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UTILIZATION OF EARL FLOWER EXTRACT (*Clitoria Ternatea Linn*) IN FISH FOOD TO INCREASE THE BRIGHTNESS OF KOI KOHAKU FISH (*Cyprinus carpio*)

Pemanfaatan Ekstrak Bungga Telang (*Clitoria ternatea Linn*) Dalam Pakan Ikan Untuk Meningkatkan Kecerahan Ikan Koi Kohaku (*Cyprinus carpio*)

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ABSTRACT

One of the biodiversity that Indonesia has and should be proud of is the diversity of freshwater ornamental fish species, one of which is koi kohaku fish (Cyprinus carpio). The purpose of this study was to determine the effect of color in telang flower extract to improve the color quality of koi kohaku fish and to determine the best dose of telang flower extract in improving the color of koi fish. This study used 4 different treatments, namely A (10%) bayang flower extract, B (15%) bayang flower extract, C (20%) bayang flower extract, and D (control). The parameters observed were the brightness of fish color, final weight, length growth, SR, and water quality, which will be analyzed using ANOVA. Measuring fish color using a modified toca color finder (M-TCF) tool where this tool has a color column column marked with a score value from 1 - 60. The results of this study indicate that the addition of telang flower extract to commercial feed affects the color quality of koi kohaku fish. The quality of color severity in Kohaku koi fish is highest in treatment C (20%) with a score value of 35 on fish color, for treatment D (control), B (15%), and A (10) each has a score value of 32, 34, 33 on fish color. Mixing bayang flower extract into commercial feed can improve the color of koi kohaku fish, the best color improvement was found in the treatment of adding 20% bayang flower extract.

Key words: Color brightness level, Telang flower extract, Koi Kohaku fish, Water quality.

ABSTRAK

Salah satu keanekaragaman hayati yang dimiliki Indonesia dan patut dibanggakan adalah keragaman spesies ikan hias air tawar salah satunya ialah ikan koi kohaku (Cyprinus carpio). Tujuannya penelitian ini adalah mengetahui pengaruh warna dalam ektrak bunga telang untuk peningkatkan kualitas warna ikan koi kohaku dan untuk mengetahui dosis ektrak bunga telang yang terbaik dalam meningkatkan warna ikan koi. Penelitian ini menggunakan 4 perlakuan yang berbeda yaitu A (10%) pemberian ektrak bunga telang, B (15%) pemberian ektrak bunga

telang, C (20%) pemberian ektrak bunga telang, dan D (control). Parameter yang diamati adalah tingkat kecerahan warna ikan, berat akhir, pertumbuhan panjang, SR, dan Kualitas air, yang akan di data analisa menggunakan ANOVA. Mengukur warna ikan menggunakan alat modified toca color finder (M-TCF) dimana alat ini memilik kolom kolom warna yang ditandai dengan nilai skor dari 1 – 60. Hasil penelitian ini menunjukan bahwa penambahan pemberian ektrak bunga telang ke pakan komersial berpengaruh terhadap kualitas warna ikan koi kohaku. Kualitas kecarahan warna pada ikan koi Kohaku yang tertinggi pada perlakuan C (20%) dengan nilai skor sebesar 35 pada warna ikan, untuk pada perlakuan D (control), B (15%), dan A (10) masing masing memiliki nilai skor sebesar 32, 34,33 pada warna ikan. Pencampuran pemberian ektrak bunga telang ke pakan komersial dapat meningkatkan warna pada ikan koi kohaku, peningkatan warna terbaik ditemukan pada perlakuan penambahan pemberian ektrak bunga telang 20%.

Kata Kunci: Tingkat kecerahan warna, Ektrak Bunga Telang, Ikan Koi Kohaku, Kualitas Air.

INTRODUCTION

The number of ornamental fish species in Indonesia reaches 300 million fish per year (lingga and susanto, (1989). Types of export ornamental fish include from the family anabantidae betta fish, batik sepat fish, pearl sepat, blue, there are also from the family bagridae, balitoridae, chandidae, chanda fish, rasbora fish, sumatra botia fish and other small fish that have attractive colors, this amount is a large amount for Indonesia as one of the ornamental fish exporting countries.

These koi fish that are kept as ornamental fish often also experience changes in the color of the pattern to be less bright. This is because the color pigments in the fish body begin to decrease. In order to maintain the color of these fish, feed containing color pigments and beta carotene / caratenoids is needed (Sholicin *et al*, 2012).

The anthocyanin element is derived from bay flowers which are taken from natural extracts. The material chosen for this research must be abundant and unused. The availability of telang flowers in Indonesia is quite abundant, especially in the city of Malang so it is not too difficult to get it, at an economical price, because Malang is one of the most abundant telang flower tourist attractions in Indonesia (Kristanto, 2008). The rest of the flowers are not used anymore and produce organic waste. It turns out that there are many sources of anthocyanins that can be utilized as natural dyes that are safer than synthetic dyes (Budiyanti *et al*., 2012).

Nursina et.al, (2018), stated that bungga telang (*Clitoria ternatea*), has an attractive color, the bluer the telang flower, the more the content of anthocyanin elements, which are used as natural coloring materials for koi kohaku fish. In the anthocyanin content of telang flowers, this has the potential to be used as a color brightening agent for koi kohaku fish. Crude extracts from telang flowers can be used as an alternative dye for staining animal blood cell preparations (suebkhampet and sotthibandhu, 2011). The purpose of this study was to determine the effect of color in telang flower extract to improve the color quality of koi kohaku fish and to determine the best dose of telang flower extract in improving the color of koi fish.

RESEARCH METHODS

This research was conducted at the Fisheries Laboratory of Muhammadiyah University of Malang in August - September 2023

Tools and Materials

The tools used in the study were blender, bucket, jar, bottle, filter, hose, sieve, sipon hose, aquarium, aeration stone, aeration hose, aerator, thermometer, litmus paper, DO meter, fish filter, test kit, M-TCF, ruler, digital scale, stationery, cellphone camera, and sponge. The materials used in this research are koi kohaku fish, commercial feed, water, bay flowers, and solvents.

Research Procedure

Experimental Unit

Aquarium experimental units with a size of 40 x 30 x 30 cm and totaling 12 units, in each aquarium will be filled with 10 koi kohaku fish in each aquarium unit. Aquariums used as test containers are washed first until clean to remove harmful substances and pests that can cause death in fish. After washing, the aquarium is dried in the sun for 2-3 days, then the aquarium is filled with clean water to a height of 24 cm. Next, aeration and filters are installed in the aquarium as oxygen supply and water filtering.

Test Fish

Test fish used were kohaku koi fish with a size of 9 cm - 15 cm, obtained from the agro koi farm.

Extraction process of bay flower

The stage of the process of crushing bayang flowers is blending bayang flowers until smooth, weighing the powder of bayang flowers that have been blended finely with a predetermined dose, then put it in a glass jar, weighing distilled water with a predetermined dose, then put it in a glass jar mixing, weighing, stirring all the ingredients in the glass jar until evenly distributed, allowed to stand for 28 hours at room temperature, then the glass jar that has been allowed to stand for 28 hours is taken and then separated and put into a filter, then the bayang flower extract is filtered so that the extract needed is collected under the filter that has been provided and collected, then separated the extract in a spray bottle that has been purchased. The blue, purple, or red color of telang flowers indicates that telang flowers have anthocyanin phytochemical content. According to (Azima *et al*., 2014) the anthocyanin content of telang flowers is 2.98 mg/gram. While the potassium content in telang flowers is 1.25 mg/gram of telang flowers (Neda *et al*., 2013).

Koi kohaku Fish Maintenance

Maintenance of koi kohaku fish as many as 10 fish / aquarium which will be the object of research, during the research process, fish feeding is carried out until the fish is full, the feed used is test feed and regular feed, given every 2 times a day, namely morning and evening. Performing water flushing to remove dirt and residual feed that settles at the bottom of the aquarium so that it does not become a poison that affects fish health.

Trial Design

The method used in this study is an expiremental method with a completely randomized design (CRD) with 4 treatments and 3 replications and there are 4 different doses of carrot flour mixing treatments, namely:

Treatment A, commercial feed (Control)
Treatment B, commercial feed supplemented with 10% telang flower extract (20 ml/200gram feed)
Treatment C, commercial feed supplemented with 15% telang flower extract (30 ml/200gram feed)
Treatment D, commercial feed supplemented with 20% telang flower extract (40 ml/200gram feed)
(Widianigrum, 2014) which has been modified with the addition of telang flower juice.

Observation Variables

Color Measurement

In the observation of fish color using the M-TCF tool, where observation of fish color is carried out by giving values starting from the smallest score of 1, 2, 3 to the largest score of 60 with color gradations from yellow, orange, and red. At the beginning of the study, color observations were made with each treatment and replicate aquarium. Where the fish in 1 aquarium will be taken all, then the fish one by one measured the color and adjusted to the M-TCF tool. When the color of the fish matches the score on the M-TCF tool, it will be written down for the data analyzed by the researcher, to find out the RGB and LAB values on the score on the M-TCF tool can be seen through the Photoshop application. According to Barus et al (2014) that, color measurement is carried out using a color measuring device, namely the Toca Color Finder (TCF). The method of observation is focused on two colors that are close to the color of the fish body (the higher the color assessment given, the brighter the color brightness of the fish).

RGB stands for Red, Green, and Blue which means red, green, and blue. These three colors are primary colors which, when combined, will give rise to new colors such as yellow, magenta, cyan, and black. L*a*b* Color Space or known as CIELAB is the most complete color space defined by the International Commission on color illumination (French Commision Internationale de l'eclairage, known as CIE). It is capable of describing all colors visible to the human eye and is often used as a color space reference.

Absolute Length Growth

Calculation of Absolute Length Growth can be calculated using the equation of Tarigan and Meiyasa (2019).

$$Pm = Pt - Po$$

Pm: Absolute length growth (cm)
Pt: Length of test biota at the end of the study
Po: Length of biota at the beginning of the study (cm)

Absolute Weight Growth

The calculation for absolute weight calculation uses the Weatherly, (1972) formula in Dewantoro, 2001 as follows:

$$W = Wt - Wo$$

W: Absolute weight gain
Wt: Weight of test biota at the end of the study
Wo: Weight of test biota at the beginning of the study

Survival Rate

Calculation of fish survival (SR) can be calculated using the Muchlisin formula *et al*, (2016).

SR=Nt/No X 100%

Nt: Final number of fish
No: Initial number of fish

Water Quality Parameters

In raising fish, water quality is very influential on the survival and color of koi kohaku fish so that water quality must be maintained so that fish do not experience stress. The water quality seen in this study is temperature, pH, ammonia, and DO.

Data Analysis

To determine the effect of carrot flour mixing on increasing the color of chef carp, the data analysis obtained was tested with Analysis of Variance (ANOVA) using Excel software. If there is a real effect, it will be continued with the Duncan Multiple Range Test (DMRT) test at a real level of 0.05.

RESULTS AND DISCUSSION

Color Quality of Fish

The results of the observation of the average rate of color increase in Kohaku koi fish, with the treatment of addition of telang flower extract are presented in Figure 1 and Table 2 below:

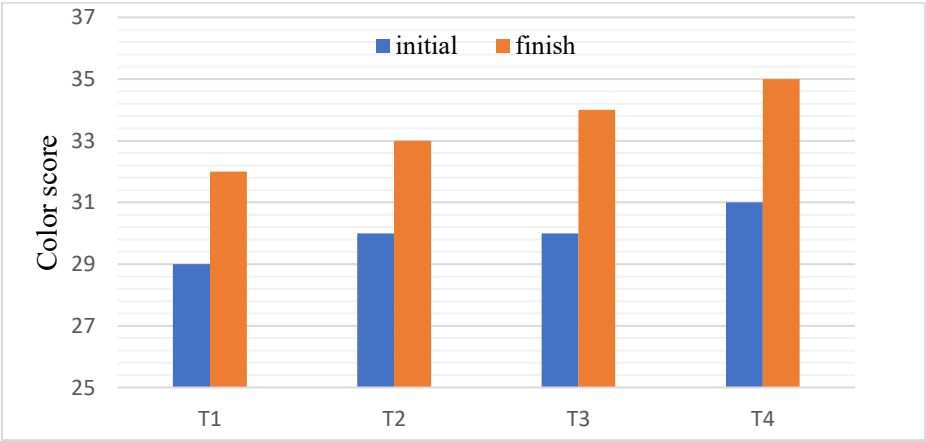

Figure 1: Improvement in Fish Color

Based on Figure 1, the 0% treatment (control) experienced an increase in fish color, where the value of 29 to 32 increased by 3 points in Figure 1, this is because the 0% treatment was not mixed with telang flower extract to increase the anthocyanin content in the feed. So that the need for pigment cells in the fish body is lacking, this makes the color increase in fish slow or sometimes decreases in fish color. In the treatment of the addition of 10%, 15%, and 20% telang flower extract, this has increased quite high, this is because the feed used 10% from the beginning of the study obtained 30 points and at the end of the research mass obtained

results with a value of 33 in the result of an increase of 3 points, for 15% content which from the beginning of the study obtained a point value of 30 and at the end of the study obtained results with a value of 34 increasing to 4 points and 20% content which obtained the initial research results of 31 points and at the end of the study obtained results with a value of 35 increasing to 4, already mixed with telang flower extract, where the content of telang flowers has anthocyanins which are quite high, this makes the needs of pigment cells in the fish body fulfilled, so that the colors on the fish body become bright. This is in accordance (Dalimartha, 2008). Anthocyanins are a subclass of water-soluble flavonoids responsible for the red, purple and blue colors in fruits, vegetables, cereals, flowers. This is also in accordance with research (Prasetyo *et al*., 2020) The increase in intensity and brightness of the Cupang fish color only occurs during treatment or when the addition of Astaxanthin still occurs, namely from H0 to H20. While after treatment at H20 to H30, the intensity and brightness of the body color tends to decrease again. So that anthocyanins can be natural food coloring, besides that, anthocyanins are also believed to be antioxidants (Purwaniati *et al*., 2020). the number of pigment cells in the fish body affects the color of the fish, if the distribution of pigment cells is evenly distributed, the color of the fish body will appear more intense. The process of gradual changes in fish color in each treatment can be seen in table 1:

Table 1. Fish Color Measurement

Treatment	Week				
	0	1	2	3	4
T1 (0%)	29	29	29	30	32
T2 (10%)	30	30	31	31	33
T3 (15%)	30	29	28	31	34
T4 (20%)	31	30	29	31	35

The results of color changes in koi kohaku fish for one month can be seen in Table 1, the level of color in fish from 0% treatment (control) tends to be stable in fish color changes, on day 7 and on day 29 the color increases by 3 points. In the 10% treatment there was no change in the color of the fish body, where the initial orange color was stable and still had an orange color and had a score of 30 - 33, in the 15% treatment there was a slight change in the color of the fish, where the color of the reddish orange fish became red orange and had a score of 30 - 34, in the 20% treatment there was a constant increase in color which had a score of 31 - 35. These results were obtained using the M-TCF tool which is made in stages based on the colors yellow, orange, and red, which are in Photoshop with modifications by entering numbers from 1 - 60, where numbers 1 - 17 are yellow, when at numbers 18 - 29 the color changes to a yellow to orangean color. At numbers 30 - 35 the color begins to change from orange to bright red, when the color at numbers 36 - 41 the color begins to change from bright red to intense red and at numbers 42 - 60 is a red color that is so intense or dark. To get the best color it is for yellow from numbers 1 - 17, for orange from numbers 18 - 29, for bright red 30 - 35, for colors 36 - 41 intense red and 42 - 60 dark red. This is in accordance with Indriyani *et al*. (2012), which states that the observation of fish color was previously given a value or weighting on

color paper starting from the smallest number with white to the highest number with intense color.

Based on the results discussed above, the color that has reached the best red color is in the 20% treatment where the treatment of Kohaku koi fish is in a bright red color, at the time of color sampling, the sampling process is carried out by 3-5 people, which will aim to match the color with the M-TCF tool that really matches the color on the fish body. This M-TCF tool is often used in research, to be an alternative to the colofider in taking the value contained in the color of the fish, which has a different color ratio value, which aims to be sensitive to see the similarity in matching the color of the fish with the color level in the M-TCF tool.

Fish Length Growth

The average length growth of koi kohaku fish during the research can be seen in Figure 2:

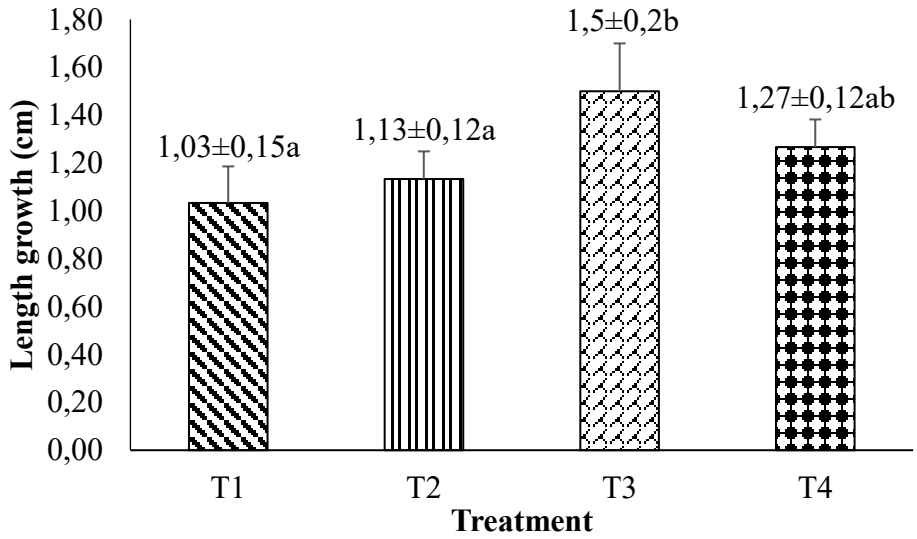

Figure 2: Length growth of fish

Based on Figure 2 shows that the growth rate in the treatment of a mixture of 10%, 15%, and 20% bayang flower extract It is higher than the treatment that does not use the addition of bayang flower extract, namely 0%, this is because the content in the bayang flower extract does not only focus on improving the color, but also contains sufficient nutrients for fish needs, besides that in this bayang flower extract also contains flavonoids so that it can affect the growth rate of koi fish length. This is in accordance with the growth of fish length where flavonoids can affect the length of the fish. This observation is known that the growth rate of manfish length has decreased, it is suspected that the higher the stocking density of fish, the longer the growth in fish decreases, so that fish are unable to optimize space and competition for food between fellow manfish has an impact on slow fish growth in the treatment of high stocking density Zubaidah *et al.,* (2020). This is in accordance with the statement (Ampritpal, 2011) the difference in absolute length in the four treatments is thought to be due to the chemical content of the extracts used which has a positive impact on the fish test. The content in the leaves of the test bars such as saponins, amino acids, flavonoids and polyphenols (Saroya & Ampritpal, 2011).

Fish Weight Growth

The average weight growth rate of kohaku koi fish during the research can be seen in Figure 3:

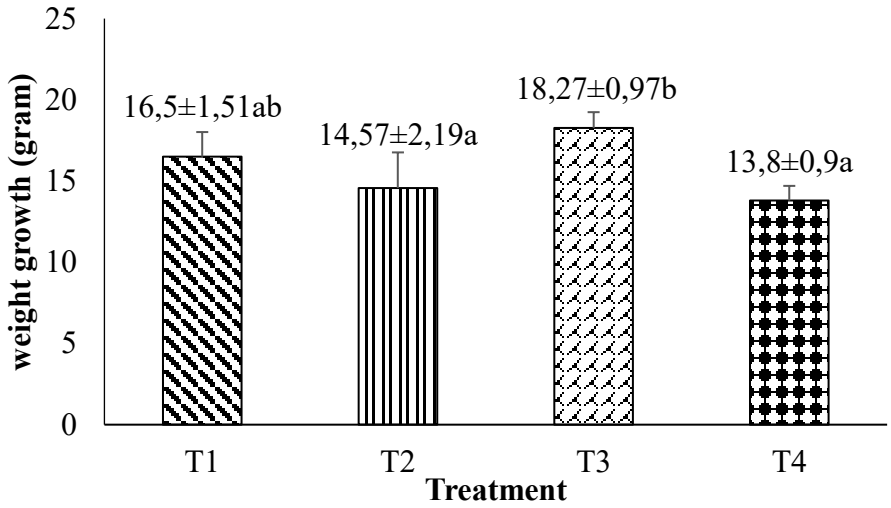

Figure 3: Fish Weight Growth

The results of this study can be seen in Figure 3, showing that the extract can increase the rate of weight growth in fish, it can be seen in the treatment of 10%, 15%, and 20% can accelerate compared to 0% (control), this is likely because in this treatment there is optimal feed utilization so that the body weight of Kohaku koi fish increases, feed that suits the needs of fish will be utilized properly for growth such as protein, carbonhydrate, fat, vitamins, and minerals. This is in accordance with the opinion of Indrati (2012), Protein and fat are food components that are needed to achieve optimum growth.

Survival Rate

The results of the survival rate of koi kohaku fish during the research can be seen in Figure 4:

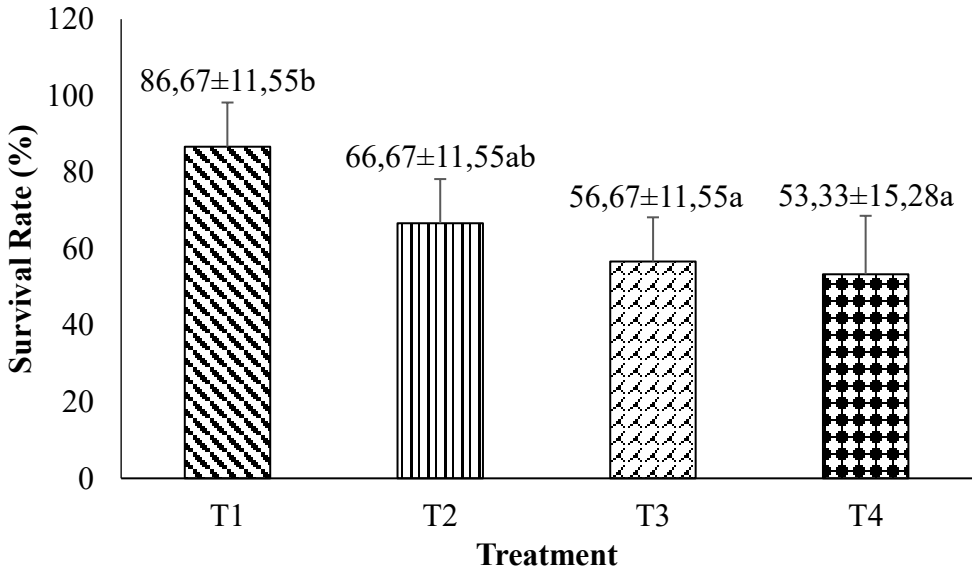

Figure 4: Fish Survival Rate

Based on the figure above, it is obtained that the survival rate of Kohaku koi fish obtained from the results of this study can be seen in Figure 4. shows that there are differences in survival values in each treatment, in the treatment that does not use extract additives (control) the lowest survival rate has a SR value of 53%, on average the survival rate given telang flower extract, 10% treatment has the highest value of 86%, 15% treatment has a value of 66% and 20% of 56%. In giving 20% extract, which is 56% because many fish die, the cause of death of fish - fish because some fish are affected by fungal diseases. the possibility of fish already affected by the disease before the start of the research or when it was still a purchase process, at the time before the research the fish was not carried out the quarantine process first, this is what caused during the research process the fish began to die one by one. This is in accordance with according to Feti, (2016) diseases can cause considerable losses in the fisheries business so that diseases must be considered so that mass deaths occur in fish, therefore the purpose and function of fish quarantine is to prevent the entry and exit or spread of pests and fish diseases from one area to another.

Water Quality Measurement

Water quality is one of the important roles for raising fish, because quality is very influential for fish growth and maintaining the immune system of fish, this is to avoid causing death in fish and also keep water conditions clean, the quality of water measured is pH, DO, Ammonia, and temperature. This is in accordance with Andriani (2018). This fish farming activity must pay attention to several parameters that affect the quality of water used for cultivation so that it will increase the quality of good fish production.

Table 2. Water quality

Parameters ***(Parameters)***	**Results** ***(Result)***	**Standard (SNI 7734)** ***(Standard)***
Temperature *(Temperature)*	26.2°C - 27.4°C	25.7°C - 27.7°C
pH	7,2 - 7,5	7,0 - 8,2
Dissolved Oxygen *(Dissolved Oxigen)*	5.7 mg/L	5.3-7.3 mg/L

Source: * SNI 7734 - 2017, (2017)
Sources: * SNI 7734 - 2017, (2017)

The results of water quality observations that on Ph The results of this study can be seen in table 2, showing that water in all treatments 0%, 10%, 15%, and 20%. has a pH of 7.2 - 7.5. and did not change during the research, meaning that the condition of the water in the aquarium was neutral not alkaline or acidic, this pH size of 7 is very suitable for keeping koi kohaku fish. This is in accordance with according to SNI 7734 (2017) this is in accordance with the opinion of Zhang *et al*,, (2006) which states that the decline in pH is caused by the remaining excretion of fish in the form of carbon dioxide which dissolves in water. So as to make the test fish experience stress and mold and interfere with fish growth until death. pH is very influential on the sustainability of aquatic life, especially in the digestive system. According to Pramleonita, *et al*., (2018) significant changes in pH can cause metabolic disruption, decreased growth, fish are susceptible to disease and stress. and for Temperature The results of this study can be seen in table 2 which shows that, the results of observations of temperature values range from 26.2

oC - 27.4 (o) C. The water temperature in the study can be categorized as feasible to support the growth and survival of koi kohaku fish. According to Prihatman (2000) *in* Lusianti (2013) the optimal temperature for freshwater fish ranges from 25 - 30 (o) C. Huet (1971) in Lusianti (2013) states that temperature is one of the external factors that affect fish production and can affect important activities in fish such as breathing, growth, reproduction, and appetite, and the results of this study can be seen in table 2, showing that the observation of DO during the study in each treatment ranged from 6.3 mg/L. the use of DO meters. The results of quality observations are still within the normal range in accordance with SNI 7734.

CONCLUSION

Based on the results of ANOVA and continued with the DMRT test that the treatment of the addition of 10% telang flower extract is significantly different from the treatment (control), in the treatment of the addition of 15% telang flower extract is significantly different from the control treatment, 10%, 15% and 20%. It can be seen that the extract of telang flowers has an effect on improving the color of koi kohaku fish, the best color improvement is in the treatment of adding 20% telang flower extract.

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