Fisheries Journal, 14 (2), 620-627 (2024)
http://doi.org/10.29303/jp.v14i2.813

MORPHOMETRICS AND SURVIVAL RATE OF FATTENING MUD CRAB (SCYLLA SERRATA) CRAB APARTMENT SYSTEM IN PAGARAWAN VILLAGE AND TAKARI BEACH, BANGKA ISLAND

Morfometrik dan Survival Rate Penggemukan Kepiting Bakau (Scylla Serrata) Sistem Apartemen Kepiting di Desa Pagarawan dan Pantai Takari, Pulau Bangka

Umroh[1], Sudirman Adibrata[1], Franto[2]

[1]Marine Science Departement Bangka Belitung University, [2]Mining Engineering Departement Bangka Belitung University

Bangka, 33172, Indonesia

*Corresponding author : sudirman@ubb.ac.id

(Received April 13th 2024; Accepted June 4th 2024)

ABSTRACT

Cultivating fattening mud crabs (Scylla serrata) usually requires a large area of land, innovation is carried out by making crab apartments. The research was conducted in September – November 2023, crab fattening locations in Pagarawan Village and Takari Beach, Bangka Regency. Location of mud crab morphometric measurements at the Aquatic Resources Management Laboratory, Bangka Belitung University. Test protein content at the DKI Jakarta Regional Health Laboratory. This research aims to examine the morphometrics, protein content and survival of mud crabs in crab apartments in Pagarawan Village and Takari Beach. Experimental research methods and community involvement to measure morphometrics, protein content and crab survival. The results of the research show that the ratio between weight, width and length of mangrove crabs in Pagarawan is 1.6:1.4:1. This shows that mud crabs are fatter. When the crab weighs around 160 grams, it is likely that the carapace width is ±14 cm and the carapace length is ±10 cm, while the crabs in Takari are smaller and thinner. The protein content of mangrove crabs in Pagarawan has an average value of 17.5 gr/100gr and in Takari 15.1 gr/100gr. The survival rate (SR) of mangrove crabs in Pagarawan is 87%. This condition means that crabs are suitable for cultivation in crab apartment boxes with a water source from a recirculation system pond. It is assumed that water pollution due to ammonia will not have much of an impact. The survival rate for mud crabs in Takari shows a zero percentage. The narrow space, food waste, and circulating water with an ammonia content of up to 0.05 mg/l are thought to have contributed to the crab's death. Water quality in both crab rearing areas shows that temperature, pH, salinity, DO, ammonia, nitrate and phosphate are still within the normal range for rearing mud crabs.

Key words: Apartment, Bangka Island, cultivation, fattening, mangrove crab (Scylla serrata)

ABSTRAK

Budidaya penggemukan kepiting bakau (*Scylla serrata)* biasanya membutuhkan lahan yang luas, inovasi dilakukan dengan membuat apartemen kepiting. Penelitian dilakukan bulan September – November 2023, lokasi penggemukan kepiting di Desa Pagarawan dan Pantai Takari, Kabupaten Bangka. Lokasi pengukuran morfometrik kepiting bakau di Laboratorium Manajemen Sumberdaya Perairan, Universitas Bangka Belitung. Uji kandungan protein di Laboratorium Kesehatan Daerah DKI Jakarta. Penelitian ini bertujuan untuk mengkaji morfometrik, kandungan protein, dan kelulushidupan kepiting bakau di apartemen kepiting di Desa Pagarawan dan Pantai Takari. Metode penelitian dengan eksperimental dan pelibatan masyarakat untuk mengukur morfometrik, kandungan protein, dan kelulushidupan kepiting. Hasil penelitian menunjukkan perbandingan antara berat, lebar, dan panjang kepiting bakau di Pagarawan yaitu 1,6:1,4:1. Hal ini menunjukan kepiting bakau lebih gemuk, saat berat kepiting sekitar 160 gram maka kemungkinan lebar karapas ±14 cm dan panjang karapas ±10 cm, sedangkan kepiting di Takari lebih kecil dan kurus. Kandungan protein kepiting bakau di Pagarawan dengan nilai rata-rata 17,5 gr/100gr dan di Takari 15,1 gr/100gr. Tingkat kelulushidupan atau *Survival Rate* (SR) kepiting bakau di Pagarawan yaitu 87%. Kondisi ini berarti kepiting cocok dibudidayakan dalam wadah box apartemen kepiting dengan sumber air dari kolam sistem resirkulasi, diduga bahwa pencemaran air akibat ammonia tidak terlalu mempengaruhi. Tingkat kelulushidupan kepiting bakau di Takari menunjukkan persentase nol. Ruang yang sempit, ada sisa makanan, dan sirkulasi air dengan kandungan amoniak hingga 0,05 mg/l diduga berkonstribusi pada kematian kepiting. Kualitas air di kedua tempat pemeliharaan kepiting menunjukkan suhu, pH, salinitas, DO, ammonia, nitrat, dan phospat masih dalam kisaran normal untuk pemeliharaan kepiting bakau.

Kata Kunci: Apartemen, budidaya, kepiting bakau (*Scylla serrata*), penggemukan, Pulau Bangka

INTRODUCTION

Bangka Island has a variety of biological resources, ranging from biological resources in the intertidal to subtidal areas. Intertidal biological resources include the phyla *mollusca* and *crustacea* which are associated with the mangrove ecosystem. A crustacean phylum that has high economic value and has great potential for cultivation is mangrove crabs (Haikal *et al.,* 2022). Mangrove crabs (*Scylla serrata*) on Bangka Island are known to be relatively expensive, but they can only be obtained from catching them in the wild. Data shows that the origin of mud crab commodities is from natural catching (±61.6%) and cultivation (±38.4%) (Saidah and Sofiah 2016; Bayu *et al.,* 2018). Crab fishing conditions in nature sometimes do not pay attention to age factors or the mature condition of the gonads. Apart from that, it was triggered by domestic market demand and exports abroad continued to increase (Ministry of Maritime Affairs and Fisheries, 2017). This condition causes a reduction in the quantity of crab biological resource populations in nature.

The problem of decreasing crab populations in nature can be carried out by restoration efforts, one of which is by cultivating and environmentally preserving crabs (Rustam *et al.,* 2023). Crab cultivation that has been developed mostly requires large areas of land, such as in several locations on Bangka Island, one of which is crab cultivation in Belinyu, Bangka Regency (Prasetiyono and Syaputra, 2017). In this research, we tried to create crab apartments in Pagarawan Village and Takari Beach by involving the local community. Community involvement and attention greatly influences maintenance in crab cultivation, thus affecting the growth and survival of mud crabs (*Scylla serrata*). The initiative to create crab apartments is one strategy to reduce cannibalism which can reduce survival rates. Cannibalism has been a

problem in mud crab cultivation since the formation of crab claws (Kamaruddin *et al.,* 2016; Mutamimah and Wahyudin, 2023).

Awareness of mangrove crab cultivation needs to be increased further, because this research is not only training people in crab cultivation, but also to preserve mangrove crabs in nature. Therefore, this activity aims to find out the results of crab cultivation in two different places (Pagarawan and Takari Villages). Successful community involvement in cultivation activities, especially crab fattening, is very beneficial for the sustainability of crab apartment management and the environment. This is because there is concern in cultivating maintenance, especially fattening in crab apartments. Apart from that, it will increase people's knowledge regarding skills to preserve the biological resources of mangrove crabs. Furthermore, economic potential is obtained from selling the results of this mangrove crab fattening business so that they do not always depend on catching them freely in nature. This study aims to examine the morphometrics, protein content and survival of mud crabs (*Scylla serrata*) in crab apartments in Pagarawan Village and Takari Beach..

METHODS

Research on cultivating mud crabs (*Scylla serrata*) was carried out experimentally in the field with the involvement of the Pagarawan Village community and Takari Beach Management, Bangka Regency. Cultivation of fattening mud crabs (*Scylla serrata*) is carried out in dryer box containers placed in the two locations above..

Place and Time

The research was conducted in September – November 2023, carrying out mangrove crab (*Scylla serrata*) cultivation in Pagarawan Village and Takari Beach, Bangka Regency. Morphometric measurements of mud crabs (*Scylla serrata*) at the Aquatic Resources Management Laboratory, Bangka Belitung University. Test protein content at the DKI Jakarta Regional Health Laboratory.

Mangrove crab cultivation plan (*Scylla serrata)*

Cultivation, especially fattening of mud crabs (*Scylla serrata*), is carried out in containers made from dry plastic. The number of mud crab fattening cultivation containers in Pagarawan Village and Takari Beach is 60 boxes for 60 individuals and 54 boxes for 54 individuals respectively, as shown in Figure 1. Feeding with trash fish and Probio_FmUBB probiotics is given to increase the appetite of mud crabs.

The morphometric measurement period along with the measurement of survival rate and environmental parameters is on the 0th, 7th, 14th, 21st, 28th, 35th, 42nd, 49th days for 70 days from the date 16 September 2023 to 25 November 2023. Morphometric measurements are assisted with calipers, writing tools and documentation tools. Protein measurements were only carried out at the end of cultivation to see differences in protein content from the two cultivation locations.

Figure 1. Mangrove crab cultivation apartment Mangrove crab cultivation apartment (*Scylla serrata*) in Pagarawan (a); and Takari (b)

Data Analysis

Morphometric measurements include body weight (gr), carapace width (mm), carapace length (mm), body thickness (mm), meat weight (gr), and gender. The protein content test was carried out using standard procedures in the laboratory. On the 42nd and 49th days, morphometrics, protein content and survival (SR) were calculated. Survival calculations are calculated using the Effendie formula (1997):

$$\% \text{ Survival rate (SR)} = [Nt/No] \times 100\%$$

Keterangan:
SR = Survival rate (%)
Nt = Number of fish at the end of the study (tail)
No= Number of fish at the start of the study (tail)

RESULT

Based on research results, the morphometric conditions of mud crabs (*Scylla serrata*) are very different between cultivation in Pagarawan and Takari. Conditions in Pagarawan show that the size is larger than in Takari. This is as shown in Table 1.

Table 1. Morphometrics of mud crabs (*Scylla serrata*) from the Pagarawan and Takari cultivation locations, Bangka Regency (average size on day-to-day)

Cultivation Location	Morfometrik	To-42	To-49
Pagarawan	Body weight (gr)	100	84
	Carapace width (mm)	80,3	73,8
	Carapace length (mm)	59,9	53,7
	Body girth (mm)	67,9	32,6
	Meat weight (gr)	16,11	15,18
	Sex	Male	Male
	Protein content (gr/100gr)	19,66	15,38
	Survival Rate (SR) (crabs)	55	52
	Body weight (gr)	22	12
	Carapace width (mm)	49,5	40,1

Takari	Carapace length (mm)	36,6	28,1		
	Body girth (mm)	19,2	15		
	Meat weight (gr)	2,73	1,21		
	Gender	Male	Male		
	Protein content (gr/100gr)	14,87	15,26		
	Survival Rate (SR) (ekor)	0	0		

The highest protein content of mud crab (*Scylla serrata*) in Pagarawan was 19.66 g/100g, while in Takari it was 15.26 g/100g (Table 1). Based on the results of research on fattening mud crab (*Scylla serrata*) cultivation, the water quality conditions during cultivation at both locations showed that conditions in Pagarawan were better than in Takari. This is as shown in Table 2.

Table 2. Water quality in rearing mangrove crabs (*Scylla serrata*) in Pagarawan and Takari

Parameter	Location and Quality Standards		
	Pagarawan	Takari	Quality standards *
pH	5,6 – 6,7	4,3 – 6,1	6,5-8,5
Temperatur (°C)	28,0 – 31,5	29,2 – 30,4	28-32°C
DO (mg/l)	7,1 - 7,6	7,4 – 7,7	>4 (mg/l)
Salinity (°/₀₀)	18 – 21	19 – 21	28-30(°/₀₀)
Amonia (mg/l)	0,2 – 0,5	0,2 – 0,5	<0,1 (mg/l)
Nitrat (mg/l)	0,5 – 1,0	0,5	<0,1 (mg/l)
Phospat (mg/l)	0,02 – 0,05	0,03	

*Nurcahyono *et al.,* 2019

Survival Rate (SR) data for fattening mud crabs (*Scylla serrata*) in Pagarawan with SR = 0.87, and in Takari with SR = 0 for 70 days of research.

DISCUSSION

Crab apartments are able to increase visitor interest in a tourist destination such as Takari Beach (Adibrata *et al.,* 2024). A crab apartment is a place and cultivation technique, especially for fattening crabs, which is arranged vertically and equipped with adequate water circulation to support crab growth. The growth of cultivated crabs (Scylla serrata) on Takari Beach shows that the average size is smaller than in Pagarawan Village (Table 1). Differences in morphological size can be influenced by new environmental conditions that affect crab seeds from different origins. Apart from that, the growth of crabs cultivated in the apartment system in Takari can be influenced by the level of community concern in maintaining them. Measuring the weight, width and length of crabs are important parameters for collecting data (Kalsum and Dimenta, 2023). The ratio between weight, width and length for the location in Pagarawan is 1.6:1.4:1. This shows that crabs are fatter, where when there are mud crabs weighing around 160 grams, it is likely that the crab's carapace width is ±14 cm and the carapace length is ±10 cm. Meanwhile, the ratio between weight, width and length for the location in Takari is 1:2.6:1.9. This shows that crabs are thinner, where when there are mud crabs weighing around 100 grams, it is likely that the crab's carapace width is ±26 cm and the carapace length is ±19 cm. Patience in feeding is key, it has been proven that fattening mud crabs in Pagarawan look quantitatively fatter. Food in the form of trash fish is the food that mud crabs like.

The highest protein content of mangrove crabs (*Scylla serrata*) in Pagarawan is known to be 19.66 gr/100gr with an average value of 17.5 gr/100gr. Meanwhile, the highest protein content of mud crab (*Scylla serrata*) in Takari is known to be 15.26 gr/100gr, with an average value of 15.1 gr/100gr. The protein content ratio of mud crabs in Pagarawan is known to be higher than Takari. The formation of crab meat is contributed by feed input and the environment. Regarding feed input for both locations, they were given the same feed, namely trash fish. Based on previous research, the protein content in trash fish without probiotics was 68.13% (Adibrata *et al.,* 2022) and the protein content in trash fish with the probiotic Probio_FmUBB was 25.75% (Adibrata *et al.,* 2022b). The protein content of probiotic trash fish appears to be lower in protein value, suggesting that the protein content has begun to be broken down by the bacteria contained in the probiotics. Even though the protein content is lower, the digestibility of probiotic trash fish is more easily digested by mangrove crabs so that it is effectively and efficiently absorbed by the crab's body. Regarding the environment as a place for mangrove crabs to live, there is tin mining activity around Takari Beach, but there is no tin mining around the river in Pagarawan. This is thought to also have an effect on the proximate content of the mangrove crab's body.

The survival rate (SR) of mangrove crabs in Pagarawan shows a percentage of 87%. This condition shows that crabs are suitable for cultivation in crab apartment boxes with a water source from a recirculation system pond. It is suspected that water pollution due to ammonia will not be too influential. This is because the clean water source from the pond can relatively guarantee the growth of mangrove crabs in the crab apartment and the water flow is relatively smooth (Figure 1a). The survival rate for mud crabs in Takari shows a zero percentage. This condition shows that crabs are not suitable for cultivation in narrow-scale containers, the water volume is small from the tedmon, it is suspected that there is water pollution due to the accumulation of leftover feed and poor water drainage (Figure 1b). This is because the feeding habit of crabs is omnivore (Iromo, 2019; Koniyo 2020), crabs in nature are also deposit feeders. Crabs are more active at night to feed on algae, fish and shrimp carcasses (Ibrahim and Iromo 2020). The narrow space, food waste, and circulating water with an ammonia content of up to 0.05 mg/l are thought to influence crab death, so that morphometrically growth in Takari's apartment is slower.

Water quality in both crab rearing areas shows that temperature, pH, salinity, DO, ammonia, nitrate and phosphate are still within the normal range for rearing mud crabs (Table 2). The life range of crabs according to Kathiandago (2014) states that the optimal temperature for rearing mud crabs (Scylla serrata) is around 25-35 oC, pH is around 7 – 8.5 (Arianto, 2017), and maximum ammonia is 1.2 mg/l (Kurniah *et al.,* 2016). Based on the water quality conditions, it is possible that morphometric differences are not only influenced by water quality. Differences in crab size and morphometrics may be due to parasites or disease and adaptation. Apart from that, the difference in the source of crab (*Scylla serrata*) seeds cultivated in the two locations comes from different seeds and origins, so genetically it also influences growth after being cultivated in a new place. This is in accordance with what was stated by Lubis and Rahmi (2022) that differences in crab size during growth can be caused by age, disease and parasites, and food availability. According to Maulana (2018) substrate is also a factor in the life of crabs. Fine substrates contain more organic material which affects crab growth.

CONNLUSION

The study of morphometric measurements of mud crabs includes body weight, carapace width, carapace length, body thickness, meat weight and gender. The ratio between weight, width and length of mangrove crabs in Pagarawan is 1.6:1.4:1. This shows that mud crabs are fatter. When the crab weighs around 160 grams, the carapace width is probably ±14 cm and

the carapace length is ±10 cm. Meanwhile, the ratio for locations in Takari is 1:2.6:1.9. This shows that the crab is thinner. When a mud crab weighs around 100 grams, it is possible that the carapace width is ± 26 cm and the carapace length is ± 19 cm. The protein content of mangrove crab (*Scylla serrata*) in Pagarawan is 17.5 gr/100gr and in Takari 15.1 gr/100gr. The formation of crab meat is contributed by the input of trash fish feed and environmental conditions. The survival rate (SR) of mangrove crabs in Pagarawan shows a percentage of 87%. This condition means that crabs are suitable for cultivation in crab apartment boxes with a water source from a recirculation system pond. It is assumed that water pollution due to ammonia will not have much of an impact. The survival rate for mud crabs in Takari shows a zero percentage. Narrow space, food waste, and circulating water with an ammonia content of up to 0.05 mg/l are thought to affect crab growth. Water quality in both crab rearing areas shows that temperature, pH, salinity, DO, ammonia, nitrate and phosphate are still within the normal range for rearing mud crabs..

ACKNOWLEDGEMENT

The entire research team would like to express their gratitude to the Institute for Research and Community Service (LPPM) of Bangka Belitung University. The 2023 University Level Lecturer Research Scheme (PDTU) is funded by Bangka Belitung University, Ministry of Education, Culture, Research and Technology with Contract Number 323.AE/UN50/L/PP/2023.

REFERENCES

Adibrata, S., Astuti, R. P., Bahtera, N. I., Lingga, R., Manin, F., & Firdaus, M. (2022). Proximate Analysis of Bycatch Fish and Probiotics Treatments Towards the Good Aquaculture Practices. *Ilmu kelautan: Indonesian Journal of Marine Sciences*, *27*(1): 37-44. DOI: 10.14710/ik.ijms.27.1.37-44

Adibrata, S., Syaputra, D., Perangin-angin, R., Wulansari, D., & Van, K. V. (2022). The Nutritional Content of Fish Meal from Bycatch in Batu Beriga Village, Bangka Belitung. *Ilmu Kelautan: Indonesian Journal of Marine Sciences*, *27*(3):233-239. DOI: 10.14710/ik.ijms.27.3.233-239

Adibrata, S., Wahidin, L. O., & Guskarnali, G. (2024). Penggemukan Kepiting Bakau (*Scylla serrata*) Sistem Apartemen sebagai Atraksi Wisata di Pantai Takari Bangka Belitung. *Jurnal Abdi Insani*, *11*(1): 41-50. https://doi.org/10.29303/abdiinsani.v11i1.1188

Arianto, I. (2017). Studi Kualitas Air di Kawasan Habitat Kepiting Bakau (*Scylla sp*) Perairan Muara Sungai Kayan Kabupaten Bulungan Provinsi Kalimantan Utara. (*Skripsi*). Universitas Borne Tarakan.

Bayu, R. W. J., & Iqbal, M. (2018). Pengembangan Alat Kondensasi Pengukur Oksigen Udara Ambien untuk Mendukung Praktikum pada Mata Kuliah Pengetahuan Lingkungan. *Saintifika*. 20 (1): 11–22.

Effendie, M. I. (1997). *Metode Biologi Perikanan*. Yayasan Pustaka Dwi Sri, Bogor.

Haikal, M., Rahmadina, N., & Berliani, S. (2022). Model Budidaya Kepiting Soka Skala Rumah Tangga Sistem Apartemen sebagai Sarana Edukasi Masyarakat Pulau Bangka. *Literasi: Jurnal pengabdian masyarakat dan inovasi*, *2*(1): 8-14.

Ibrahim, A. J., & Iromo, H. (2020). Pengembangan Usaha Budidaya Kepiting Bakau di Tambak Tradisional Desa Liagu Kabupaten Bulungan. *Jurnal Pengabdian Masyarakat Borneo*, *4*(2): 129-136.

Iromo , H. (2019). *Pengembangan Budidaya Kepiting Bakau di Kaltara*. Deep Publish Press. Yogyakarta. 67 hal.

Kalsum, U., & Dimenta, R. H. (2023). Studi Morfometrik kepiting rajungan (*Portunus Pelagicus*). *Bioedusains: Jurnal Pendidikan Biologi dan Sains*, *6*(1): 256-267. https://doi.org/10.31539/bioedusains.v6i1.4785.

Katiandagho, B. (2014). Analisis Fluktuasi Parameter Kualitas Air Terhadap Aktifitas Molting Kepiting Bakau (*Scylla* sp). *Agrikan*: *Jurnal Agribisnis Perikanan*, 7(2): 21-25.

Kamaruddin, K., Usman, U., Laining, A. (2016). Performa Pertumbuhan Krablet Kepiting Bakau (*scylla olivacea*) dengan Frekuensi Pemberian Pakan Berbeda pada Stadia Pendederan. *Jurnal Riset Akuakultur*, 11(2): 163-170.

Kementerian Kelautan dan Perikanan (KKP). (2017). *Kelautan dan Perikanan dalam Angka Tahun 2011*. Pusat Data Statistik dan Informasi. Jakarta, 120 hlm.

Kurniah, K., Rohani, S., & Gaffar, A. 2016. Fluktuasi Amonia dan Nitrit pada Pemeliharaan Kepiting Bakau (*Scylla* sp.) Sistem Silvokultur. *Buletin Teknik Litkayasa Akuakultur*, *11*(2): 93-96.

Koniyo, Y. (2020). *Teknologi Budidaya Kepiting Bakau (Scylla serrate Forsskal) Melalui Optimalisasi Lingkungan dan Pakan*. CV.AA.Rizky: Banten

Lubis, F., & Rahmi M M. (2022). Parameter Pertumbuhan Rajungan (*Portunus pelagicus*) di Perairan Asahan Sumatera Utara. *Journal of Aceh Aquatic Science*, *6*(1): 1-10. https://doi.org/10.35308/jaas.v6i1.5406.

Maulana, L. H. (2018). Keanekaragaman Makrozoobentos sebagai Bioindikator Kualitas Air Sungai Cokro Malang [dissertation]. Malang : Universitas Islam Negeri Maulana Malik Ibrahim.

Mutamimah, D., & Wahyudin, Y. (2023). Teknik Pembesaran Kepiting Bakau (*Scylla* sp.) di Teluk Pangpang Kabupaten Banyuwangi. *Insologi: Jurnal Sains dan Teknologi*, *2*(1), 244-249.

Nurcahyono E., Raharjo S., Subali, I., & Jasmo. (2019). Petunjuk Teknis Pembenihan Kepiting Bakau (*Scylla serrata*). Balai Besar Perikanan Budidaya Air Payau. Direktorat Jenderal Perikanan Budidaya. Kementrian Kelautan dan Perikanan. Jepara. 20 hal

Prasetiyono, E., & Syaputra, D. (2017). Budidaya Kepiting Bakau di Kelurahan Air Jukung, Kecamatan Belinyu, Kabupaten Bangka. *Jurnal Pengabdian Kepada Masyarakat Universitas Bangka Belitung*, *4*(2): 9-17.

Rustam, R., Jayadi, J., & Darmawati, D. (2023). Analisis Bioekologi Perairan Pesisir untuk Pengembangan Budidaya Kepiting Bakau (*scylla serrata, forskal*) dengan Hutan Mangrove (*sylvocrab*). *jurnal Akuakultur, Teknologi dan Manajemen Perikanan Tangkap dan Ilmu Kelautan*, *6*(2): 162-173.

Saidah, S., & Sofia, L. A. (2016). Pengembangan Usaha Pembesaran Kepiting Bakau (*Scylla* spp) Melalui Sistem Silvofishery. *Jurnal Hutan Tropis*, *4*(3): 265-272.