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UTILIZATION OF PURPLE SWEET POTATO PEEL (*Ipomoea batatas*) ON COLOR INTENSITY OF GUPPY FISH (*Poecilia reticulata*)

Pemanfaatan Kulit Ubi Jalar Ungu *(Ipomoea batatas)* Terhadap Intensitas Warna pada Ikan Guppy *(Poecilia reticulata)*

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ABSTRACT

Guppy fish (*Poecilia reticulata*) is one of the freshwater ornamental fish species with high economic value, in which body color quality and intensity are the main factors determining attractiveness and market value. Color intensity in ornamental fish is influenced by natural pigments that largely cannot be synthesized endogenously and therefore must be obtained through diet. One potential source of natural pigment is purple sweet potato peel (*Ipomoea batatas*), which contains high levels of anthocyanins and is environmentally friendly. This study aimed to analyze the effect of purple sweet potato peel (*Ipomoea batatas*) solution supplementation on the color intensity of guppy fish (*Poecilia reticulata*). Guppy fish have high economic value, making color quality an important factor in increasing their commercial appeal. Purple sweet potato peel contains anthocyanin pigments that can be utilized as a natural colorant source in ornamental fish feed. The study was conducted for 30 days at the UMKM Perkumpulan Aquaculture Kasih Karunia Suwawa, Bone Bolango Regency, Gorontalo Province. The experimental design used was a Completely Randomized Design (CRD) with four treatments and three replications, namely P0 (control without solution), P1 (5 ml/100 g feed), P2 (10 ml/100 g feed), and P3 (15 ml/100 g feed). Observed parameters included color intensity, absolute length and weight growth, survival rate (SR), feed conversion ratio (FCR), and water quality. The results showed that treatment P3 produced the highest increase in color intensity compared to other treatments, although the differences were not statistically significant ($p > 0.05$). The best FCR value was obtained in treatment P1, while the highest survival rate was observed in treatment P3. Based on these results, it can be concluded that supplementation of purple sweet potato peel solution has the potential to enhance the color intensity of guppy fish and can be utilized as an alternative natural colorant in ornamental fish culture.

Keywords: anthocyanin, guppy fish, color intensity, purple sweet potato peel, natural colorant

ABSTRAK

Ikan guppy (*Poecilia reticulata*) merupakan salah satu ikan hias air tawar yang memiliki nilai ekonomi tinggi, di mana kualitas dan intensitas warna tubuh menjadi faktor utama yang menentukan daya tarik serta nilai jualnya. Intensitas warna ikan hias dipengaruhi oleh kandungan pigmen alami yang sebagian besar tidak dapat disintesis sendiri oleh ikan, sehingga harus diperoleh melalui pakan. Salah satu sumber pigmen alami yang berpotensi dimanfaatkan adalah kulit ubi jalar ungu (*Ipomoea batatas*) yang mengandung antosianin tinggi dan bersifat ramah lingkungan. Penelitian ini bertujuan untuk menganalisis pengaruh pemberian larutan kulit ubi jalar ungu (*Ipomoea batatas*) terhadap intensitas warna ikan guppy (*Poecilia reticulata*). Ikan guppy merupakan ikan hias air tawar yang memiliki nilai ekonomi tinggi, sehingga kualitas warna menjadi faktor penting dalam meningkatkan daya jual. Kulit ubi jalar ungu mengandung pigmen antosianin yang berpotensi dimanfaatkan sebagai sumber pewarna alami dalam pakan ikan hias. Penelitian dilaksanakan selama 30 hari di UMKM Perkumpulan Aquaculture Kasih Karunia Suwawa, Kabupaten Bone Bolango, Provinsi Gorontalo. Metode penelitian menggunakan Rancangan Acak Lengkap (RAL) dengan empat perlakuan dan tiga ulangan, yaitu P0 (kontrol tanpa larutan), P1 (5 ml/100 g pakan), P2 (10 ml/100 g pakan), dan P3 (15 ml/100 g pakan). Parameter yang diamati meliputi intensitas warna, pertumbuhan panjang dan berat mutlak, kelangsungan hidup (SR), rasio konversi pakan (FCR), serta kualitas air. Hasil penelitian menunjukkan bahwa perlakuan P3 menghasilkan peningkatan intensitas warna tertinggi dibandingkan perlakuan lainnya, meskipun secara statistik tidak berbeda nyata ($p>0,05$). Nilai FCR terbaik diperoleh pada perlakuan P1, sedangkan kelangsungan hidup tertinggi terdapat pada perlakuan P3. Berdasarkan hasil tersebut dapat disimpulkan bahwa pemberian larutan kulit ubi jalar ungu berpotensi meningkatkan intensitas warna ikan guppy dan dapat dimanfaatkan sebagai pewarna alami alternatif dalam budidaya ikan hias.

Kata kunci: antosianin, ikan guppy, intensitas warna, kulit ubi jalar ungu, pewarna alami

INTRODUCTION

Guppies (Poecilia reticulata) are a type of freshwater ornamental fish with high market demand due to their bright colors, diverse patterns, and ease of maintenance. In the ornamental fish industry, color quality is a key parameter determining aesthetic value and selling price, therefore, increasing color intensity is a crucial aspect in supporting the success of guppy cultivation (Mustari et al., 2022).

Biologically, the body color of ornamental fish is influenced by the presence of chromatophore cells, such as erythrophores, xanthophores, and melanophores, which contain natural pigments. Most of these pigments cannot be synthesized endogenously by the fish and must be obtained through their diet (Yaeni et al., 2017). One natural pigment responsible for the formation of red to purple colors is anthocyanin. In addition to functioning as a natural dye, anthocyanin also has antioxidant activity that has the potential to improve fish health and immunity (Saenjum et al., 2025).

Purple sweet potato peel (Ipomoea batatas) is an agricultural waste product known to have a high anthocyanin content and has the potential to be used as a natural pigment source in ornamental fish feed. Utilizing this natural ingredient can improve fish color quality while supporting sustainable and environmentally friendly cultivation concepts by reducing the use of synthetic dyes (Mustari et al., 2022).

Several studies have reported that the use of purple sweet potato can increase color intensity in ornamental fish, such as rainbow trout (Melanotaenia boesemani) (Yaeni et al., 2017) and koi (Cyprinus carpio) (Isnaini et al., 2022). However, information regarding the use

of purple sweet potato peel in guppies, particularly regarding the optimal dosage for increasing color intensity, is still limited.

Therefore, this study is important to evaluate the effect of purple sweet potato peel solution on guppy color intensity and determine the most effective dosage as an alternative source of natural pigment in ornamental fish feed.

RESEARCH METHODS

Place and Time

The research was conducted for 30 days, namely in July 2025, at the UMKM Aquaculture Kasih Karunia Suwawa Association, Bone Bolango Regency, Gorontalo Province.

Tools and Materials

The tools used in this study included a 30 × 20 × 25 cm aquarium, an aerator, an aeration hose, a digital scale, a ruler, a thermometer, a pH meter, a DO meter, a blender, a filter, and a sprayer. The materials used included full red albino guppy fish with an initial length of 2–3 cm and a weight of 0.12–0.30 g/fish, commercial feed with a protein content of 34%, purple sweet potato peels, and fresh water.

Research Design

The study used a Completely Randomized Design (CRD) with four treatments and three replications. The treatments were as follows: P0 (without the addition of purple sweet potato peel solution), P1 (5 ml solution/100 g feed), P2 (10 ml solution/100 g feed), and P3 (15 ml solution/100 g feed). The determination of treatment doses refers to the results of previous research related to the use of natural pigment sources in ornamental fish feed.

Research Procedures

The purple sweet potato skin was washed thoroughly, weighed to a mass of 300 g, and then mashed with 30 ml of water using a blender. The resulting mixture was filtered to obtain a solution, which was then fermented for 24 hours. The solution was sprayed evenly onto the feed using a sprayer according to the treatment dosage, then dried for approximately 30 minutes before being fed to the fish. Feed was provided at a rate of 5% of the fish biomass twice daily.

Parameters and Data Analysis

The observed parameters included fish color intensity analyzed using Hue values through Adobe Photoshop software, absolute length and weight growth, survival rate, and feed conversion ratio. Water quality parameters measured included temperature, pH, and dissolved oxygen (DO). Color intensity measurements were carried out on the same part of the fish's body and at consistent observation times to minimize measurement bias. Data were analyzed using ANOVA at a 95% confidence level ($\alpha = 0.05$). If there were significant differences, the analysis was continued with the Duncan Multiple Range Test (DMRT).

RESULT

Based on the research that has been conducted using purple sweet potato skin solution on color intensity in guppy fish, the results of the analysis in the research are presented in Figure 1. The Average Color Brightness Graph is as follows:

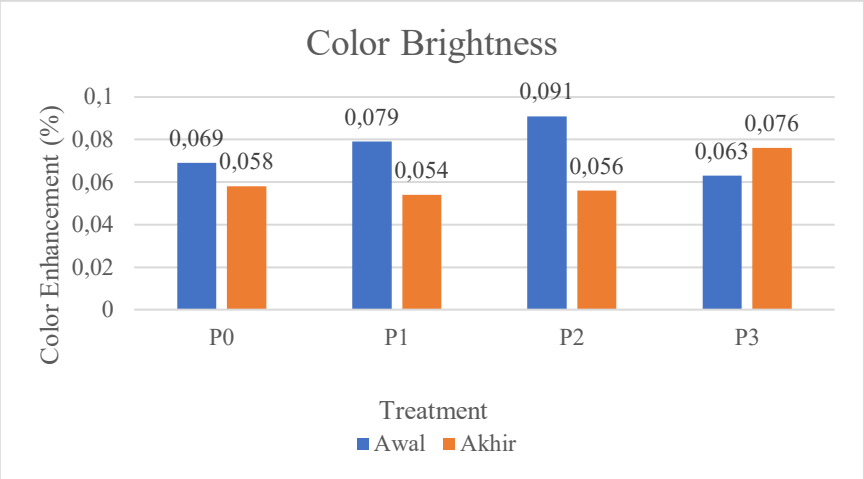

Figure 1. Average Color Brightness Graph

The purple sweet potato peel solution treatment resulted in the highest increase in color brightness at P3 (0.013%), while the largest decrease occurred at P2 (0.035%). The ANOVA test showed that the difference between treatments was not significant (p>0.05). Meanwhile, the results of the length measurements can be seen in Figure 2. The graph of average length growth is as follows:

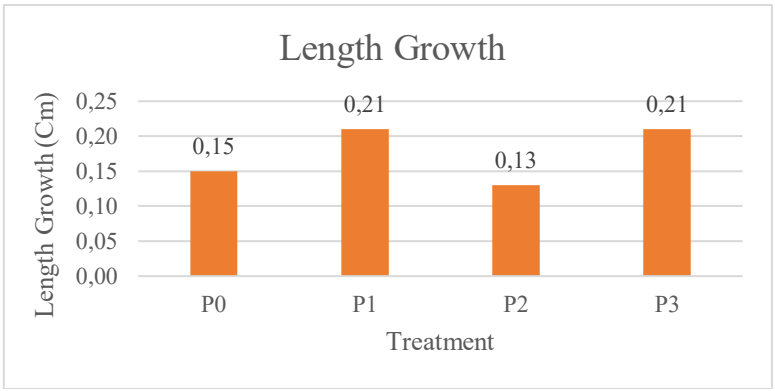

Figure 2. Average Length Growth Graph

Length and weight growth were also not significantly different between treatments (p>0.05), although P3 showed a tendency for higher length and weight growth compared to other treatments. The results of the weight growth analysis can be seen in Figure 3. The graph of average weight growth is as follows:

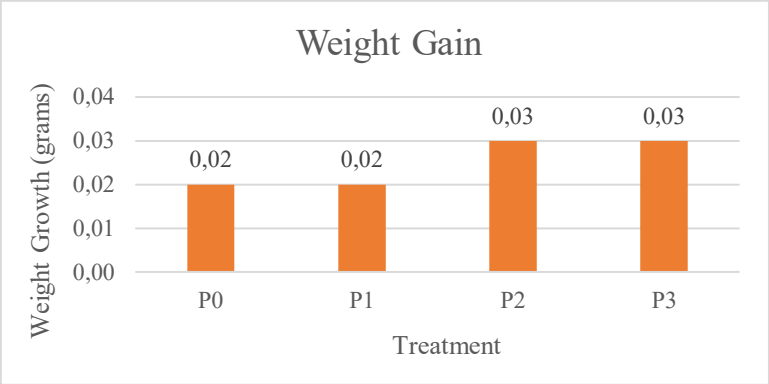

Figure 2. Average Weight Growth Graph

The best FCR value was obtained in P1 (13.41) which shows higher feed efficiency, while the highest survival rate was in P3 (73.3%), as can be seen in Figure 3. Average FCR Graph and Figure 4. Average Survival Graph.

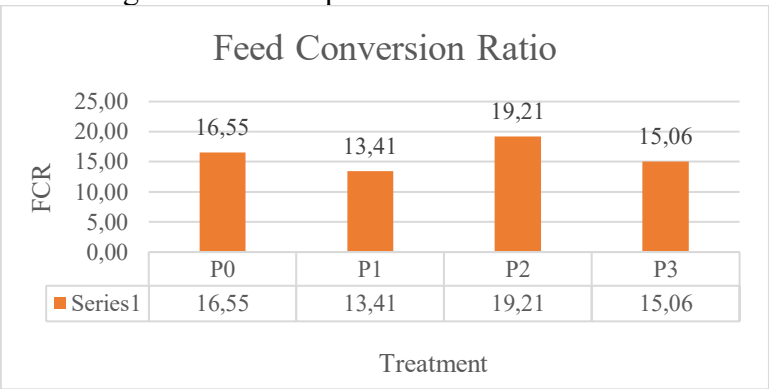

Figure 3. Average FCR Graph

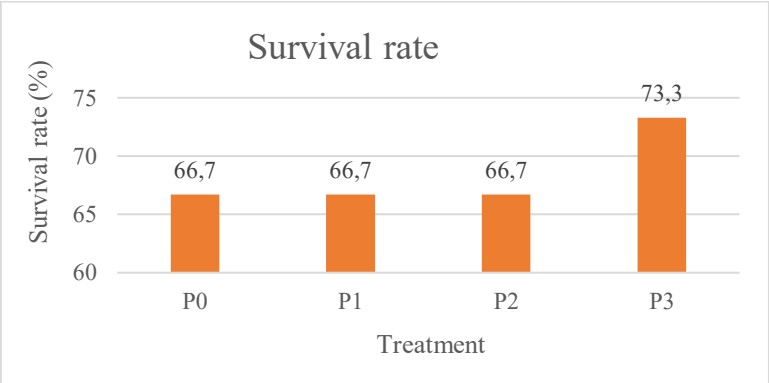

Figure 4. Mean Survival rate

Table 1. Average Water Quality Parameters

Observation Parameters	Unit	P0	P1	P2	P3	Average Measurement Results
Temperature	(°C)	27,9	28,0	28,.1	27,9	27,9–28,1
pH	Unit	7,3	7,4	7,3	7,4	7,3–7,4
DO	mg/L	5,4	5,5	5,6	5,7	5,4–5,7

Water quality parameters are one of the factors related to fish survival. Good quality is in accordance with the biological requirements of the fish or is still within the tolerance range

for fish survival. During the study, water quality parameters remained within the appropriate range for gappy fish survival, as shown in Table 1. Average Water Quality Parameters.

DISCUSSION

Research results indicate that the increased color brightness in guppies is due to the anthocyanin content in purple sweet potato skin, which acts as a natural pigment and antioxidant (Yaeni et al., 2017). This compound increases the efficiency of pigment metabolism and protects cells from oxidative stress (Saenjum et al., 2025).

Anthocyanins are natural pigments of the flavonoid group that play a vital role in the formation of red, purple, and bluish colors in animals and plants (Yaeni et al., 2017). In ornamental fish, these compounds function as precursors in the formation of chromatophore cells such as erythrophores (red cells) and xanthophores (yellow cells). When anthocyanins are fed, they are absorbed by the intestines and transported to the skin tissue, where the pigments accumulate (Isnaini et al., 2022).

Although the ANOVA results showed no significant differences, the trend toward increased color and growth in the P3 treatment indicates a positive effect of anthocyanin addition. These results align with research (Isnaini et al., 2022) on koi fish, which reported improved color and growth due to purple sweet potato extract supplementation.

The highest feed efficiency in treatment P1 demonstrated that low doses of anthocyanins can support feed metabolism more effectively, but increasing the dose to 15 ml/100 g of feed (P3) had a greater effect on improving body color. This suggests that anthocyanins play a more dominant role in pigmentation than growth, aligning with research (Muhazzir et al., 2024) that showed that supplementation with natural pigments containing anthocyanins increased fish color intensity but had no significant effect on weight or length growth.

The highest survival rate in treatment P3 (73.3%) indicates that anthocyanins can help increase fish's resilience to environmental stress. According to (Saenjum et al., 2025), anthocyanins have anti-inflammatory effects and can suppress free radical formation, thus stabilizing the fish's immune system.

Furthermore, the well-maintained water quality conditions throughout the study also supported fish survival. Temperatures ranging from 27.9–28.1°C, pH 7.3–7.4, and DO 5.4–5.7 mg/L were still within the optimal range for guppies (Mahendra et al., 2022). This environmental stability also supports the interpretation that differences in results were more influenced by variations in feed treatment, rather than water conditions.

CONCLUSION

Administering purple sweet potato (Ipomoea batatas) peel solution has the potential to increase the color intensity of red guppies (Poecilia reticulata), with the best results at a dose of 15 ml/100 g of feed (P3). However, statistically, there was no significant effect on growth in length, weight, or feed efficiency. Purple sweet potato peel solution can be used as an alternative natural ingredient to improve the color appearance of guppies in an environmentally friendly manner.

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REFERENCES

Habmarani, N., Lumbessy, S. Y., & Marzuki, M. (2023). Kecerahan Ikan Guppy (*Poecilia reticulata*) dengan Pemberian Tepung Bunga Marigold (*Tagetas erecta*) pada Pakan Komersil. *Jurnal Teknologi Perikanan dan Kelautan*, *14*(1), 73-85.

Isnaini, N., Istyadji, M., & Yulinda, R. (2022). Pengaruh Penambahan Pigmen Alami dari Ekstrak Ubi Jalar Ungu (*Ipomoea batatas* L) pada Pakan Terhadap Kecerahan Warna dan Pertumbuhan Benih Ikan Koi (*Cyprinus carpio*). *JUSTER: Jurnal Sains dan Terapan*, *1*(3), 57-64.

SMuhazzir, S., Thaib, A., Sabil, S. R., Sriwanti, R., & Handayani, L. (2024). Suplementasi Pigmen Karotenoid dan Antosianin Melalui Coating Pakan Terhadap Intensitas Warna dan Kinerja Pertumbuhan Ikan Platy Pedang (*Xiphophorus helleri*). *Media Akuakultur*, *19*(2), 81-90.

Saenjum, C., Thim-Uam, A., Khonthun, C., Oonlao, P., Nuntaboon, P., Surh, Y. J., & Phromnoi, K. (2025). Anthocyanins from A New Hybrid Sweet Potato Peel Cultivated in Northern Thailand Mitigate LPS-Induced Inflammation and RANKL-Induced Osteoporosis by Regulating ROS-Mediated Pathways. *Inflammopharmacology*, *33*(1), 381-399.).

Yaeni, T., & Yuniarti, T. (2017). Pemanfaatan Ekstrak Ubi Jalar (*Ipomoea batatas* Var Ayumurasaki) dalam Pakan untuk Performa Warna Tubuh, Pertumbuhan dan Kelulushidupan Ikan Rainbow (*Melanotaenia praecox*). *Journal of Aquaculture Management and Technology*, *6*(3), 293-302.

Zheng, L., Xie, S., Zhuang, Z., Liu, Y., Tian, L., & Niu, J. (2021). Effects of Yeast and Yeast Extract on Growth Performance, Antioxidant Ability and Intestinal Microbiota of Juvenile Pacific White Shrimp (*Litopenaeus vannamei*). *Aquaculture*, *530*, 735941.