Effect of curcuma (*Curcuma xanthorriza* roxb) immersion on the survival of tilapia (*Oreochromis niloticus*)

[1.2]Yayu Angriani Ngodu, [2]Rully Tuiyo, [3]Mulis

[1]yayu_ngodu@yahoo.co.id
[2]Department of Aquaculture, Faculty of Fishery and Marine Science, Universitas Negeri Gorontalo

Abstract

This study aims to determine the duration of soaking of curcuma (*Curcuma xanthorriza* roxb) powder on the survival of tilapia (*Oreochromis niloticus*) seeds infected with *Aeromonas hydrophilla* bacteria. This study was an experiment with a Completely Randomized Design (CRD) using analysis of variance (ANOVA) with four treatments and three repetitions. The treatments used were curcuma powder immersion, which were treatments A (3 minutes), B (5 minutes), C (7 minutes) and D (Control). The results showed that different soaking time using ginger powder did not affect the survival of tilapia seeds. The best treatment is treatment A (3 minutes) with a survival rate of 86.67%.

Keywords: Tilapia; *Oreochromis niloticus*; seed; infection; bacteria; *Aeromonas Hydrophylla*; survival.

Introduction

Mulyani et al. (2014), states that tilapia (Oreochromis niloticus) is one of the fisheries commodities favored by the community in meeting animal protein needs because it has thick meat and good taste. Tilapia is also a potential fish to be cultivated because it is able to adapt flexibly to environmental conditions.

Tilapia is a type of freshwater fish that is easily maintained, because it has a good growing speed and has a high tolerance in various water conditions. Based on these reasons, this fish is widely cultivated to meet the increasing consumer demand. Tilapia experienced a high growth of around 23.96% in 2004-2008. Production in 2004 was around 97.116 tons, then in 2008 it increased to 291,037 tons. Even the Ministry of Maritime Affairs and Fisheries is targeting fish production to reach 1.25 million tons in 2014 (Indriani et al., 2014)

According to Sari et al. (2012), technological advances in the field of fisheries include intensive aquaculture businesses that can increase the production of the fisheries sector. However, there are several obstacles, one of which is the emergence of diseases in fish that generally occur due to interactions between fish, pathogens and the environment.

Simatupang and Anggraini (2013) stated that the disease that often develops in freshwater aquaculture is red spot disease or often known as Motile Aeromonas Septicemia (MAS) caused by Aeromonas hydrophilla bacteria. Aeromonas hydrophila bacteria are gram negative bacteria that are pathogenic in fish that can cause infectious diseases in several types of freshwater fish. Transmission is very fast through water intermediaries, body contact, contact with contaminated equipment or due to the transfer of infected fish from one place to another. According to Kurniawan (2011), fish infected with this bacterium experience abnormal behavioral conditions, refuse food, bleeding, pale color and fins eroded to sores on the skin.

Efforts to control MAS disease in fish farming are still using antibiotics. However, the use of antibiotics for long-term, uncontrolled and incorrect dosages can have a negative impact. This impact is not only feared by the emergence of antibiotic-resistant bacterial strains that can harm humans (zoonotics), but also can pollute the aquatic environment, and even have an impact on health by the presence of chemical residues from antibiotics in consumed fishery products. Sukenda et al. (2008) stated that antibiotics are expensive drugs, so that at the pool scale the use of antibiotics causes high costs making it less efficient.

Another alternative that can be used in the treatment of fish is to use traditional medicine or herbal medicine (Pasetriyani, 2013). One of the ingredients that can be used in the treatment of fish diseases is curcuma herbal ingredients containing yellow substances (curcumin), fiber, starch, potassium oxalate, essential oils, and flavonoids, these substances function as antibacterial, prevent blood clotting, anti-inflammation , smooth metabolism and organ function (Sari et al., 2012).

This study aims to determine the duration of soaking of curcuma (*Curcuma xanthorriza* roxb) powder on the survival of tilapia (*Oreochromis*

niloticus) seeds infected with *Aeromonas hydrophilla* bacteria.

Research Methodology

This research was carried out from November to December 2016 in the Parasite Section Labolatory of Quality Control and Safety of Fishery Products in the Fish Quarantine Station of Gorontalo.

This study was an experimental study using a completely randomized design (CRD), with 4 treatments and 3 replications. The factor which became the test variable was the duration of soaking of fish seeds. Sari et al. (2013) stated that immersion of goldfish attacked by Aeromonas hydrophylla for 5 minutes is a treatment that can still be tolerated for the carp survival. As for the treatment in this research is immersion for 3 minutes, 5 minutes, 7 minutes and control.

Firstly, the preparation of the test fish containers: 12 aquariums equipped with a hose and aeration system. Aquarium filled with 5 liters of clean water and aerated for 12 hours.

The fish seeds used in this study were tilapia seeds from the Gorontalo City Fish Seed Center measuring 8 to 11 cm. Before spreading to the culture container, the tilapia seeds are acclimatized for 2 days so that if there are fish that die can be replaced immediately.

The infectious process was carried out by injecting Aeromonas hydrophilla 5x108 cells / ml into the stomach of healthy tilapia seeds using a syringe with a 0.1 ml volume.

Tilapia seeds attacked by Aeromonas hydrophilla can be seen on day 2 after injection, the characteristics of attacked by Aeromonas hydrophilla disease are loss of fins, flaky tail, loose scales, after the fish seeds look like the above characteristics, the fish seeds are then immersed in each plastic container contains 1 liter of curcuma powder water. After the immersion process is completed tilapia seeds are placed to a total of 5 head / container with treatment that is 3 minutes, 5 minutes, 7 minutes. Tilapia seeds are maintained for 1 week, while the fish culture process is fed F-999 at a dose of 3% per day.

The data obtained include the calculation results of tilapia seed survival, calculated using one-way Analysis of Variance (ANOVA) by performing the F test of the Completely Randomized Design (CRD) method, if there are differences followed by the Least Significant Difference test (LSD).

Results and Discussion

Survival rate

Survival rate is the ratio between the number of individuals at the end of an experiment and the number of individuals at the beginning. Biotic factors that affect survival are parasites, competitors, predation, age, adaptability, human management and population density (Putra et al., 2013). The results of the calculation of survival of tilapia fish can be seen in Figure 1.

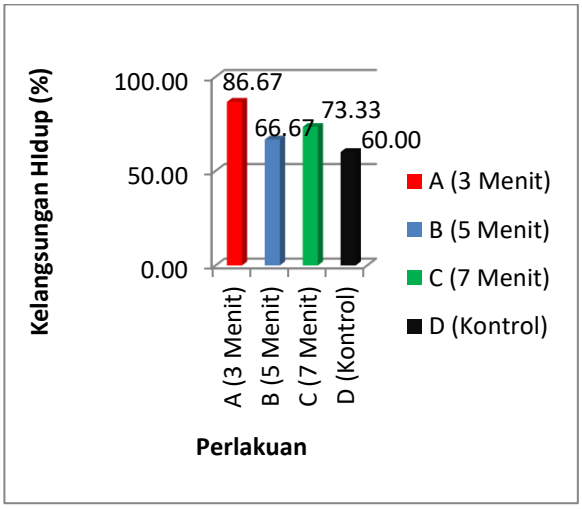

Figure 1. Survival rate of tilapia with curcuma immersion

The highest survival was obtained in treatment A, it was suspected that the immersion time was effective to inhibit the growth of Aeromonas hydrophilla bacteria in the body of tilapia seedlings thereby suppressing mortality in tilapia seedlings. In the treatment B and C are considered still less effective for survival due to excessive soaking time so that more fish die, whereas in treatment D (control) tilapia is unable to survive. The results of tilapia test samples conducted at the end of culture showed that in treatment A there was no Aeromas hydrophila (-) bacteria, in treatment B there was still Aeromas hydrophila (+) bacteria, in treatment C there were no more Aeromas hydrophila (-) bacteria while in treatment A and treatment D (Control) contained Aeromas hydrophila (+)

The number of dead fish in treatment D was 6 fish, then in treatment B was 5 fish, then in treatment C was 4 fish and the lowest in treatment A was 2 fish. The highest mortality was obtained in treatment D because no treatment was given to inhibit the growth of Aeromonas hydrophylla bacteria.

According to Sari et al. (2012), administration of curcuma powder with a concentration of 4 g / l had the best influence on the survival of tilapia fish. Samsundari (2007) added that the disk test results

showed a real effect of turmeric extract and curcuma extract on the growth of Aeromas hydrophila bacteria. The higher the concentration of turmeric extract and curcuma extract given, has a tendency to increase the area of growth inhibition of Aeromas hydrophilia bacteria.

According to Rosidi et al. (2013), some of the main groups of chemical compounds that are anti-microbial in the curcuma rhizome are phenols and phenolic compounds, alcohols, heavy metals and their compounds, dyes and detergents, ammonium khemosterilan compounds. Curcumin is a phenolytic compound, so its action as an anti-microbial will be similar to that of other phenol compounds.

Sari et al. (2012) states that curcumin has anti-bacterial properties that can stimulate the wall of the gallbladder so that it can facilitate the metabolism of anti-inflammatory fat, antioxidants, antibacterial, and can also be used to enhance the body's immunity.

Color and behavior

After the injection of Aeromonas hydrophylla bacteria in tilapia the body color becomes dull and dark, abnormal movements and swimming sideways, and does not respond to the feed given. But after immersion and cultivation for seven days, in treatment A tilapia fish body color becomes bright and shiny, normal and stable movement, the feed given is eaten immediately. In treatment B the body color becomes dark, movement is unstable and tends to be silent and lack of appetite. Treatment C, body color starts to brighten and wounds begin to heal, movements begin to stabilize and remain silent at the base and the feed given is consumed. Treatment D, body color darkens and the wound begins to bleed, unstable movements, little response to feed and some do not respond to feed.

In treatments A and C where the treatment given was immersion of fish using kurkuma powder, it was found that the body color of the fish began to light from the fourth to the seventh day while in the control treatment the dark color was obtained.

The dark color caused by treatments B and D (control) is due to the attack of Aeromonas hydrophylla bacteria on the body of tilapia seed. According to Nurjannah et al. (2013), fish infected with A. hydrophila will show morphological changes such as wounds and changes in fish body color. The existence of these infections results in changes in the condition of fish which is a form of self defense. The change in body color in fish is thought to be related to the effects of the toxin derived from the Aeromonas hydrophila bacteria.

In treatment A and C at the end of the observation, the movement of the fish began to look normal and stable, where at first the tilapia was sometimes seen standing still in the waters. Whereas in treatments B and D, the movement of the fish is unstable where fish swim sideways and often crash into aquarium glass, this shows that the attack of A. hydrophila bacteria continues.

According to Aminah et al. (2014), fish that are attacked by disease will cause unstable movements, goldfish after bacterial infection A. hydrophila looks stressed, swim swarming around aeration and fish swim with their body position tilted because of reduced body balance. Simatupang and Anggraini (2013) added that fish that have been attacked will show symptoms of silence, unstable movements and swimming horizontally above the water surface.

The observation of appetite or response of fish to the given feed shows that in treatment A and C the feed given is still consumed by tilapia while in treatment B and D the fish feed given is less responded to or even left unchecked. This shows that the attack of A. hydrophila bacteria on the body of tilapia causes decreased appetite of fish.

Aminah et al. (2014), stated that the decrease in feed response was due to metabolic disorders in the body, the response to stimulation of fish appetite decreased due to infection with A. hydrophila causing internal organ abnormalities in the form of swelling or inflammation of the liver, kidneys and bile after the injection of Aeromonas hydrophilla bacteria. According to Wahjuningrum et al. (2008), fish that are attacked by the bacterium A. hydrophila do not have a good appetite due to stress.

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