Advances in Tropical Biodiversity and Environmental Sciences
8(1): 40-44, February, 2024
e-ISSN:2622-0628
DOI: 10.24843/ATBES.2024.v08.i01.p07
Available online at: https://ejournal1.unud.ac.id/index.php/atbes/article/view/211

Effect of Amazon Sword (*Echinodorus grisebachii*) Plant Density on Specific Growth Rate of Platy Fish (*Xiphophorus maculatus*)

Ardiansyah*, Felix Rebhung, and Yudiana Jasmanindar

Aquaculture Study Program, Faculty of Animal Husbandry, Marine and Fishery, University of Nusa Cendana
Jl. Matani Raya, Lasiana, Kota Kupang, Nusa Tenggara Timur, Indonesia
*Corresponding author: ardiansyahardi61993@gmail.com

Abstract. This study aimed to determine the effect of Amazon sword plant density on the specific growth rate of platyfish. The research during April-May was carried out in the dry land lab of the Semiri islands, University of Nusa Cendana. Platy fish that use as many as 120 tails. The research method used a completely randomized design with four treatments and 3 replications. Control treatment (without plants; treatment A (using three root plants), treatment B (using five root plants), and treatment C (using seven root plants). The best treatment results were shown in treatment C with an absolute average weight value of 0. 35 g. ANOVA showed that the difference in the density of Amazon sword plants in rearing media affected platyfish's water quality and growth rate.

Keywords: Amazon Sword, platyfish, Aquascape

I. INTRODUCTION

Platy fish is a cultivated commodity with beautiful colors that vary on the body and fins. This platyfish is included in the ten highest export rankings in the ornamental fish trade [13]. Therefore, efforts are needed to increase production efficiency so that platy fish farming activities produce maximum profits [9]. In cultivating platyfish, the problem experienced by cultivators is the slow rate of growth. According to [7], the growth rate of platyfish is influenced by internal and external factors. Therefore, a cultivation method that can support the growth rate of Platy fish by paying attention to the optimal environment is needed.

Aquascape is an aquarium containing ornamental fish and plants whose appearance, design, layout, and water circulation are as similar as possible to their natural habitat to form a good ecosystem [18]. Aquascape displays aesthetic value, and its biotic and abiotic components have their respective roles and functions.

Aquatic plants are one of the biological components in lake ecosystems, which are very sensitive to changes in environmental conditions [15]. Aquatic plants are a balancer for ecosystems and maintain water quality because they can produce oxygen, reduce ammonia levels, and act as energy-producing producers in an ecosystem and shelter and spawning grounds for fish. [14] [3, 4].

II. METHODS

A. Research Location

This research was conducted from April-May 2022 at the Semiri Islands Dryland Laboratory, Nusa Cendana University.

B. Tools and Materials

The tools used in this study were 12 aquariums, aerators, digital scales, rulers, cellphones, DO meters, stationery, thermometers, and pH meters. The materials used in this study were Platy Fish, amazon sword plants, essential fertilizers, and poor sand.

C. Research Design

This study used a completely randomized design (CRD) with four treatments and three replications. The treatment used in this study is the difference in plant densities: K = without plants; A, B, and C is with Amazon Sword plant density of 3, 5, and 7 roots, respectively.

D. Research procedure

Prepare 12 clean aquariums as maintenance containers. The planting medium, essential fertilizer, and Amazon sword plants are arranged in each aquarium according to the research concept. After that, the aquarium is filled with water and left for three days. Each maintenance container is filled with platy fish with a stocking density of 10 fish per aquarium. Feed is given in the form of commercial feed with a frequency of 2 times a day at 08.00 and 16.00 with a percentage of 3% of biomass weight. Water quality, temperature, pH, and DO were measured once a week, while Ammonia and fish growth rates were carried out thrice at the beginning, middle, and end of the study.

E. Parameters observed

1. Specific weight growth rate (SGR). According to [19], the specific growth rate calculation formula is:

$$SGR = \frac{wt - w0}{T} \times 100\%$$

Description:
SGR: Specific growth rate (%/day)
Wo: Average weight at the beginning of the study (g)
Wt : Average weight at the end of the study (g)
T: Length of maintenance (days)

2. Water quality

Water quality parameters measured during the 60 days of rearing time were temperature, pH, dissolved oxygen and ammonia (NH3).

F. Data analysis

This research used two types of data analysis: analysis of variance (ANOVA) and quantitative methods. Analysis of variance was used to determine the effect of treatment on the tested parameters. If the treatment significantly affected the tested parameters, further tests were carried out using the Honest Significant Difference (HSD). Statistical tests were conducted with the help of SPSS software. The descriptive quantitative method is used to analyze the data by describing the data that has been collected.

III. RESULTS AND DISCUSSION

1. Specific growth rate of platyfish

Based on Figure 1, the growth rate of the specific weight of platyfish (X. maculates) varies. ANOVA density of Amazon sword plants in a rearing medium affected the specific growth rate of platyfish ($P < 0.05$).

The BNT test showed that control (K) differed significantly from treatments A and B. Treatment B was not significantly different from treatment C. Still, treatment C was very different from control (K) and treatment A. A plant density of 7 roots gave the highest value. This is presumably due to water quality. In line with [3], fish growth depends on the quality of the water in it. The better the water quality, the better the fish grows and develops. Good water quality is inseparable from the benefits and uses of aquatic plants, which can work efficiently in balancing the ecosystem and maintaining stable water quality in the aquarium optimally for fish life. This is in line with the research results, which showed that the values for temperature, pH, DO, and ammonia were in a good range, so the specific growth rate of fish also increased.

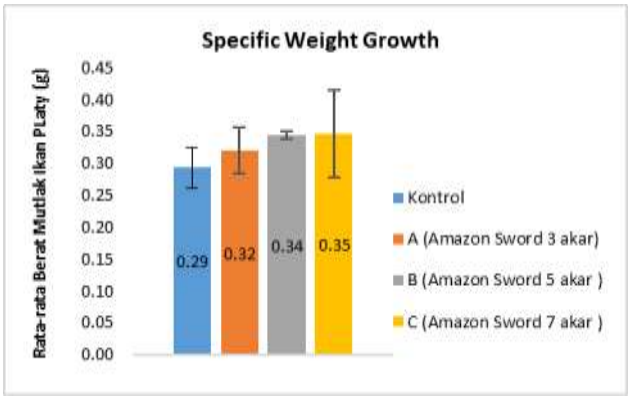

Fig. 1. Specific growth rate of platyfish

2. Water quality

a. Temperature

Temperature (Table 1) is one of the physical parameters that can affect essential activities in fish, such as breathing, growth, reproduction, and the metabolic system [10].

TABLE 1.
AVERAGE TEMPERATURE DATA DURING THE STUDY

Treatment	Temperature		
	Repeat		
	1	2	**3**
K	25.1	25.5	25.8
A	25.6	26	26.5
B	25.7	26.2	26.1
C	26.3	26.5	25.5

Based on the research results in Table 1 above, the temperature values during the study ranged from 25.1 °C to 26.5 °C; this value is included in the optimal range for platy fish life. In line with the opinion [6], the temperature suitable for the growth of ornamental fish is around 22-28°C. Optimal temperature conditions are inseparable from the role of the Amazon sword plant, which functions as a balancer for aquatic ecosystems [12] so that the

Amazon sword plant can make the water temperature value in the optimal range where fish can live in it.

b. pH

The degree of acidity (pH) in water is one of the vital chemical parameters for monitoring the stability of the water (Table 2). The results of the pH value observations during the period ranged from 6.7 to 7.6. The pH value in this range is suitable for platy fish farming. A good pH value for platy fish cultivation ranges from 6.5 to 8.5 [2]. The pH level in water is still related to the water temperature, where when the temperature increases, the pH of the water will also become alkaline [3]. Therefore, the Amazon Sword plant has a role in stabilizing the pH of the water for the survival of Platy fish.

TABLE 2.
PH AVERAGE DATA DURING THE STUDY

Perlakuan	pH		
	Ulangan		
	1	2	3
K	6.7	7.6	7.6
A	7.6	7.6	7.6
B	7.6	7.6	7.6
C	7.6	7.6	7.6

c. Dissolved Oxygen (DO)

Dissolved oxygen (DO) content plays a vital role in aquaculture ecosystems. Dissolved oxygen in water fluctuates according to the intensity of photosynthesis and oxygen diffusion from the air.

TABLE 3
DO AVERAGE DATA DURING THE STUDY

Treatment	DO		
	Repeat		
	1	2	3
K	6.1	6.1	6.1
A	6.3	6.1	5.3
B	6.4	5.6	6.3
C	6.3	6.2	6.6

d. Ammonia

The presence of ammonia naturally corresponds to the need for biota for ecosystem balance processes. However, high concentrations make it toxic to some biota, including fish [16]. The results of measuring ammonia levels during the study ranged from 0.421 – 0.742 ppm. The ammonia content is still within the tolerable range for ornamental fish farming. This is in accordance with the opinion of [1] a safe ammonia concentration for fish and aquatic organisms is less than 1 mg/L. The function of aquatic plants, besides supplying oxygen, can reduce ammonia levels in waters. Treatment C had the lowest ammonia content, which aligned with the measurement results.

TABLE 4.
AMMONIA AVERAGE DATA DURING THE STUDY

Temperature	Amoniak		
	Repeat		
	1	2	3
K	0.786	0.726	0.716
A	0.661	0.629	0.603
B	0.541	0.551	0.447
C	0.414	0.442	0.409

IV. CONCLUSION

Based on the research results on the effect of different densities of Amazon sword plants on the specific growth rate of platyfish, it can be concluded that it has a significant effect on the particular growth rate where the best treatment was shown in treatment C with an average value of specific weight growth rate (0.35 g).

ACKNOWLEDGMENT

The author would like to thank the Head of the Laboratory of the Faculty of Animal Husbandry, Marine and Fisheries, UNDANA, who has guided and provided facilities for conducting research.

REFERENCES

[1]. Boyd CE. 1982. Water Quality Management for Pond Fish Culture. Elsevier Scientific Publishing Co. New York. p: 6-50.

[2]. Cahyono, B. (2000). Budidaya Ikan Di Perairan Umum. Kanisius.

[3]. Dauhan RES., Efendi E., Suparmono. 2014. The Effectiveness of the Aquaponic System in Reducing Ammonia Concentrations in Fish Culture Systems. e-Journal of Aquaculture Engineering and Technology, 2(1): 297-302

[4]. Diana R, Samidjan I, Pinandoyo. 2016. Analysis of the Brightness of the Platysword (Xhiphophorus helleri) Color Through the Addition of Astaxanthin With Different Doses in Commercial. Journal of PENA Aquatics. 13 (1) : 65 pages

[5]. Effendi H. 2003. Study of Water Quality for the Management of Aquatic Resources and Environment. Yogyakarta: Kanisius. 258 pages.

[6]. Fajlan A, Rahimi SAE, Melisa S. 2019. The Effect of Adding Spirulina to Feed on the Color Intensity of Mickey Mouse Platy Fish (Xiphorus maculatus). Unsyiah Maritime and Fisheries Student Scientific Journal. 4(3):152-160.

[7]. Hidayat D., Sasanti A. 2013. Survival, Growth and Feed Efficiency of Snakehead Fish (Channa striata) Given Feed Made from Golden Snail Flour (Pomacea sp). Journal of Indonesian Swamp Aquaculture. 1(2): 161-172

[8]. Irma D. (2012). Keragaman Jenis dan Persen Penutupan Tumbuhan Air di Ekosistem Danau Laut Tawar, Takengon, Provinsi Aceh. Jurnal. 4 (2): 37-49

[9]. Kuncoro, E. 2011. Sukses Budidaya Ikan Hias Air Tawar. Yogyakarta. Liliy Publisher. 436 halaman.

[10]. Lesmana, D. S. 2001. Water quality for freshwater ornamental fish. Independent Spreader, Jakarta. 88 p

[11]. Levit SM. (2010). A Literature Review of Effects of Ammonia on Fish. The Nature Conservancy, Center for Science in Public Participation, Bozeman, Montana.

[12]. Nuryadi. Haryati. Indrayani, Lilis. 2021. Design and Build a Balanced Control System for Aquatic Plant Needs in Aquascape. Proceeding KONIK (National Conference on Computer Science). 3 (5) : 112-128

[13]. Priliska, Hamelia. 2013. Levels of Platy Fish Sunset Xiphophorus maculatus at Several Levels of Water Temperature. Thesis. Department of Aquaculture, Faculty of Fisheries and Marine Sciences ITB. 18 pages.

[14]. Emilia Riska., Sartika Dauhan., Eko Efendi., Suparmono. 2014. Efektifitas Sistem Aquaponik Dalam ereduksi Kinsentrasi Amonia Pada Sistem Budidaya Ikan. Jurnal Rekayasa dan Teknologi Budidaya Perairan. Vol 3, No 1

[15]. Sunanisari S. 2008. Ability of Lotus (Nymphaea sp) and Algae (Hydrilla verticillta) in Reducing Nitrogen and Phosphorus Levels of Chemical Analysis Laboratory Washing Wastewater. J. Tropical Inland Waters In Indonesian 15 (1): 35-48 pages.

[16]. Susanti E, Harpeni E, Setyawan A, Putri B. 2013. Screening of Ammonia Nitrogen Degrading Bacteria from Traditional Tiger Shrimp (Panaeus Monodon) Pond Sediments. Journal of Fisheries Science and Aquatic Resources 2 (2): 145-148 pages.

[17]. Wardoyo STH. 1975. Water Quality Management. Bogor Agricultural Institute. Bogor. 41 Pages.

[18]. Widjaja T. 2013. Aquascape, Enchantment of Gardens in Aquariums. Jakarta: Agromedia Pustaka. 26 pages.

[19]. Zenneveld, N. E. A. Huisman dan J. H. Boon. (1999). Prinsip-prinsip budidaya ikan. PT. Gramedia Pustaka Umum.