Fisheries Journal, 14(3), 1488-1495 (2024)
http://doi.org/10.29303/jp.v14i3.998

THE EFFECT OF BAIT COLOR ON OCTOPUS CATCHES

Pengaruh Penggunaan Warna Umpan Terhadap Hasil Tangkapan Gurita

Rahmatang[1*], Arham Rumpa[1], Asia[1], Paduartama Tandipuang[1], Rafi Ohorella[1], Angraeni[2]

[1]Bone Marine and Fisheries Polytechnic, Bone Marine and Fisheries Polytechnic, [2]Fisheries Science, Faculty of Science and Technology, Cahaya Prima University

Bone Marine and Fisheries Polytechnic Campus, Sungai Musi Km 9 Street, Wetuo Subdistrict, Tanete East, Riattattang Bone Regency

[*]Coresponding author: rahmatang.kkp@gmail.com

(Received July 1st 2024; Accepted September 16th 2024)

ABSTRACT

Octopuses have a preference for colors often associated with their natural prey, such as small fish or other marine invertebrates. Bait colors that mimic this natural prey can increase the likelihood of an octopus responding and attacking the bait. Handline fishing is one of the methods used by the fishing community in Pattiro Village to catch octopuses using various bait colors, which allows for further study on the effectiveness of bait color in octopus fishing. This research aims to evaluate the impact of different bait color variations on octopus catch rates using handline fishing, with the goal of supporting the development of octopus fisheries in South Sulawesi. The study utilized an experimental fishing method, conducting octopus fishing operations using a specialized handline with colored bait. Data collection was conducted by observing local fishermen's octopus fishing activities. Based on the effectiveness of the bait colors used, the total catch for blue bait was approximately 8.706 kg (28%), red bait was 13.980 kg (31%), green bait was 2.790 kg (9%), and brown bait was 5.600 kg (18%). The blue bait had a higher catch rate compared to red, green, and brown bait.

Keywords: Artificial Bait, Bait Color, Bone District, Fishing Line, Octopus

ABSTRAK

Gurita memiliki preferensi terhadap warna-warna yang sering terkait dengan mangsa alami mereka, seperti ikan kecil atau invertebrata laut lainnya. Warna umpan yang meniru makanan alami ini dapat meningkatkan kemungkinan gurita untuk merespons dan memangsa umpan tersebut. Alat tangkap pancing adalah salah satu jenis alat tangkap yang digunakan oleh masyarakat nelayan di Desa Pattiro untuk menangkap gurita dengan berbagai jenis warna umpan sehingga lebih lanjut dapat di kaji efektivitas warna umpan pada penangkapan gurita. Penelitian ini dilakukan untuk mengevaluasi pengaruh variasi warna umpan terhadap hasil tangkapan menggunakan pancing gurita, dengan tujuan mendukung pengembangan perikanan gurita di Sulawesi Selatan. Penelitian ini menerapkan metode *experimental fishing* dengan melakukan operasi penangkapan gurita menggunakan alat tangkap pancing gurita (hand line) yang diberi perlakuan khusus, dimana pengambilan data dilakukan dengan mengikuti kegiatan penangkapan gurita oleh nelayan. Berdasarkan efektivitas warna umpan yang digunakan,

e-ISSN : 2622-1934, p-ISSN : 2302-6049

umpan berwarna biru total berat berkisar 8,706 Kg atau (28%), umpan berwarna merah dengan berat 13,980 Kg atau (31%), umpan berwarna hijau total berat 2,790 Kg atau (9%) dan umpan yang berwarna coklat diperoleh berat 5,600 Kg atau (18%). Umpan gurita berwarna biru tingkat kemunculan hasil tangkapan lebih besar jika dibandingkan dengan umpan gurita yang berwarna merah, hijau dan coklat.

Kata Kunci: Gurita, Kabupaten Bone, Pancing, Warna Umpan, Umpan Buatan

INTRODUCTION

The octopus is a mollusk from the class Cephalopoda, order Octopoda, whose main habitat is coral reefs in the ocean (Balansada et al., 2019; Shamilyan et al., 2021). With a total of 289 species, octopuses account for a third of the total species of the Cephalopod class. This species usually lives in rocky habitats and grasslands along coastlines, and migrates to deeper waters during the winter (Chung et al., 2022). Octopuses are caught globally, both by large-scale fishing industries (trawlers and jiggers) and traditional fishermen. One of the fishing tools that is often used is octopus fishing rods or handlines (Ikhsan et al., 2023; Ikhsan & Arkham, 2020). which has the characteristic form of many curved hooks at the end.

The use of bait in octopus catching has a very important role, especially related to the color of the bait which can influence the effectiveness of the catch (Vrandich et al., 2024). The color of the bait can trigger the octopus' reaction to approach and prey on the bait (Nende et al., 2022). Choosing the right color of bait is crucial because it can increase the visual appeal of octopuses, especially if the color resembles their natural food such as small fish or marine invertebrates (Alwi & Muhammad, 2019). In addition, the color of the bait that contrasts with the surrounding environment will be easier to recognize and attract the octopus' attention, even in different light conditions (Setiawan, 2022; Tur et al., 2018).

Previous studies have shown that octopuses have preferences for certain colors, which influence catch success (Kurniawan et al., 2019; Purwanto et al., 2021). Understanding octopus responses to different bait colors is not only important for fishermen to increase catches, but also contributes to more sustainable fisheries management (MacKinlay & Shaw, 2023). This research aims to explore the effectiveness of bait color in increasing octopus catches, especially in the context of octopus fisheries in South Sulawesi.

Initial interviews with fishermen in the waters of Bone Bay, Mare District, showed that most fishermen did not know the shape and type of bait that was effective for catching octopus. Therefore, this research focuses on studying variations in shape and color of bait that can maximize octopus catches. It is hoped that the research results will provide practical guidance for fishermen and researchers in selecting optimal bait for sustainable octopus fishing.

METHODS

Place and Time

This research was carried out in Pattiro Village, Mare District, Bone Regency, South Sulawesi Province, from March to November 2023. Research activities were centered at the fishing base location at coordinates 04°45'36." S, 120°23’47” E (Figure 1).

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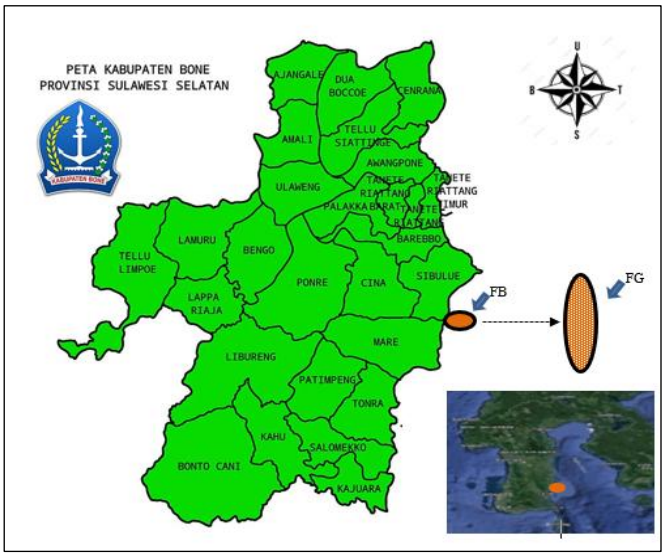

Fig 1. Map of research locations

Methods and Data Analysis

The research method used is the survey method (Siyoto & Sidik, 2015). This research aims to obtain a representative picture of the use of octopus resources in Bone Regency. Data was collected through direct observation and interviews with 10 octopus fishermen. The data obtained consisted of primary and secondary data. Primary data includes information about ship construction, fishing gear, fishing gear operating methods, fishing areas, octopus fishing seasons, and types of octopus catches. Meanwhile, secondary data consists of related journals and other supporting references. The data collected was then analyzed descriptively, both qualitatively and quantitatively, and linked to literature study.

Method

The research method used in this study is an experimental method, where manipulation is carried out by giving special treatment to research subjects, then the impact is observed and measured (Priadana & Sunarsi, 2021). In this research, experimental fishing was carried out with octopus catching operations using octopus fishing gear (hand line) which was given special treatment. This experimental method allows researchers to provide certain treatment to research variables. These variables are in the form of different shapes and colors in artificial bait, where each bait is given a different color (Figure 2).

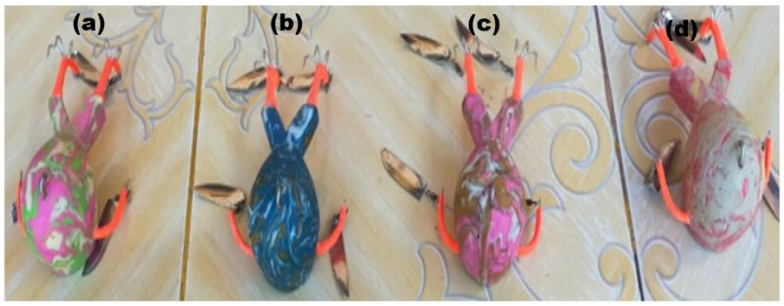

Fig 2. Artificial Bait Color Model (a). Green color, (b). Blue color, (c). Brown color, (d). Red

Data Collection Techniques

Data collection was conducted by participating in the fishing gear operation activities alongside the fishermen. Octopus fishing was carried out over 6 trips (replications) using 4 different bait colors (blue, red, green, and brown). A total of 4 fishermen were involved in

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operating the octopus fishing gear, with each fisherman using a different colored bait. During the operation process, the fishing lines were lowered simultaneously at the same location. The minimum time allocated for each repetition was set at two and a half hours

Data analysis

The effect of the four bait color treatments on catch yield was analyzed using inferential statistics, namely One-Way ANOVA. This test was used to determine whether there were statistically significant differences among the four bait color treatments in terms of mean catch yield. If the ANOVA results showed significant differences, a post-hoc test (Tukey HSD) was conducted to identify which treatment performed best. All data were analyzed using statistical software SPSS 25, with a significance level set at $\alpha = 0.05$.

RESULT

Total Catch

During the research, which used octopus fishing rods treated with four colors of bait and carried out over 6 trips, the total catch was 38 fish. Details of the catch for blue bait showed a total weight of around 8,706 grams or 28% of the total catch, red bait weighed 13,980 g or (31%), green bait had a total weight of 2,790 g or (9%) and brown bait was obtained weight 5,600 g or (18%). The weight composition of the catch is presented in Figure 3.

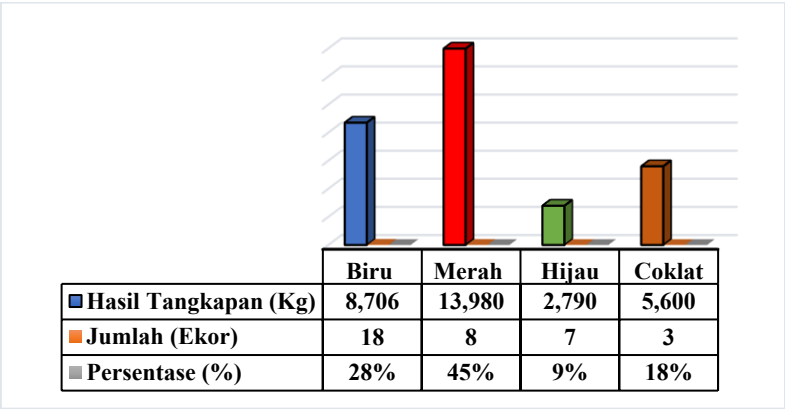

Fig 3. Graph of Total Catch Results from Each Bait Color

Figure 3 shows the frequency of octopus appearances when using artificial bait, with the highest occurrence observed for blue bait (18 appearances), followed by red bait (8 appearances) and green bait (7 appearances), while brown bait had the lowest frequency (only 3 appearances). Statistical test results and analysis based on the per-individual octopus weight data from the four bait colors is as follow:

Table 1. One-Way ANOVA Test Results

Source of Variation	Sum of Squares (SS)	df	F-value	p-value
Bait Color	13,380,710.00	3	1.43×10^3	< 0.001
Residual	≈ 0 (simulation artifact)	32	-	-

Since the p-value < 0.05, there is a statistically significant difference in octopus catch weights based on bait color.

The one-way ANOVA test on octopus weight per individual (Table 1) yielded an F-value of 1.43×10^{31} and p-value <0.001, indicating a highly significant statistical difference ($p<0.05$) in octopus catch weights (kg) among the different bait color treatments. To determine which specific bait colors differed significantly from each other, a post-hoc test was conducted using

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Tukey's Honestly Significant Difference (Tukey HSD) method. This test provides pairwise comparisons of means between groups.

Based on the Tukey HSD test results, red bait demonstrated significantly higher octopus catch weights ($p<0.05$) compared to blue, brown, and green bait, indicating its superior visual attraction properties. Blue bait was also effective, showing significant results compared to both brown and green bait, though its performance was slightly below the red bait. Brown and green colors are not significantly different, indicating relatively equivalent effectiveness but lower than red and blue. The difference between brown and green is situational and can be considered equally effective if not statistically significant.

Weight Measurement of Catch

The frequency range for the weight of the catch is shown in Figure 4 below.

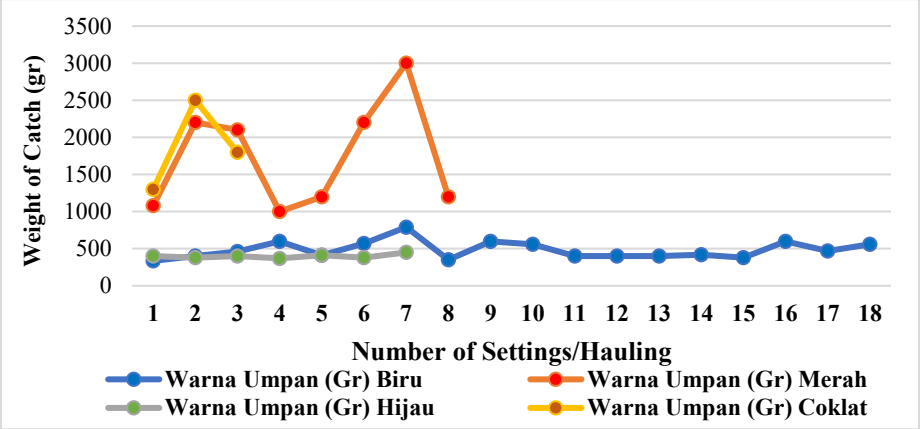

Figure 4. Graph of Frequency Range of Weight of Catch for Each Bait Color

The results of measuring the weight range per individual for each catch based on the color of the bait used can be explained in Table 1 below.

Table 1. Weight range per individual based on the color of the bait used

Bait Color	Blue	Red	Green	Brown
Number (Tail)	18	8	7	3
Weight (Kg)	(0,33-0,79)	(1,00-3,00)	(0,38-0,45)	(1,30-2,50)

DISCUSSION

Figure 3 shows that by using blue octopus bait the catch rate is greater when compared to red, green and brown octopus bait. However, if you look at the size/weight of the octopus caught, the most ideal is to use red and brown bait compared to green and blue. In Figure 4 and Table 1, it can be seen that brown has a lower frequency of appearance compared to green or red. This is because octopuses tend not to consider brown bait as food. In contrast, green, red, and blue colors appear more like food to octopuses, so they are more attracted to bait with brighter colors.

The difference in total catches from the four bait colors is caused by the absorption of the color when the bait is in the water. Red has a longer light spectrum, so it will disappear more quickly at a certain depth. On the other hand, brown has a shorter light spectrum, so it absorbs less in the water, making it more easily visible to target fish. These results are in line with research conducted by (Jesus et al., 2022; Kurniawan et al., 2019), which used tassel-

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shaped fishing rods to study the effect of different colors on octopus fishing hooks on catch results.

Octopus eyes have the ability to detect the polarization of light in water. This ability is very dependent on the conditions of the aquatic environment. Therefore, observing water conditions during research is a key factor in supporting the success of fishing operations. Apart from that, the shape of artificial bait also plays an important role in determining the success of fishing operations, this is similar to findings in previous research (Idrus et al., 2023; Kane & Higham, 2014). The shape of artificial bait influences octopus catches, with shapes that resemble crabs tend to be more effective than forms that resemble shrimp. In this research, the selection of artificial forms was based on the natural food of octopuses, namely crabs and shrimp. Therefore, the type of bait needs to be adjusted to the type of food preferred by the fish to be caught.

In general, the use of blue fishing hooks shows higher octopus catches compared to fishing hooks that have other shapes or colors. Most likely, the success of this blue fishing hook is related to the octopus' motive in finding a partner, because the octopuses caught are generally individuals who have just reached gonadal maturity (Omar et al., 2020). Another possibility is that it is related to the cannibalistic nature of the octopus or because the octopus is caught are considered competitors (Espinoza et al., 2019; Hernández-Urcera et al., 2014; Nurdiansyah et al., 2015).

All octopuses caught are included in the adult category and meet the requirements for capture, according to the criteria set by (Omar et al., 2020), which states that the weight of an adult octopus that meets the requirements is 320 grams. However, if judged from the selling price, the majority of those caught using blue octopus bait are generally still under size. The results of observations regarding the selling value of octopuses in Bone Regency, namely those measuring ≥ 0.4 Kg, are priced at Rp. 20,000, and size 0.5-0.99 Kg selling value Rp. 40,000,-, for sizes 1-1.9 Kg for Rp. 55,000,- while the 2 Up weight size is priced at Rp. 80,000,-.

CONCLUSION

The dimensions of the vessels used for octopus fishing range from 5 to 7 GT. Fishing equipment consists of two main components: line and hook. The working principle of this tool is to attract the attention of fish or octopus using natural or artificial bait attached to the hook. Octopus catches mostly consist of the Octopus cyanea species, with fishing locations around 1.5 miles from the coast at a water temperature of 27°C-28°C and salinity of around 35%. Based on the effectiveness of the color of the bait used, blue bait has a total weight of around 8,706 kg or (28%), red bait weighs 13,980 kg or (31%), green bait has a total weight of 2,790 kg or (9%) and colored bait chocolate obtained weighs 5,600 kg or (18%). Blue octopus bait has a greater catch rate compared to red, green and brown octopus bait. However, if you look at the size/weight of the octopus caught, the most ideal is to use red and brown bait compared to green and blue.

ACKNOWLEDGEMENT

The author expresses his appreciation to octopus fishermen in Pattiro Village, Mare District, Bone Regency, as well as to all parties who played a role in this research. Special thanks also go to Bone Marine and Fisheries Polytechnic for providing research funding support for the 2023 fiscal year.

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