Growth And Survival Rate of Tilapia (*Oreochromis* niloticus) Fed with Different Level of *Azolla microphylla*

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Abstract

Azolla microphylla is abundant in nature and has not been utilized optimally. A. microphylla can grow and bloom quickly. The protein content of A. microphylla is quite high, 19.54%-28.12% . Furthermore A. microphylla also has 7-10% amino acids, especially 0.24% lysine. Utilization of A. microphylla as feed potential for aquaculture. This research aims to determine the effect and optimum dose of combination A. microphylla flour with artificial feed on growth and survival rate of tilapia (O. niloticus). This study used a Completely Randomized Design with 4 (four) treatments and 3 (three) replications, repectively treatment A (0% A. microphylla), treatment B (10% A. microphylla), treatment C (A. microphylla 15%), and treatment D (A microphylla 20%). The parameters tested were specific growth rate (SGR), *growth rate (GR), survival rate* (SR) *and feed conversion ratio* (FCR). *The tilapia used had an average initial body weight of 1.10 g with a stocking density of 10 fishes/containers. The fish reared for 30 days and fed 2 times a day. The result showed that there was no significant difference in specific growth rate, growth rate, survival rate and FCR (P>0.05). A. microphylla can be used as a combination of artificial feed up to 20%, it showed the same growth and survival rate as the control treatment.*

Keywords: *A. microphylla*, FCR, Tilapia, Growth, Survival Rate

Introduction

Tilapia (*Oreochromis niloticus*). has quite high potential in aquaculture. This fish is in great demand by farmers because it is easy to breed, grows quickly, and has high tolerance to various environmental conditions (Simajuntak, 2018; Hartamin et al., 2015). In the fish farming, fish can grow optimally by fed with adequate nutrient of feed. Feed is the largest component (50%-70%) of production costs, an increase in feed prices without being accompanied by an increase in the selling price of fish is a challenge for farmers (Yanuar, 2017). Combination of artificial feed and *A. microphylla* can be chosen as an alternative to reduce the production cost.

A. microphylla is abundant in nature and has not been utilized optimally. *A.microphylla* can grow and bloom quickly. It lives floating on the surface of the water and is in symbiosis with cyanobacteria (blue green algae), capable of fixing nitrogen in the air. The protein content of *A. microphylla* is quite high, 19.54%-28.12%. According to Ghofoer (2013), the nutritional content of *A. microphlylla* is contain (in dry weight) 25-35% protein, 10-15% minerals and 7-10% amino acids (0.24% lysine). *A. microphylla* contains quite complete essential amino acids. Therefore, utilization of *A. microphylla* as a feed is potential.

Tilapia is an omnivorous fish so it is expected to be able to utilize azolla optimally. Observe the potential of *A. microphylla* to be used as feed, it is necessary to carry out research to determine the effect and optimum dose of combination *A. microphylla* flour with artificial feed on growth and survival rate of tilapia.

Materials and Methods

The research was carried out on July 2023 for 30 days at SMK Negeri Rea Timur Kecamatan Rea Timur, Kabupaten Polewali Mandar, Sulawesi Barat Province. This research used a Completely Randomized Design with 4 (four) treatments and 3 (three) replications.

Experimental Diets

The diets containing different level of azolla flour combine with artificial feed. The treatments used in this research are as follow:

Table 1. The dose of combination *A.microphylla* flour and artificial feed

Treatment	Composition (%)	
	A. microphylla	Artificial Feed
A (0%)	-	100
B (10%)	10	90
C (15%)	15	85
D (20%)	20	80

The ingredients used were weighed according to its composition and mixed. After getting mixed, then feed stored and used according to its treatment.

Fish Rearing

Each aquarium was equipped with aeration. The water dissolved oxygen, temperature and pH were measured daily during rearing period. The water quality during rearing period was at the optimum range for catfish, with temperature ranging from 18-29.8 ^{o}C, dissolved oxygen 8.1-9.7 mg L^{-1}, pH 7.1-8.9. The parameters of survival rate and specific growth rate were calculated based on Halver and Hardy (2002); feed conversion ratio and growth rate were calculated based on Effendie (2002).

Statistical Analysis

This research used completely randomized design with four treatments and three replications. Data were analyzed using software SPSS 16. Data were tested with ANOVA and followed by Tukey test with a 95% confidence level. The difference between treatments was found with a significance value of $p<0.05$.

Results and Discussion

The growth performance of tilapia (*Oreochromis niloticus*.) fed with combination of *A. micrphylla* flour and artificial feed presented in Table 2.

Table 2. Specific growth rate (SGR), growth rate (GR), survival rate (SR), feed conversion ratio (FCR) of tilapia *Oreochromis niloticus.*

Parameter	Treatments of selenium supplementation			
	A (0%)	B (10%)	C (15%)	D (20%)
SGR (%day-^{1})	1.30±0.58 ^{a}	1.28±0.10 ^{a}	1.39 ± 0.65 ^{a}	1.65 ± 0.15 ^{a}
GR (g)	5.30±2.53 ^{a}	5.20±0.30 ^{a}	5.93 ± 1.55 ^{a}	6.86±0.65 ^{a}
SR (%)	90±17.32 ^{a}	93.33±5.77 ^{a}	93.33± 11.54^{a}	93.33 ± 5.77 ^{a}
FCR	1.95±0.15 ^{a}	2.01±0.27 ^{a}	1.91±0.39 ^{a}	1.62±0.24 ^{a}

Note: *) The values in the same rows with different superscript letter indicate significant differences ($p<0.05$).

The result showed there was no difference in specific growth rate, growth rate, survival rate, and feed conversion ratio ($P>0.05$). It showed that the used of azolla combine with artificial feed gave no different result compare to fish fed with full artificial feed (treatment A).

Along with the length of the rearing time, the biomass in all treatments increased. All treatments show no different result in specific growth rate, growth rate and feed convertion ratio. It indicates that tilapia could utilize azzola well for its growth. Growth of organism depend on feed consumed, thereby produce optimal growth. Tilapia is omnivorous fish, which causes tilapia to utilize azolla up to 20% combine with artificial feed.

The survival rate was 90% - 93.3%. Azolla did not caise high mortality in tilapia in all treatments. It possible low mortality was suspected because azolla is not toxic. *Azolla* can be used for feed because it does not contain toxins or anti-nutrients (Suwondo *et al*. 2021; Nurvanila, 2022).

Conclusions

Combination of azolla and artificial feed had a positive effect on growth performance and survival rate of tilapia. Tilapia can utilize azolla up to 20% combine with artificial feed.

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References

Effendie, M. I. 2002. *Biologi Perikanan*. Yayasan Pustaka Nusantara. Yogyakarta.

Ghofoer. 2013. *Pemanfaatan Azolla Terhadap Pakan Unggal*. Universitas Brawijaya Press. Malang

Halver JE, Hady RW. 2002. Fish Nutrition. California (US): cademic Press.

Hartamin, K., Mukhlis., Erniati. 2015. Komsumsi Harian yang Berbeda Dari Beberapa Sirai Ikan Nila (*Oreochromis Niloticus*). Skripsi. Universitas Malikus Saleh Aceh. Aceh.

Simajuntak, A. H. 2018. Pertumbuhan Dan Kelulusan Hidup Ikan Nila Merah (*Oreochromis* Sp) Yang Dipelihara Pada Slinitas Berbeda Dengan Teknologi Bioflok. Skripsi. Fakultas Perikanan Dan Kelautan. Universitas Riau. Pekan Baru.

Suwondo., Darmadi., Amin, M. 2021. Pengaruh Pertumbuhan *Azolla microphylla* Terhadap Pertumbuhan Ikan Nila (*Oreochromis niloticus*) Sebagai Rancangan Pembelajaran Biologi SMA. *Jurnal Biogenesisi*. 17 (1) : 39-48.

Yanuar, V. 2017. Pengaruh Pemberian Jenis Pakan yang Berbeda Terhadap Laju Pertumbuhan Benih Ikan Nila (*Oreochromis niloticus*) dan Kualitas Air di Akuarium Pemeliharaan. *Ziraa'ah*.. 42 (2) : 91-99.

Nurvanila,Y. 2022.Pemberian Tepung Azolla (*Azolla microphylla*) Fermentasi ke dalam Pakan dengan Konsentrasi yang Berbeda Terhadap Persentase Giblet (hati, jantung dam ampela) Ayam.skripsi. Universitas Bosowa.