

The Effect Different Dossage of Cinnamomum Leaves (*Cinnamomum burmanni*) Supplementation on Growth and Survival Rate of Tilapia (*Oreochromis niloticus*)

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Abstract

Firma Fika Rahmawati and Mohammad Fikri Ubaidillah. 2017. The Effect Different Dossage of Cinnamomum Leaves (*Cinnamomum burmanni*) Supplementation on Growth and Survival Rate of Tilapia (*Oreochromis niloticus*). *Aquacultura Indonesiana*, 18 (2): 62-66. This trial was aimed to evaluate the effect different dossage of cinnamomum leaves (*Cinnamomum burmanni*) supplementation on the growth performance and survival rate of tilapia (*Oreochromis niloticus*). A 30-day feeding trial was conducted in 12 aquaria with water system. Ten fish with average body weight of 100 g were reared in 60 x 35 x 30 cm³ of aquarium. Fish were randomly selected and stocked in each aquarium. The experiment was designed according to completely random design with three treatments and three replicates in each treatment. Experimental diets were prepared as dry pellet with *Cinnamomum burmanni* leaves of 0,25%, 0,5%, 1,0% respectively, for 30 days. Fish were fed with experimental diets three times daily at satiation level. Result of the experiment showed that addition of 0,25%, 0,5%, 1,0% cinnamomum leaves (*Cinnamomum burmanni*) gave specific growth rate (SGR) 2,55±0,34%^a, 2,15±0,25%^b and 2,21 ± 0,16%^a respectively; feed conversion ratio (FCR) 1,29±0,24^a, 1,68±0,07%^b, and 1,50±0,18%^a respectively and survival rate (SR) all treatment were 100± 0,00%. If compared to control (SGR 1,87 ± 0,22%^a, FCR 1,83±0,15%^a and SR 100± 0,00%^a), it was concluded that cinnamomum leaves dietary gave a better result, especially the addition of 0,25% cinnamomum leaves gave a significant increase of growth and feed conversion of tilapia (*Oreochromis niloticus*).

Keywords: Cinnamomum leaves; Growth performance; Survival rate; Tilapia.

Introduction

All organisms need feed for growth and survival. Food used for any organism should be balanced meaning should contain all essential nutrients which are basic for that candidate species. The feed given should be easily accessible and cost effective. Feed accounts for 40-50% of aquaculture production costs and is considered one of the major constraints for small and large scale commercial aquaculture.

Tilapia (*Oreochromis niloticus*) one of the main aquaculture commodities in Indonesia and the world, with global production of 4.85 million tons in 2014. Increases production capacity can be reached by various ways, one of the alternative means is application of biotechnology. One of biological control strategies to improve growth and disease resistance in aquaculture organisms is the cinnamomum leaves application.

Cinnamomum leaves is an additive substance from plant that can be used to improve quality flesh of fish because the contain polyphenols and sinnamaldehyd that function as antioxidants and activation of insulin-like growth

factor (IGF-1) to increase metabolism (Gruenwald, *et al.*, 2010; Takasao, *et al.*, 2012; Jayaprakasha and Rao, 2011).

Application of cinnamomum leaves (*Cinnamomum burmanni*) has been proven to improve the growth performance and quality of meat during the feeding period of catfish *Pangasius* sp. (Sakinah, 2014), on the growth performance of striped catfish (*Pangasianodon hypophthalmus*) (Nugroho, 2016), and immune response in catfish (Safratilofa, 2016).

This research aimed to evaluate the effect of cinnamomum leaves (*Cinnamomum burmanni*) supplementation at different dosages on the growth performance and survival rate of tilapia (*Oreochromis niloticus*).

Materials and Methods

The study was conducted in July-Agust 2017 at the Laboratory of Aquaculture Department of Aquaculture, Faculty of Agriculture, University of Muhammadiyah, Gresik, East Java, Indonesia.

The experimental Diets Preparation

The Experimental diets were prepared by pellet F999 (38% protein content) adding cinnamomum leaves (0,25%, 0,5%, 1,0% g/kg) to the diet. The control treatment diets were added only with egg white and without cinnamomum leaves. Feed used in this study was commercial fish feed pellet. Feeding was done three times a day (at 08.00;12.00;16.00) for 30 days.

Design of the study

This experiment was conducted in a completely randomized design with five treatment diets including thee dosages of *Cinnamomum burmanni* leaves diet [0.25%(A), 0.5% (B), 1% (C) (w/w), and control]. Each treatment was conducted in four replications. Fish at the weight of 74,53±0.61 g were reared in 12 aquariums at size of 60x35x30 cm³ with density of 10 fishes for each aquarium for 30 days. Each tank containing 30 L and kept under controlled conditions (temperature was ranging from 26 to 27 °C, pH 6.48-6.59, DO 4.3-5.6 ppm and TAN 0.12-0.35 mg/L.

After 30 days of *Cinnamomum burmanni* leaves dietary, specific growth rate (SGR) and

feed conversion ratio (FCR) were observed. The Specific Growth Rate (SGR) and Feed Conversion Rate (FCR) were calculated from day 0 to day 30, the Survival Rate (SR) was calculated from the start till the end of the study (Effendie, 1997). The data were analyzed using Microsoft Excel 2010 and tested using ANOVA (Analysis of Variants); if it had a significant effects, it was continued with a Duncan test using the Minitab 16.

Results

Survival rate (SR) of fish was observed after adding cinnamomum leaves for 30 days (Figure 1). The cinnamomum leaves dietary did not show a significant different effect on SR because no mortality occurred during cinnamomum leaves cinnamomum leaves dietary.

The results of this study also showed that the *Cinnamomum* leaves dietary on feed provide a beneficial effect on growth performance . The result of feeding, Specific Growth Rate (SGR), is presented in Figure 2.

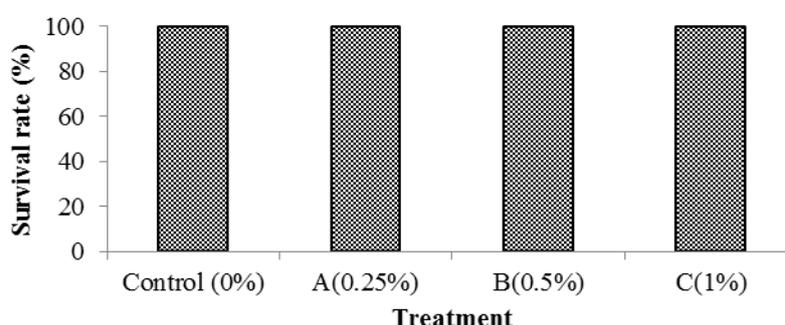


Figure 1. *Survival rate* (SR) Tilapia. Different letters over each treatment bar (mean ± standard error) indicate significant difference (p< 0.05). A: 0.25% adding *Cinnamomum* leaves dietary; B: 0.5% adding *Cinnamomum* leaves dietary; C: 1% adding *Cinnamomum* leaves dietary and Control (without *Cinnamomum* leaves dietary).

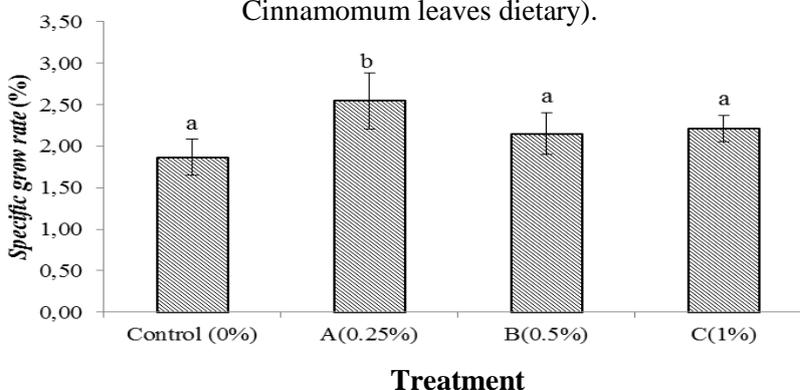


Figure 2. Specific grow rate (SGR) Tilapia. Different letters over each treatment bar (mean ± standard error) indicate significant difference (p< 0.05). A: 0.25% adding *Cinnamomum* leaves dietary; B: 0.5% adding *Cinnamomum* leaves dietary; C: 1% adding *Cinnamomum* leaves dietary and Control (without *Cinnamomum* leaves dietary)

The result clearly showed the beneficial effects of cinnamomum leaves have significant increase of SGR in comparison to the control treatment (without cinnamomum leaves) ($p < 0.05$). The experimental treatment of this study were significantly different for all treatment. The greatest effect was obtained in treatment A (0.25% Cinnamomum leaves dietary) which had a value of A ($2.55 \pm 0.34\%$); B ($2.15 \pm 0.25\%$); and

C ($2.21 \pm 0.16\%$); and fish without cinnamomum leaves dietary (Control) was $1.87 \pm 0.22\%$.

The feed conversion ratio (FCR) of Tilapia fed by Cinnamomum leaves were lower compared with the control treatment ($p < 0.05$) (Figure 3). The lower FCR value was showed by treatment A ($1.29 \pm 0.24\%$), followed by treatment B ($1.68 \pm 0.07\%$), then C ($1.50 \pm 0.18\%$), and control ($1.83 \pm 0.15\%$).

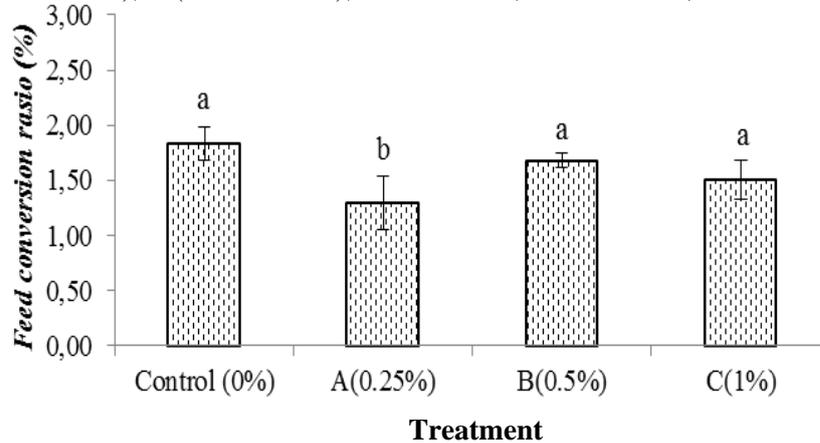


Figure 3. Feed conversion ratio (FCR) Tilapia. Different letters over each treatment bar (mean \pm standard error) indicate significant difference ($p < 0.05$). A: 0.25% adding Cinnamomum leaves dietary; B: 0.5% adding Cinnamomum leaves dietary; C: 1% adding Cinnamomum leaves dietary and Control (without Cinnamomum leaves dietary).

Discussion

Survival rate (SR) of treatment A, B, and C was not show a significant different effect on SR because no mortality occurred during cinnamomum leaves dietary. Similar results have been reported for farmed fish cultured with cinnamomum leaves dietary, e.g., Tilapia (Sakinah, 2014) and catfish (*Pangasianodon hypophthalmus*) (Nugroho, 2016), which mean the addition of cinnamomum leaves dietary didn't gave adverse effects on fish health.

Increasing Specific growth rate (SGR) was found along increasing dosage. However, after adding cinnamomum leaves dietary showed a significant difference ($p < 0.05$) among fish fed with cinnamomum leaves dietary. Treatment A ($2.55 \pm 0.34\%$); B ($2.15 \pm 0.25\%$); and C ($2.21 \pm 0.16\%$); and fish without cinnamomum leaves dietary (Control) was $1.87 \pm 0.22\%$. The lower FCR value was showed by treatment A ($1.29 \pm 0.24\%$), followed by treatment B ($1.68 \pm 0.07\%$), then C ($1.50 \pm 0.18\%$), and control ($1.83 \pm 0.15\%$). The lower FCR value in this study indicated that the fish fed by cinnamomum leaves dietary showed the effectivity in nutrient digestibility. Similar result resported by Laheng (2016) and Setiawati, *et al.* (2014) that

cinnamomum leaves dietary gave a significant increase of growth and feed convection of catfish (*Pangasianodon hypophthalmus*) and can improve the quality of feed to increased growth performance. These results indicate that the addition of cinnamon leaves are able to give effect to decrease of FCR within 30 days. Decreasing the value of FCR in each cinnamon leaf additive treatment, means increased nutrient feed which indicates the addition of cinnamon leaves in the feed was able to utilize the nutrients in optimization and use for growth. Hutama (2012) states that the addition of cinnamon leaves to goldfish feeds has a significant effect with increasing doses in the feed, this statement does not apply equally to tilapia where the decrease of feed conversion ratio (FCR) by treatment dose of 0.25%. These results may correlate with polyphenols which improved metabolism in the body tissues.

Handayani and Widodo (2010) cited energy needs for growth, activity and energy, mostly from consumed feed. The addition of 0,25% cinanmomum leaves can improve the quality of feed, proved from the result of this study obtained SGR increased and FCR is low, meaning the efficiency of feed utilization becomes better because of the addition of 0,25%

cinnamomum leaves. Research that has been done by Laheng (2016) and Setiawati, *et al.*, (2014) proves that the addition of cinnamon leaves can improve the quality of commercial feed by providing faster growth rate of daily growth, better digestibility and increased body protein content in catfish. According to Jayaprakasha and Rao (2011), expressed as cinnamon is an herbal plant that has polyphenolic compounds, sinamaldehyd and flavonoids that function as antioxidants activity and metabolism improving effect. Increased metabolism can accelerate the reshuffle of blood glucose, fatty acids and improve fish health so that protein retained can be used for growth.

Azima, *et al.* (2004) suggested that flavonoids, saponins and tannins could improve nutrient absorption in rabbits. Sabitha, *et al.* (2014) suggested that antioxidant activity may increase the immune system and maintain the cell physiology, and reduce cell damage caused by free radicals and oxidative stress. Lopes, *et al.* (2015) argued that the cinnamon could improve the metabolism of fatty acids in adipose tissue. Cinnamaldehyde was able to activate the insulin-like growth factor (IGF-1) (Takasao, *et al.*, 2012) which enhanced the biosynthesis of protein and collagen in the body tissues thereby increasing the deposition of protein that played key role in increasing body weight (biomass) in fish (NRC, 2011; Vinasyiam, *et al.*, 2016), so it can accelerate the process of digestion of feed then launched the process of nutrient absorption needed to trigger growth.

Conclusion

The addition of cinnamomum leaves supplementation gave a better result, especially the addition of 0,25% cinnamomum leaves gave a significant increase of specific growth rate (SGR) and decrease of feed conversion ratio (FCR) in tilapia fish (*Oreochromis niloticus*).

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