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Pemanfaatan Bahan Lokal Biji Pala (*Myristica* sp.) Sebagai Bahan Anestesi Pada Kegiatan Budidaya Ikan Hias Blue Devil (*Chrysiptera cyanea*)

Utilization of Local Material Nutmeg (*Myristica* sp.) As Anesthesia Material in the Transportation of Blue Devil Ornamental Fish (*Chrysiptera cyanea*)

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ABSTRAK

Ikan Blue Devil (*Chrysiptera cyanea*) merupakan salah satu komoditi ikan hias air laut yang sangat populer sehingga sering dicari diperdagangan internasional karena morfologinya yang menarik. Proses perdagangan komoditi ikan hias sangat berbeda dengan komoditi ikan konsumsi karena perdagangannya dalam keadaan hidup. Penanganan dan transportasi memegang peranan yang sangat penting pada sistem ini. Namun, kendala yang sering dihadapi adalah kematian sebelum ikan sampai di tempat tujuan. Selama ini, proses perdagangan ikan hias menggunakan bahan anestesi, bahan-bahan anestesi tersebut adalah MS-222, benzocaine, 2-phenoxyethanol dan quinaldine sulphate. Aplikasi bahan ini tidak direkomendasikan untuk digunakan karena memiliki dampak negatif bagi ikan yang dapat menurunkan imunitas ikan. Aplikasi bahan anestesi alami menjadi alternatif yang dapat digunakan karena lebih rama lingkungan. Tanaman pala **(*Myristica* sp.)** merupakan salah satu bahan alami lokal yang dapat digunakan sebagai bahan anastesi. Tanaman pala **(*Myristica* sp.)** mengandung minyak atsiri yang bermanfaat sebagai zat sadaptif. penelitian ini bertujuan untuk mengetahui potensi biji tanaman Pala (*Myristica* sp.) lokal sebagai bahan anastesi ikan Blue Devil (*Chrysiptera cyanea*) dengan pengujian lethal konsentrasi/LC-50. Pengujian LC-50 pada penelitian ini sebagai tahapan awal menentukan dosis anastesi yang tepat bagi ikan Blue Devil (*Chrysiptera cyanea*)**.** Pembuatan ekstrak dari biji Pala (*Myristica* sp.) bertujuan untuk memperoleh minyak atsiri. Prosedur dalam mendapatkan minyak atsiri biji pala (*Myristica* sp.) dilakukan dengan cara destilasi uap air. Hasil penelitian menunjukan bahwa biji tanaman Pala (*Myristica* sp.) sangat berpengaruh bagi ikan Blue Devil (*Chrysiptera cyanea)* dengan dosis yang sangat berpengaruh adalah 10ml, namun tidak dianjurkan digunakan. Untuk pengembangan sebagai bahan anastesi, maka gunakan dosis <2 ml.

Kata Kunci: Ikan Blue Devil; *Myristica* sp.; Anestesi; LC-50

ABSTRACT

Blue Devil (*Chrysiptera cyanea*) is one of the very popular seawater ornamental fish commodities that is often sought after in international trade because of its attractive morphology. The trading ornamental fish commodities are very different from the consumption fish commodity because the trade is alive. Handling and transportation play a critical role in this system. However, the problem of delivering these goods is high mortality happened before the fish arrive at their destination. In this study, the delivery of ornamental fish using anesthetic ingredients. The anesthetic ingredients are MS-222, benzocaine, 2-phenoxyethanol, and quinaldine sulfate. The application of this material is

not recommended because it will harm fish that can reduce fish immunity. The application of natural anesthetic ingredients can be used as an alternative environment. Nutmeg (*Myristica* sp.) is one of the local natural ingredients that have anesthetic potential. Nutmeg (*Myristica* sp.) contains essential oils that are useful as adaptive substances. This study aims to determine the potential of local Nutmeg (*Myristica* sp.) Seeds as an anesthetic material for Blue Devil (*Chrysiptera cyanea*) by lethal concentration / LC-50 testing. LC-50 testing in this study is an initial step to determine the appropriate anesthetic dose for Blue Devil (*Chrysiptera cyanea*). Making extracts from nutmeg seeds (*Myristica* sp.) Aims to obtain essential oils. The procedure for obtaining nutmeg (*Myristica* sp.) Essential oils are carried out by steam distillation. The results showed that the seeds of the Nutmeg plant (*Myristica* sp.) Were very influential for Blue Devil (*Chrysiptera cyanea*) with a very significant dose of 10ml, but not recommended for use. For development as an anesthetic material, then use a dose <2 ml.

Keywords: The Blue Devil; Nutmeg; Anesthesia; LC-50

INTRODUCTION

The Blue Devil (*Chrysiptera cyanea*) is a trendy seawater ornamental fish commodity. This fish is one of the top ten species of seawater ornamental fish most sought after international trade. The interesting morphology is a reason for ornamental fish lovers or hobbyists to hunt them down. Besides, Blue Devil (*Chrysiptera cyanea*) is also easily maintained (Jung *et al.*, 2010; Bapary *et al.*, 2011). The cultivation of ornamental fish is different from the fish cultivation for consumption. That difference is, the trade is alive. Handling and transportation play a crucial role in this system. However, the obstacle that is often faced is death before the fish arrive at their destination. The cause of death is due to stress and physical damage due to mishandling (de Oliviera *et al.*, 2019).

Anesthesia in transporting fish is a viable alternative. The anesthetics used in aquaculture activities are MS-222, benzocaine, 2-phenoxyethanol, and quinaldine sulfate (Ortuno *et al.* 2002). However, this material is not recommended for use because it harms fish that can reduce fish immunity. Natural anesthesia is an alternative that can be used because it is more environmentally friendly (Bressler and Ron, 2004).

Nutmeg (*Myristica* sp.) It is a local ingredient that can be used as an anesthetic ingredient. Nutmeg (*Myristica* sp.) It contains essential oils that are useful as adaptive substances. Nutmeg (*Myristica* sp.) Has been used as an anesthetic agent in Belida fish (*Notopterus chitala*) and Nilem fish (*Osteochillus hasselti*) (Rahayu and Supriatna, 2012; Dayatino *et al.*, 2014).

Each species of test fish has different responses to the test parameters. It is due to different physiological responses (Vanlandeghem *et al.* 2010; Singh *et al.*, 2013). In this regard, this study aims to determine the potential of seeds of the local Nutmeg (*Myristica* sp.) As an anesthetic ingredient for Blue Devil (*Chrysiptera cyanea*) with lethal concentration / LC-50 testing. LC-50 testing in this study is an initial step to determine the appropriate anesthetic dose for Blue Devil (*Chrysiptera cyanea*).

MATERIALS AND METHODS

Test Fish

In this study, test fish were healthy Blue Devil (*Chrysiptera cyanea*) fish, which were 5 cm in size, totaling 120 individuals. Blue Devil (*Chrysiptera cyanea*) is acclimatized for 1 week first in a container with a 5-liter water capacity before the treatment is given. During acclimatization, Blue Devil (*Chrysiptera cyanea*) are fed twice a day. This procedure follows the

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method developed by Islami et al (2017).

Experimental Design

The study used a completely randomized design with 4 treatments and 3 replications for each treatment. The treatments given were 4 ml (A) nutmeg (*Myristica* sp.) Extracts; 6 ml (B); 8 ml (C); and 10 ml (D).

Nutmeg Seed Extract Preparation

Making extracts from nutmeg seeds (*Myristica* sp.) Aims to obtain essential oils. The procedure for obtaining nutmeg (*Myristica* sp.) Essential oils are carried out by steam distillation. This process follows the method proposed by Ikhsanudin and Azizah, (2017).

LC-50 Testing

LC-50 testing in this study is a study that aims to determine the upper and lower threshold concentration of local Nutmeg (*Myristica* sp.) Seed extracts. This test looks at the speed of influence of test material in killing 50% of the test animal population. This procedure follows the method developed by Islami et al (2017).

Water Quality Observation

Water quality is one of the main factors for the success of Blue Devil (*Chrysiptera cyanea*) aquaculture. The parameters observed in this study, namely, temperature, salinity, pH, and dissolved oxygen (DO).

Data Analysis

Data analysis used analysis of variance (ANOVA). Meanwhile, to see the difference in influence between treatments, an LSP further test was conducted.

RESULTS AND DISCUSSION

Lethal concentration (LC-50) test results of Nutmeg (*Myristica* sp.) Seed extract on Blue Devil (*Chrysiptera cyanea*) can be seen in Figure 1.

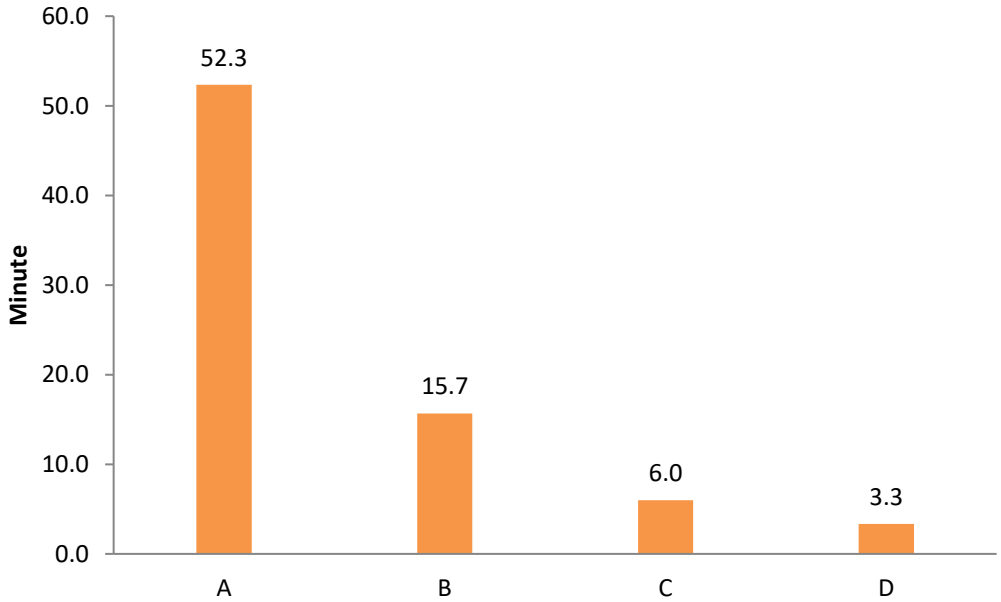

Figure 1. Histogram testing for LC-50 Nutmeg (*Myristica* sp.) Seed extract on Blue Devil (*Chrysiptera cyanea*). Note: (A) 4 ml of nutmeg (*Myristica* sp.) Extracts; (B) 6 ml; (C) 8 ml; and (D) 10 ml.

The results of the study, as shown in Figure 1, show that the higher the concentration of Nutmeg (*Myristica* sp.) Seed extract, the faster the death rate of Blue Devil (*Chrysiptera cyanea*). The fastest average mortality rate is treatment D, which is 3 minutes 3 seconds. Then, treatment C is 6 minutes; treatment B, 15 minutes 7 seconds; and treatment A, 52 minutes 3 seconds.

Results of analysis of variance (Table 1) showed that Nutmeg (*Myristica* sp.) Seed extracts had a very significant effect (Fcount> Ftable) on the speed of the death of Blue Devil (*Chrysiptera cyanea*). LSP further tests showed that treatment A was significantly different from treatment B, C, and D, which had the same effect.

Nutmeg seed extract (*Myristica* sp.) can affect Blue Devil (*Chrysiptera cyanea*) because it contains essential oils (Rangkuti *et al.*, 2019). In Nutmeg seeds (*Myristica* sp.), The essential oil content is 1.85% (Ikhsanudin and Azizah, 2017). The essential oils of Nutmeg (*Myristica* sp.) are β-pinene, α-pinene, myristicin, α-thujene, camphene, sabinene, myrcene, α-phellandrene, trans-β-ocimene, α-terpinene, benzene, limonene, linalool, and 2-methoxy-4- (1-propenyl) (Sari *et al.* 2018).

Essential oils have various functions, one of which is as an anesthetic that has been applied to several species of fish, namely tilapia (*Oreochromis niloticus*), freshwater Angelfish (*Pterophyllum scalare*), Milkfish (*Chanos chanos*), Zebra (*Dascyllus melanurus*), and Grouper (*Epinephelus fuscoguttatusus)* (Supriyono *et al.*, 2010; Khalil *et al.*, 2013; Rahim, 2017; de Oliveira *et al.*, 2019).

In this study, nutmeg seed extract also resulted in changes in the behavior and morphology of Blue Devil (*Chrysiptera cyanea*). Exposure to Nutmeg (*Myristica* sp.) Seed extract caused the Blue Devil (*Chrysiptera cyanea*) to experience stress accompanied by a change in color from bright blue to dark blue. It is an initial response to changes in environmental conditions. This color pattern change ends with a dark blue to black change. The higher the dose, the faster the color change response.

The entry of chemicals in the environment can disturb the response of fish. Reactions in question include respiratory activity changes, swimming activities and movements, fish body color, and higher chemical exposure resulting in death (Arfiati *et al.*, 2018). In a study conducted by Dayatino *et al.* (2014), the administration of essential oils as an anesthetic material greatly influences fish behavior changes. This change is a physiological response to the anesthetic material. Besides, the higher the dose given, the lower the survival of the test fish.

Water quality also dramatically influences the survival of Blue Devil (*Chrysiptera cyanea*). Water quality parameters also determine the growth and success of Blue Devil (*Chrysiptera cyanea*) cultivation. The results of observing water quality parameters can be seen in Table 2.

Table 1. Analysis of variance

Source of Variation	SS	Df	MS	F	P-value	F crit
Between Groups	4608,67	3	1536,22	15,29	0,00	4,07
Within Groups	804,00	8	100,50			
Total	5412,67	11				

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Table 2. Observation results of water quality parameters

Parameter	Observation Result
Temperature (°C)	27,5
Salinity (ppt)	33
pH	7,65
Dissolved Okxygen (mg/l)	4,02

Water temperature is one of the most critical factors in regulating life processes and the spread of organisms in water (Burt *et al.* 2011). Observations show that the temperature range is around 27.5 °C. The optimal range for the maintenance of Blue Devil (*Chrysiptera cyanea*) is 25-28 (Bapary *et al.*, 2011).

Salinity is closely related to aquatic biota's osmotic pressure adjustment (Varsamos *et al.* 2005). The observations showed that the salinity range was 33 ppt. A good salinity range for Blue Devil (*Chrysiptera cyanea*) is 33 ppt (Sahetapy *et al.*, 2016).

The degree of acidity or pH is an important chemical parameter in monitoring water stability (Kale, 2016). The observations showed a pH range of 7.65. The optimal pH range for rearing Blue Devil (*Chrysiptera cyanea*) is 8.1 - 8.4 (Bapary *et al.*, 2011).

Oxygen determines the life of organisms in such waters, especially in the biological function of growth (Pörtner, 2009). The observations showed that the DO range was around 4.02 mg / l. The optimal range of dissolved oxygen (DO) for rearing Blue Devil (*Chrysiptera cyanea*) is> 4 mg / l (Sahetapy *et al.*, 2016).

CONCLUSION

Based on research that has been done, it can be concluded that the seeds of the Nutmeg plant (*Myristica* sp.) Are very influential for Blue Devil (*Chrysiptera cyanea*) with a very significant dose of 10ml, but it is not recommended for use. For development as an anesthetic material, then use a dose <2 ml. Granting of Nutmeg (*Myristica* sp.) Seeds cause changes in behavior and morphological changes in Blue Devil (*Chrysiptera cyanea*).

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