JURNAL PERIKANAN DAN KELAUTAN
Volume 28 No. 2, June 2023: 255-262

e-issn : 2721-8902
p-issn : 0853-7607

Effect of Different Types of Bait in Collapsible Traps Gear on Mangrove Crab (*Scylla serrata*) Catches in Kampung Laut Waters

Efek Perbedaan Penggunaan Jenis Umpan pada Alat Tangkap Bubu Lipat Terhadap Hasil Tangkapan Kepiting Bakau (Scylla serrata) di Perairan Kampung Laut

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Received
28 April 2023

Accepted
2 June 2023

Abstract

Mangrove crab (*Scylla serrata*) catching activities generally use collapsible traps. collapsible traps can be operated using bait and not using bait but the catch is less effective if it does not use bait. The purpose of this study was to determine the effect of using different types of bait (fresh stingray, salted stingray, fresh eel, and salted eel) on the catch of mangrove crab in Kampung Laut waters. The material of this research is the catch of mangrove crabs using fresh stingrays, salted stingrays, fresh eels, and salted eels as bait. The research method used is experimental fishing. The data collected includes environmental parameters, the total number of catches, and the size of the catch. Data analysis used a completely randomized design (CRD) and Duncan's follow-up test. The results showed that the different types of bait used had an effect on the number of catches, catch weight, and catch size. This study concludes that the catch of mangrove crabs with salted stingray bait gets the most catches, namely 16 fish, and on salted eel bait gets 13 catches while fresh stingray bait treatment only gets 7 catches and on fresh eel gets 5 catches.

Keywords: Mangrove Crab, Bait, Fiber, Collapsible Traps, Kampung Laut Waters

Abstrak

Kegiatan penangkapan Kepiting Bakau (*Scylla serrata*) pada umumnya menggunakan bubu lipat (*collapsible trap*). Bubu lipat dapat dioperasikan menggunakan umpan dan tidak menggunakan umpan tetapi hasil tangkapan kurang efektif jika tidak menggunakan umpan. Tujuan dari penelitian ini adalah untuk mengetahui efek penggunaan jenis umpan yang berbeda (ikan pari segar, ikan pari asin, belut segar, dan belut asin) terhadap hasil tangkapan kepiting bakau di perairan Kampung Laut. Materi penelitian ini adalah hasil tangkapan kepiting bakau menggunakan umpan ikan pari segar, ikan pari asin, belut segar, dan belut asin. Metode penelitian yang digunakan adalah metode *experimental fishing*. Data yang dihimpun meliputi parameter lingkungan, jumlah total hasil tangkapan, ukuran hasil tangkapan. Analisis data menggunakan Rancangan Acak Lengkap (RAL) dan uji lanjut Duncan. Hasil penelitian menunjukkan bahwa perbedaan penggunaan jenis umpan memberikan efek terhadap jumlah hasil tangkapan, berat hasil tangkapan, dan ukuran hasil tangkapan. Kesimpulan penelitian ini adalah hasil tangkapan kepiting bakau dengan umpan pari asin mendapatkan hasil tangkapan terbanyak yaitu 16 ekor dan pada umpan belut asin mendapatkan hasil tangkapan 13 ekor sedangkan pada perlakuan umpan pari segar hanya mendapatkan hasil tangkapan 7 ekor dan pada belut segar mendapatkan hasil tangkapan 5 ekor

Kata Kunci : Kepiting Bakau, Umpan, Bubu Lipat, Kampung Laut

1. Introduction

Tanjung Jabung Timur Regency has considerable natural resource potential in the marine and fisheries sector, with a coastline length of 191 km stretching from the border with Tanjung Jabung Barat Regency to the border of South Sumatra Province which has the potential for marine capture fisheries with an area of 77,752 ha. Based on fish production according to the Fisheries Service of Tanjung Jabung Timur Regency, the results of capture fisheries consisting of marine fisheries production reached 23,491.54 tonnes, public waters reached 130.86 tonnes, and aquaculture reached 120.4 tonnes. Of the various types of waters in East Tanjung Jabung Regency, the largest production for marine waters is in several sub-districts, such as Mendahara, Nipah Panjang, Sadu, Kuala Jambi, and Muara Sabak Timur (BPS Kabupaten Tanjung Jabung Timur, 2018).

Most of the population in the waters of Kampung Laut are fishermen, using several traditional fishing gears, such as nets, traps, belat, sondong, and rawai. According to Martasuganda (2003), mangrove crab fishing can be done using traps, the type of trap that is often used to catch mangrove crabs is the collapsible trap (bubu lipat). The use of collapsible traps is based on the reasons that it is relatively easy to make, low cost, easy to operate, the catch is alive and environmentally friendly and can be folded so that one boat unit can carry a large number of traps, this fishing gear is known by the local community as a pentor. Based on the survey results, the number of fishermen who use folding traps in the waters of Kampung Laut is 3 people with 24 folding traps each. (Tinambunan et al., 2021). Fishermen start fishing activities in the morning, the operation process starts with installing the bubu (setting), and immersing after the afternoon fishermen lift (hauling) the collapsible trap fishing gear.

Bait is very important in fishing operations because it is one of the success factors of fishing operations. collapsible traps can be operated using bait or not, but the results are less effective if not using bait. Initially, fishermen in the waters of Kampung Laut operated collapsible traps not using bait, with the development of the times. Finally, fishermen in the waters of Kampung Laut knew the use of bait in the operation of collapsible traps could increase catches. Generally, fishermen in the waters of Kampung Laut use various types of bait derived from by-catch fish that have low economic value and are relatively easy to find.

Fresh stingray is often used by fishermen as bait because only some people consume it, salted stingray is a bait treatment carried out by practitioners. According to Adlina et al. (2014), salted-type fish is durable in the water and its texture is not easily broken or decomposed, while fresh-type bait has properties that are easily separated and easily damaged by water movement during fishing operations. Sihotang (2018) stated that the use of fresh stingrays got the most catches with a catch of 17 fish, compared to other types of bait, namely 10 sharp nose hammer croakers and 8 starry triggerfish. According to Andora (2018), getting the most catches of 7 tails, compared to other types of bait, namely low fish getting a catch of 2 fish and fresh stingrays getting a catch of 2 fish. The choice of fresh eel bait is based on the fact that it is one of the fishery commodities that are relatively easy to find in shallow waters and is also a bait commonly used by fishermen in the waters of Kampung Laut because it does not have economic value. According to Soim (1999), adult crabs can be considered omnivores and scavengers. Therefore, the salted eel bait treatment can also be used as a comparison.

However, they do not know the best type of bait to catch mangrove crabs, so based on the description above, the authors are interested in conducting research on the effects of different types of bait on collapsible traps fishing gear on mangrove crab (*Scylla serrata*) catches in Kampung Laut waters. The purpose of this study was to determine the effect of different types of bait on the catch of mangrove crabs in the waters of Kampung Laut

2. Material and Method

2.1. Time and Place

This research was conducted in Kampung Laut on 11 April to 26 April 2022.

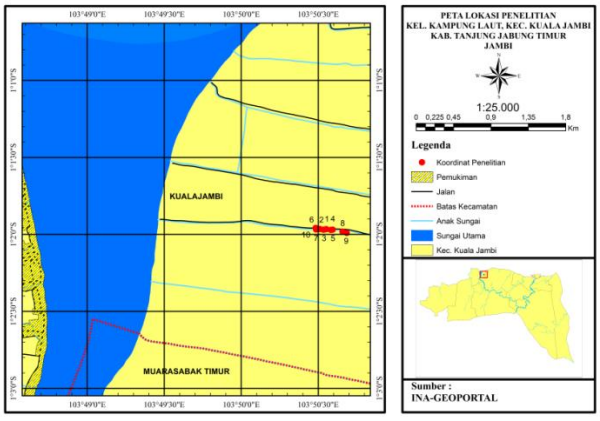

Figure 1. Research location

2.2. Methods

The method used in this research is experimental fishing. Data collection for this study was obtained directly by conducting fishing operations with local fishermen using collapsible traps. Sampling in this study was repeated 10 times in order to get maximum results, the placement of collapsible traps in each bait treatment was carried out randomly and given a maximum distance of 5m. Each repetition is done with different randomization so that each bait gets the same chance, this study uses collapsible traps operated with four different bait treatments (salted stingray, fresh stingray, salted eel, and fresh eel).

2.3. Procedure

The preparatory stage in the operation of collapsible traps that need to be done is to prepare the bait. The bait used salted stingray bait, fresh stingray, salted eel, and fresh eel, each bait weighed 40 g. In one day spent 800 g of bait. Then the fishing gear used bubu as many as 20 units, each 5 units are marked treatment. then the installation of the bubu by plugging the collapsible traps into the water with a depth of 1.5 m. Each treatment is spaced 2-5 m apart. All bubu soaked (immersing) in the water for 6 hours.

2.4. Data Analysis

The data of this study were analyzed using variance analysis (ANOVA) in accordance with a completely randomized design (CRD). If there was a significant difference ($P<0.05$) between treatments on the diversity of experimental data, it was continued with Duncan's test (Steel & Torrie, 1995). Data were analyzed manually using Microsoft Excel 2010 software. Water quality parameters observed were temperature, pH, and current velocity.

3. Result and Discussion

3.1. Environmental Parameters

Environmental parameters are indicators that can be measured to see the quality of certain waters. The existence of mangrove crabs is strongly influenced by water quality in the aquatic habitat of the mangrove crabs, namely in mangrove forests. According to Ulqodry et al. (2010), Mangrove ecosystems have ecological functions that are very beneficial for organisms in the coastal environment. In addition, mangroves also function as nutrient providers, the ecosystem is a spawning, nursery, and feeding grounds for various types of fish, shrimp, and other marine life (Bengen, 2004).

Mangrove ecosystems are one form of coastal ecosystems that are very unique because in this area there are physical, chemical, and biological elements of land and sea. This combination creates a complex ecosystem entanglement between marine and terrestrial ecosystems. During this research, measurements of environmental parameters were always carried out, namely by measuring physical elements and chemical elements where physical elements include measuring water temperature and current speed, while chemical elements include measuring pH or acidity. The measurement results can be seen in Table 1.

Table 1. Environmental parameter measurement results

Repetition	Environmental Parameters		
	Temperature (^oC)	pH	Current Velocity (m/s)
1	30	6,9	0,16
2	30	7,2	0,14
3	31	6,8	0,16
4	29	7,1	0,25
5	30	6,8	0,15
6	30	7,2	0,14
7	29	7,3	0,14
8	31	7,4	0,25
9	30	6,9	0,14
10	31	7,4	0,14
Average	30,1	7,1	0,167
Range	29-31	6,8-7,4	0,14-0,25

Temperature greatly affects the presence of fish, shrimp, and other marine life if the temperature is too high it will cause stress conditions in the fish body (Mainassy, 2017). According to Shelley *in* Siringoringo et al. (2017), temperature is the most influential factor in the growth of mangrove crabs, the optimal temperature for mangrove crab growth is in the range of 25-35^oC. Based on Table 1, the results of the measurement of environmental parameters, the water temperature of the mangrove crab fishing area is in the range of 29-31^oC with an average of 30.1^oC, this shows that the habitat of mangrove crabs in the waters of Kampung Laut is still in accordance with the optimal temperature for growth.

The optimum degree of acidity (pH) will have a maximum growth impact on mud crabs because it is related to the degree of acidity and alkalinity in the water, the pH in the water will have a major effect on the survival of mud crabs (Hastuti et al., 2016). Based on pH measurements in the waters of Kampung Laut, the results are in the range of 6.8-7.4 with an average of 7.1, this states that the acidity in the waters of Kampung Laut is still good for mangrove crab habitat. This is in accordance with the opinion of Kordi, (2007) which states that mangrove crabs have a pH tolerance range in the range of 6.5 - 9. This means that mangrove crabs can live in waters with mildly acidic to alkaline conditions (pH 6.5-9).

The bait used gives off an odor that comes out of the mesh gap and is carried by the current, the current is needed to deliver the smell of bait in the waters, for the current speed in the waters of Kampung Laut, which is more precisely in the fishing ground for mangrove crabs during the study, the results were obtained in the range of 0.14-0.25 m/s. Current speed can be divided into 4 categories, namely current speed 0-0.25 m/s called slow current, 0.25-0.50 m/s called medium, 0.50-1 m/s called fast, and above 1 m/s called very fast (Sari & Usman, 2012). So the current speed in the waters of Kampung Laut is a slow current category and the current speed in this study can be said to be good because it is in accordance with the opinion of Nando et al. (2015) who said that there is a tendency that the slower the current, the greater the catch because in slow currents the odor can last longer around the bubu and in turn increase the opportunity for crabs to find their source. According to Sampurno et al. (2017), the process of catching mangrove crabs using collapsible traps is that at high tide, the crabs will come out of hiding and look for food ashore, when the crabs realize or are stimulated by the presence of bait, the crabs will try to find the source of the stimulation and when they find the source of stimulation, the crabs approach and enter the traps to eat the bait.

3.2. Catch Composition of Collapsible Traps (Bubu Lipat)

Collapsible traps in the waters of Kampung Laut is usually operated to catch mangrove crabs but does not make the possibility of other types of fish caught in the collapsible traps, because the bait is a stimulus for fish to enter the collapsible traps. To see the composition of the collapsible traps caught during the study can be seen in Table 2.

Table 2. Catch the composition of collapsible traps in Kampung Laut waters during the study

Composition of collapsible traps catches	Latin Name	Feed Treatment				Total
		Fresh ray	Salted ray	Fresh Eel	Salted Eel	
Mangrove Crab (fish)	*Scylla serrata*	7	16	5	13	41
Mangrove Crab (g)		1254	3551	1046	2661	8512
Asian redtail catfish (Fish)	*Hemibagrus nemurus*	5	9	4	6	24
Asian redtail catfish (g)		559	830	398	570	2357
King prawn (Fish)	*Macrobrachium rosenbergii*	11	14	8	12	45
King prawn (g)		241	352	225	340	1158

Based on Table 2, the composition of the collapsible traps catch in the waters of Kampung Laut during the study can be seen that in the catch there are three types of catches, namely mangrove crabs, Asian redtail catfish, and king prawns. In the bait treatment, the highest catch was still found in the salted ray bait where the catch was 16 mangrove crabs with a total weight of 3551 g, 9 Asian redtail catfish with a total weight of 830 g, and 14 prawns with a total weight of 352 g. The lowest catch was in the fresh eel bait treatment where the catch was 5 mangrove crabs with a total weight of 1046 g, 4 Asian redtail catfish with a total weight of 398 g, and 8 prawns with a total weight of 225 g. This is thought to be because the salted ray bait treatment emits a very pungent or unpleasant odor which causes fish to come close or enter the collapsible traps and eat the bait, this is in accordance with the opinion of Susanto et al. (2012) say that the type and size of bait used must be able to provide stimulation for the target fish to approach and eat the bait. It is further clarified by the opinion of Siswoko et al. (2013) which says that the use of bait in a fishing gear operation serves to invite or stimulate fish so that the operating system carried out will be more effective.

It can also be seen that the use of salted bait in this study was able to attract mangrove crabs, king prawns, and Asian redtail catfish in large numbers compared to the use of fresh bait. According to Adlina et al. (2014), salted bait used lures more crabs (*Portunus pelagicus*) to enter the bubu, this is because salted fish bait has a longer-lasting aroma compared to fresh fish bait.

3.3. Mangrove Crab Catches

Based on the results of the analysis of variance showed that different bait treatments had a very significant effect ($P < 0.05$) on the number (fish) of mangrove crab catches. The highest average mangrove crab catch was found in salted ray bait at 1.6 days/fish, followed by salted eel bait at 1.3 days/fish, fresh ray bait at 0.7 days/head, and the lowest average catch was in fresh eel bait at 0.5 days/fish. So the use of salted ray bait

provides the best catch in terms of the number (fish) of mangrove crab catches. Mangrove crab catches by number (fish) in each different bait treatment during the study can be seen in Table 3.

Table 3. Total mangrove crab catches with different baits

Treatment	Average (fish/day)
PS (Fresh ray)	$0.7^{ab} \pm 0.483$
PA (salted ray)	$1.6^{a} \pm 0.699$
BS (Fresh Eel)	$0.5^{b} \pm 0.527$
BA (Salted Eel)	$1.3^{a} \pm 0.948$

The catch in the use of salted ray bait and salted eel is more than other bait treatments. It is suspected that mud crabs prefer salty bait. According to Permana et al. (2022), the number of catches of bubu is strongly influenced by the smell of bait, texture, durability, and speed of dispersion of bait odor in the waters. Fresh bait gives off a very strong odor but the smell is not enough to stimulate the mangrove crab's sense of smell because the texture and durability of the bait are not durable. But the salty type of bait is durable in the waters and also gives off a very strong odor that can stimulate the mangrove crab's sense of smell. This is in accordance with the opinion of Adlina et al. (2014) who said that the use of salted fish is often used because the texture is not easily broken or decomposed and gives off an odor that can last a long time.

3.4. Mangrove Crab Catch Size

The size of the mangrove crab catch can be seen from the weight and width that the growth of the carapace width has an influence on the body weight of mangrove crabs, according to Hardiyanti et al. (2018) said that the greater the carapace width, the greater the body weight. Based on the results of collapsible trap catches with different bait treatments, the total weight of mangrove crab catches during the study can be seen in Table 4.

Table 4. Total weight of mangrove crab catch with different baits

Treatment	Average (g/day)
PS (Fresh ray)	$125.4^{ab} \pm 98.513$
PA (Salty ray)	$355.1^{a} \pm 158.136$
BS (Fresh Eel)	$104.6^{b} \pm 115.889$
BA (Salted Eel)	$266.1^{a} \pm 189.817$

Based on the results of the analysis of variance showed that different bait treatments had a very significant effect ($P<0.05$) on the weight (g) of mangrove crab catches. The highest average mangrove crab catch was found in salted ray bait, 355.1 days/g, followed by salted eel bait, 266.1 days/g, fresh ray bait, 125.4 days/g, and the lowest average catch was found in fresh eel bait, 104.6 days/g. So the use of salted ray bait also provides the best catch in terms of the weight (g) of mangrove crab catch.

The weight (g) of the catch in the use of salted ray bait and salted eel is more than other bait treatments, namely in salted ray bait 3551 g and in salted eel 2661 g, this happens because the number (fish) of the catch with salted ray bait and salted eel get the highest number (fish) of catches. This is in accordance with the opinion of Rahmad (2019), which states that the greater the number of catches. The weight of mud crabs can also be distinguished by the size of the grade that applies to mud crab collectors, and in this study, the size of the grade most caught using different baits can be seen in Table 5.

Table 5. Mangrove crab catch grade

Grade	Size (g)	Treatment				Number (fish)
		Fresh ray	Salted ray	Fresh Eel	Salted Eel	
Jumbo	> 1000	0	0	0	0	0
SP	700-999	0	0	0	0	0
A	500-699	0	0	0	0	0
B	350 - 499	0	0	0	0	0
C	200 - 349	2	8	2	6	18
KS	< 199	5	8	3	7	23

Based on Table 5, it can be seen that the grade that is mostly caught is in grade KS, which is <199 g with the number of catches in different bait treatments being 23 fish, while in grade C, which is 200 - 349 g with the number of catches is 18 fish. In grades Jumbo, SP, A, and B there was no catch with the size of the grade. This is thought to be due to the low abundance of natural food associated with the carrying capacity of the mangrove ecosystem in the waters of Kampung Laut which is decreasing, resulting in mangrove crabs with the size of grade Jumbo, SP, A, and B were not found during this study. This is in accordance with the opinion of Siahainenia (2008), which says that large mangrove crab individuals will move to areas where the abundance of natural food is high.

Regulation of the Minister of Maritime Affairs and Fisheries of the Republic of Indonesia Number 12/Permen-Kp/2020 concerning the Management of Lobsters (*Panulirus* spp), Crabs (*Scylla* spp), and Crabs (*Portunus* spp.) in the Territory of the Republic of Indonesia in article 7 paragraph (1b) state that the catchable weight of mangrove crabs is above 150 g/fish. Based on Table 5, the catch grade of mangrove crabs is mostly caught in the catchable size because the size below the catchable size is only a few caught from the total catch.

The size below the catchable size in this study is still recorded because according to the Regulation of the Minister of Maritime Affairs and Fisheries of the Republic of Indonesia, Number 12/Permen-Kp/2020 concerning the Management of Lobsters (*Panulirus* spp), Crabs (*Scylla* spp), and Crabs (*Portunus* spp.) in the Territory of the Republic of Indonesia in article 7 paragraph (2) states that the provisions for catching and/or releasing Crabs (*Scylla* spp.) as referred to in paragraph (1) are exempted for activities to carry out education, research, development, assessment, and/or application within the territory of the Republic of Indonesia. The total carapace width of mangrove crabs caught with different bait treatments during the study can be seen in Table 6.

Table 6. Total carapace width size of mangrove crab catches

Treatment	Average (days/mm)
PS (Fresh ray)	$68.79^{a} \pm 47.865$
PA (Salty ray)	$105.22^{a} \pm 12.482$
BS (Fresh Eel)	$53.44^{ab} \pm 56.716$
BA (Salted Eel)	$89.14^{a} \pm 33.287$

Based on the results of the analysis of variance showed that different bait treatments had a significant effect ($P<0.05$) on the size of the carapace width (mm) of mangrove crab catches. The highest average mangrove crab catch was found in salted ray bait with 105.22 days/mm, followed by salted eel bait with 89.14 days/mm, fresh ray bait with 68.79 days/mm, and the lowest average catch was found in fresh eel bait with 53.44 days/mm. The size of the range of mangrove crab carapace width during this study is 77.5-135.8 mm, the size of the range of carapace width in this study is greater than the research of Kasril et al. (2017), namely mangrove crabs observed during the study in Kuala Baru District ranged from 62-150 mm, Singkil District ranged from 61-125 mm and North Singkil ranged from 66-151 mm. According to the opinion of Tahmid et al. (2015) the average adult mangrove crab when the carapace width starts to measure 80-120 mm.

It can be seen from the size of the mangrove crab catch that there are interrelated sizes in weight and carapace width, there is a tendency that the heavier the mangrove crab, the wider the size of the carapace. In the case study of mangrove crab fishing in the waters of Kampung Laut, it fulfills the requirements of the Regulation of the Minister of Marine Affairs and Fisheries of the Republic of Indonesia Number 12/Permen-Kp/2020 concerning the Management of Lobsters (*Panulirus* spp), Crabs (*Scylla* spp), and Crabs (*Portunus* spp) in the Territory of the Republic of Indonesia in article 7.) in the Territory of the Republic of Indonesia in article 7 paragraph (3d) which states that crab (*Scylla* spp) fishing must be carried out using static or passive fishing gear; and in the waters of Kampung Laut mangrove crab fishing has used passive fishing gear, namely collapsible traps which is often referred to by the local community as penthor

4. Conclusions

Based on the results of the study, it can be concluded that the use of different types of bait has an effect on the catch of mangrove crabs with the catch on use of salted ray bait getting the most catches of 16 fish and on salted eel bait getting a catch of 13 fish while in the fresh ray bait treatment only gets a catch of 7 fish and on fresh eel gets a catch of 5 fish.

5. Suggestion

Based on the research that has been carried out, the researcher suggests that collapsible traps fishermen in Kampung Laut waters use salted bait, namely salted ray bait, and salted eel to get optimal mangrove crab catches.

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