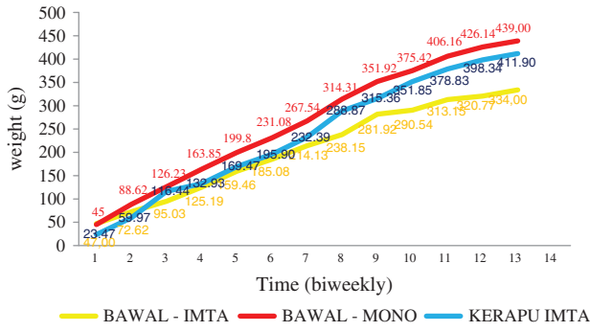

Fig. 2. Growth of silver pompano and grouper assessed by weight (g) at the time of weighing (every two weeks).

3.2. Relationship Analysis of Length to the Weight of Fish

Analysis of a length relationship with weight of pompano (*Trachinotus blochii*) and grouper at the time of measurement and weighing at both sites, the result as shown Figure 3. The relationship between length and weight of silver pompano farmed in IMTA system followed the formula $W = W_{(t)} = 13.34 \times L - 101.1$ ($R^2 = 0.976$). Based on linear regression analysis, the equation of the relationship is $y = 13.34 \times -101.1$, thus b value is 13.34. Further analysisi using t-test (confidence interval of 95%), it is categorised as positive allometric. This indicates that the rate growth of pompano in weight farmed at the area of Sea Farming KarangLebar is more dominant than the growth rate in length.

Results of linear regression analysis yields the equation $Y = 27,42 \times -245.5$ in order to get the value of b is 27.42. After the t-test at 95% confidence interval, it was decided that the value b of 27.42 alometrik positive nature. In other words, the growth rate of heavy grouper around the area of sea farming is more dominant than the growth rate in length.

Results of linear regression analysis yields the equation $Y = 19,24 \times -148.1$ in order to get the value of b is 19.24. After the t-test at 95% confidence interval, it was decided that the value b of 19.24 alometrik be positive, in other words, the rate of heavy growth silver pompano around the area of sea farming is more dominant than the growth rate in length.

Results value of $b > 3$ obtained in the two sites (IMTA and monoculture) in Pompano and grouper means to have the same pattern of relationships which alometrik positive. The growth pattern of fish can be determined by analyzing a long relationship

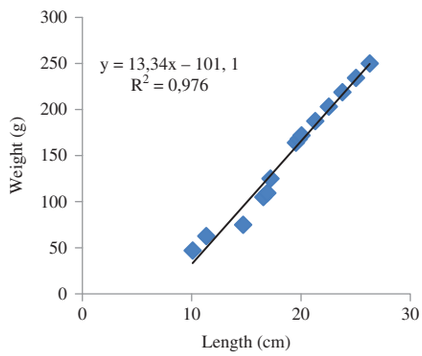

Fig. 3. The graph of relationship between growth rate of weight and length of silver pompano in IMTA system.

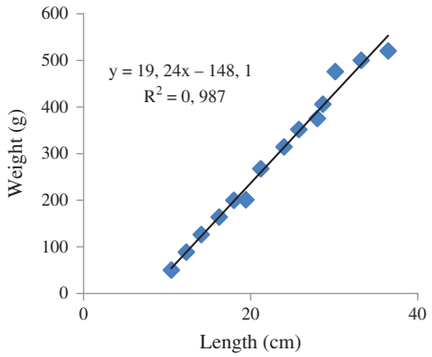

Fig. 4. The graph of relationship between growth rate of weight and length of silver pompano in monoculture system.

with weight. Weight can be considered as a function of the length. Practical value obtained from the calculation of the length with a weight can be used to estimate the weight of the fish length or otherwise, information regarding growth, weight and change of environment.[3]

3.3. Fish Growth Rate Data Analysis

The results of measurements performed on a growth rate of pompano (*Trachinotus blochii*) in both sites can be seen in the following Table I.

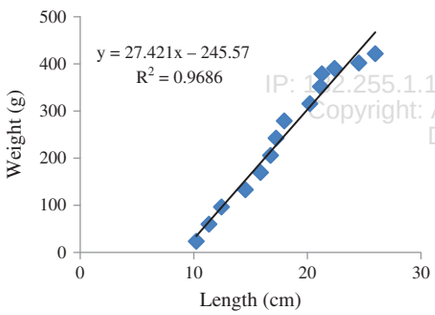

Fig. 5. The graph of relationship between growth rate of weight and length of tiger grouper (*Epinephelusfuscoguttatus*) in IMTA system.

Table I. Growth pompano (*Trachinotus blochii*).

Parameter	Monoculture	IMTA
Growth (G) (g)	394	287
Growth rate (GR) (g/h)	2, 9	1,6
Specific growth rate (SGR) (%)	1,26	1,09
Relative growth rate (RGR) (%)	4,86	3,39
Feed convertion ratio (FCR) (kg)	2	1,5

The results of this study showed that daily growth rates of silver pompano in FNC (floating net cage) are 1.26% and 1.09%, in accordance to the criteria for the size of the daily growth of fish. Mayekiso and Hecht[4] stated that the feed composition, method of feeding, feeding time, genetic and environmental conditions are a decisive factor fish growth and survival of fish to disease in an aquaculture system.

4. CONCLUSION

The results of the study in both locations showed the growth rate of the tiger pompano (*Trachinotus blochii*) with a pattern of *positive alometric* ($b > 3$) indicating faster in the growth rate of fish weight than those in length. The physical and chemical factors indicated within the normal range of water quality criteria for marine life.

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References and Notes

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