Application of Coloring Pigments for Anemone Clown (Heterctis magnifica) and its Effect on Survival Rate and Color Resistance

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Abstract

Anemone clown is an animal that has a low selling value compared to other types of anemones. Coloring aims to increase economic value for clown anemones. This study aims to determine the effect of different color pigments on anemone clown (Heteractismagnifica) with various colors for survival and color resistance. In addition, it aims to compare the success of dyes in food coloring and natural color resistance. The research parameters observed included the level of survival, behavior, observation of color fading and measurement of water quality. Data analysis used was analysis of variance in the response of anemones to feed. The results of this study showed that the administration of different pigments in the clown anemone did not experience differences in survival and color resistance. The color resistance that gets the best results is the coloration of food.

Keywords: anemone clown, color, survival rate, color resistance

1. Introduction

Anemone clown is an ornamental fish biota that has a lower selling value compared to other types of sea anemones. Prices offered for clown anemones range from 15,000-20,000 rupiah per individual, whereas when compared to other types of anemones such as red butt anemones, sand anemones and yellow butt anemones reach prices above 50,000 rupiah (Sekotong Marine Aquaculture Center, 2016). The low selling price of anemone clown occurs because the appearance of color in the anemone is only uniform so that it is less desirable to be used as a complement to the decoration of the saltwater aquarium. Therefore, there is a need for new innovations in increasing the selling value of clown anemones by coloring the anemone which aims to produce different colors.

The coloring method is done by soaking the clown anemone on water media that has been given the dye. The success of the color given to anemones is not known so that the
coloring results do not have a standard of success. Soaking is absorbed by the anemone because part of the body is water. The immersion process does not need to take a long time so it is easy to do. The obstacle faced in carrying out this activity is the success of the methods carried out to maintain the given color so that it is necessary to use special materials so that the color lasts long.

The ingredients used in color delivery are natural coloring from the results of decoction of mangrove skin and food coloring. The use of mangrove skin as a coloring agent is because of its abundant availability so that it is easy to obtain. Pigments in food dyes have better stickiness than natural dyes, so it is likely that food coloring can display more attractive colors. The coloring of the clown anemone needs to be done aiming to see the success of the method carried out while knowing the effect of coloring on the survival of the biota. Therefore, this research needs to be done to determine the success that will be achieved

The purpose of this study was to determine the effect of anemone clown coloring method (Heteractismagnifica) with synthetic and natural dyes on survival and color resistance, and compare the success of dyes in synthetic and natural dyes in color resistance. The benefit of this research is that it can be a new innovation in manipulating the color and survival of anemone clown (Heteractismagnifica) in cultivation activities and information for cultivators of anemone clown (Heteractismagnifica) as well as reference for researchers interested in similar research.

2. Materials and Method

Time and Place of Research

The study was conducted in November 2017 until March 2018. Located at the Lombok Aquaculture Center (BPBL), GiliGenting Hamlet, Tawun Village, Sekotong District, West Lombok Regency, West Nusa Tenggara Province.

Research Plan

The study used a completely randomized design (CRD) method in a controlled container consisting of 4 treatments using clown anemones that were healthy and not deformed. Such treatments include P0 (treatment without color use (control)), P1 (treatment
with the use of natural ingredients), P2 (treatment with the use of synthetic and natural ingredients comparison between 50: 50), P3 (treatment with the use of food ingredients).

The implementation of the research included preparation of maintenance containers, preparation of test animals, preparation of dyes, bleaching of anemones, anemone coloring techniques, feeding, and measurement of water quality. The research parameters observed included survival, behavior, color fading observation and water quality measurements.

**Data analysis**

Data collection is carried out two weeks during the maintenance period. Data was taken using two methods of retrieval, namely descriptive data and analysis of variance (Analysis of Variance (ANOVA) at a real level of 5%. If the ANOVA data between treatments shows a significant (significant) effect, then the data analysis is tested further with a real / honest HSD test with a real level of 5%.

**3. Results**

**Survival Rate**

The survival rates for each color treatment during maintenance for 2 weeks showed different results (Figure 1).

![Figure 1. Survival rate of clown anemones given color treatment.](image-url)

Information:
- P0 (control treatment), P1 (coloring treatment with natural ingredients), P2 (coloring treatment with a mixture of natural and synthetic ingredients 50: 50), P3 (coloring treatment with synthetic ingredients in the form of food coloring).
Long Clown Anemone Tentacles

Changes in tentacle length occur every day during the maintenance period of two weeks (Figure 2).

Information:
- P0 (control treatment), P1 (coloring treatment with natural ingredients), P2 (coloring treatment with a mixture of natural and synthetic ingredients 50:50), P3 (coloring treatment with synthetic ingredients in the form of food coloring).

Figure 2. Changes in the length of the tentacles given color treatment

Mesental Filament Conditions

Table 1. Mesental filament conditions in clown anemones which are given color treatment during maintenance.

<table>
<thead>
<tr>
<th>Day to-</th>
<th>Treatment</th>
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<tbody>
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<td>PO</td>
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<td>+</td>
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<td>14</td>
<td>+</td>
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</tbody>
</table>

Information:
- P0 (control treatment), P1 (coloring treatment with natural ingredients), P2 (coloring treatment with a mixture of natural and synthetic ingredients 50: 50), P3 (coloring treatment with synthetic ingredients in the form of food coloring).
- (-) shows abnormal conditions and (+) indicates normal conditions.

Figure 3. Central filament conditions: (A) normal conditions, (B) abnormal conditions.

**Anemone's Response Time Clown against Feed**

The duration of response to the given feed showed appetite for anemones. (Figure

**Color fading**

The results of color fading on anemonclown using different color materials can be seen in Figure 13. The color resistance given in treatment 3 tended to be longer when compared to treatments 1 and 2. However different in treatment 1 with color resistance tended to be faster than treatment others. howing of 4 treatments had significant results.
- P0 (control treatment), P1 (coloring treatment with natural ingredients), P2 (coloring treatment with a mixture of natural and synthetic ingredients 50: 50), P3 (coloring treatment with synthetic ingredients in the form of food coloring).
- The letters indicate the notation of each treatment.

Figure 4. The time needed by anemone clown in response to feed.

- P0 (control treatment), P1 (coloring treatment with natural ingredients), P2 (coloring treatment with a mixture of natural and synthetic ingredients 50: 50), P3 (coloring treatment with synthetic ingredients in the form of food coloring).

Figure 5. Color fading in each treatment given color.
Measurement of Water Quality

Table 2. Results of measurement of water quality during maintenance

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Container bleaching</th>
<th>Container</th>
<th>Literature</th>
</tr>
</thead>
<tbody>
<tr>
<td>pH</td>
<td>7-8,1</td>
<td>7,8-8,9</td>
<td>7,2-8,3 (Stella et al., 2011)</td>
</tr>
<tr>
<td>DO (mg/l)</td>
<td>5,2-6</td>
<td>5,6-6,2</td>
<td>4,3-7 (Stella et al., 2011)</td>
</tr>
<tr>
<td>temperature (°C)</td>
<td>27-28</td>
<td>27,1-28,5</td>
<td>26-28 (Suciadi, 2008)</td>
</tr>
<tr>
<td>salinity (ppt)</td>
<td>31-33</td>
<td>30-35</td>
<td>31-33 (Stella et al., 2011)</td>
</tr>
</tbody>
</table>

4. Discussion

Survival Rate

Giving color with the immersion method in clown anemones is done for 1 week. Anemones that have been given color are maintained for 2 weeks in a controlled container. The survival rate in this study showed different results. Anemone in the control treatment did not experience death because the maintenance media provided was the same as its natural habitat.

The survival rate in treatment 3 with the use of food coloring has brighter color results and higher adhesion. Food coloring used contains fructose and carmoisin C.I.14720 which is safe to use for food because it is widely traded on the market as a commercial coloring agent. The dye given in treatment 3 as much as 30 ml is still within safe limits to be given to living creatures, this is in accordance with the statement of Karunia (2013) which states that the safe limit for the use of dyes ranges from 50 - 300 ml.

The survival rate of anemone clown in treatment 1 with the administration of color from the results of mangrove skin decoction has more faded color results and lower adhesion. The results of decoction of mangrove skin contain flavonoids, tannins and saponins. This statement is supported by Liya et al. (2006) that mangrove fruit, leaves and stems contain chemical compounds in the form of flavonoids, tannins and saponins which can be used as anti-oxidants and anti-bacteria. But of the three compounds, the saponin
content is a poison that is capable of killing fish. This is reinforced by the statement of Prihatman (2011) which states that saponin is a poison that can destroy blood grains for cold-blooded animals if the amount is very large. The concentration obtained from 30 ml of the given dye is 2.6 g / l. Concentration can be one of the causes of death that occurs in anemones. Anemones are invertebrate animals that are resistant to environmental conditions that change drastically even though they will inhibit the processes that occur in the body.

**Long Clown Anemone Tentacles**

Changes in the length of the tentacles determine the ability of anemones to fill the space of the tentacle cavity which serves as a tool that helps movement of food to easily approach the mouth. Clown anemones are said to be normal if the size of the tentacles can expand and function normally according to their habitat. The length of the tentacles that have a long stagnant size during maintenance are control and 1. The length of the tentacles that have measurement results changes every day, namely treatments 2 and 3. However, all measurements made show abnormal results because the size of the anemone's tentacle is shorter than its size. Clown anemone body size used in this study ranged from 8 ± 0.5 cm. This is in accordance with Shimek's (2006) statement that normal tentacle conditions have the same length as their body size.

The cause of shrinking body size and part of anemone tentacles from all treatments is because the pH obtained when measuring water quality in a maintenance container exceeds the optimal range. According to the statement of Stella et al. (2011) which states that if the pH range is below or above from 7.2 to 8.3 the anemone will appear to shrink.

**Mesentral Filament Condition**

Mesentral filament is part of the inner mouth of anemone. The results showed that the central filament conditions at the beginning of coloring were abnormal in treatments 1, 2 and 3. The condition of the central filament in treatments 1 and 2 returned to normal after 3 days of maintenance, while in treatment 3 returned to normal after 2 days of maintenance. Abnormal conditions that occur indicate that anemones are in the process of being adapted after being given different treatments according to the statement Ulfa (2009) which states
that anemones will adapt to reduce or eliminate stress. If the adaptation is successful, this biota will return homeostatic. But if it doesn't work then this biota will experience stress again with the possibility of increasing stress. It appears that the mouth of the anemone's body appears outward and widens.

**Anemone's Response Time Clown against Feed**

Treatment 1 and 2 have a food response tend to be faster than treatment 3. However, the control treatment had the fastest response to feed compared to other treatments. The longer the response to feed shows the stress levels experienced in anemones vary. Loss of anemone appetite can affect the response that takes place in the body due to stress. According to Stumbler's statement (2010), stress can affect the rate of growth, reproduction and survival of holosimbion. Anemones that experience stress will experience changes in metabolism, behavioral responses to the environment and reproductive biology due to external or internal factors that limit the activity of anemones.

**Color fading**

Giving color to the clown anemone at each treatment experienced fading for 2 weeks of maintenance. Color changes are expressed as percentages according to the color category that determines the color change. According to Pringganies (2010), which states that the pigments produced from mangrove skin dyes wear off faster than other synthetic dyes.

The treatment of 3 by giving colors with synthetic materials shows the resilience of colors that tend to be better than other treatments. It is suspected that synthetic dyes are more durable than natural dyes in accordance with the statement Cahyadi (2008) which states that generally synthetic dyes are more resistant old, more concentrated and more stable than natural dyes.

**Water quality**

Water quality is one of the main factors in determining the health of fish. The results showed that the water quality measured in bleaching activities was not optimal. The pH measurements obtained range from 7-8.1. Anemone's body size looks smaller according to the statement of Stella et al. (2011) which states that if the pH range is lower or above from
7.2-8.3, the anemone will appear to shrink. Whereas in the maintenance process the results of measurements of water quality indicate that the range obtained ranges from 7.8-8.9 which exceeds the optimal range of good water conditions for anemones. Stella et al. (2011) stated that a good pH content in waters ranged from 7.2 to 8.3 which can affect the metabolism and growth of anemones. If it is too high it will inhibit the growth system and cause death.

The measurement of DO when the bleaching activity is included in the optimal range is 5.2-6 mg / l. Whereas DO measurements on maintenance activities get results ranging from 5.6-6.2 mg / l which indicates that dissolved oxygen in the maintenance container is optimal. This is in accordance with the statement of Stella et al. (2011) which states that dissolved oxygen requirements for anemones range from 4-7 mg / l and if less it will affect the metabolic process in the biota.

Temperature measurements in bleaching containers showed normal results in the range of 27-28ºC. Whereas measurements in maintenance containers range from 27.1-28.5ºC. This shows that the range obtained exceeds the optimal range in maintaining anemones. According to the statement Birkeland (1997) in Suciadi (2008) states that the growth and metabolism of anemones is very good at a temperature range of 26-28ºC. Temperature can affect oxygen demand and if the temperature is too low or too high the biota's oxygen needs reach 2 times. In addition, according to Birkeland (1997) in Suciadi (2008) states that drastic changes in temperature will lead to a decrease in appetite, a reduction in the quality of reproduction, a lot of mucus and photosynthesis and respiration in zooxanthella decreases.

Salinity measurement results in bleaching containers ranging from 31 to 33 ppt, this indicates that the range is optimal. While the results of measurements of salinity obtained in the maintenance container show results outside the optimal range which are around 30-35 ppt. According to Stella et al. (2011) that living conditions are good for sea anemones with levels ranging from 31-33 ppt. Outside of this range it will affect the decrease in the quality of growth and reproduction, causing stress.
5. Conclusion

Giving different color pigments to clown anemones with various dyes does not give different results for color survival and resilience. In addition, the color resistance that gets better results is in treatment 3 with food coloring.

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