Fisheries Journal, 15 (5), 2905-2913 (2025)
http://doi.org/10.29303/jp.v15i5.1828

DIVERSITY OF FIDDLER CRABS (*Uca* spp.) IN THE MANGROVE FOREST AREA OF PARIT 9 TUNGKAL I VILLAGE TUNGKAL ILIR DISTRICT TANJUNG JABUNG BARAT REGENCY

Keanekaragaman Kepiting Biola (*Uca* spp.) pada Kawasan Hutan Mangrove Parit 9 Desa Tungkal I Kecamatan Tungkal Ilir Kabupaten Tanjung Jabung Barat

Lina Sarpika[1], Bs Monica Arfiana[1*], Teja Kaswari[2], Yun Alwi[2], Fauzan Ramadhan[1], Muhammad Hafidz Ibnu Khaldun[1]

[1]Fishery Resources Utilization Study Program, University of Jambi, [2] Animal Husbandry Study Program, University of Jambi

Jambi – Muaro Bulian Road No. KM. 15, Mendalo Darat, Jambi, 36361

[*]Corresponding author: besse020195@unja.ac.id

(Received August 25th 2025; Accepted December 9th 2025)

ABSTRACT

The mangrove ecosystem is an important habitat for fiddler crabs (*Uca* spp.). Mangroves provide shelter, breeding grounds, and a food source in the form of organic matter from decaying leaves. The reduction in mangrove forest area will impact the survival of fiddler crabs because mangrove trees are their natural habitat and also provide food for these crabs. This study aims to identify the diversity and population density of fiddler crabs (*Uca* spp.) and to analyze the types of mangroves and their density. The method used in this research was a survey method at three observation stations, employing manual sampling techniques (hand collecting), as well as diversity analysis using the Shannon-Wiener index and mangrove density based on standard criteria from the Ministry of Environment. The results showed the presence of four species of fiddler crabs (*Uca rosea, Uca forcipata, Uca coarctata, Uca dussumieri*) and four types of mangroves (*Sonneratia alba, Rhizophora mucronata, Avicennia alba, and Nypa fruticans*). The diversity index of fiddler crabs was categorized as moderate, while mangrove density varied among stations, with tree density classified as sparse, and pole and seedling density classified as moderate and dense, respectively. This research provides important information for conservation efforts and sustainable management of the mangrove ecosystem in the region.

Keywords: Fiddler Crab, Mangrove, Diversity, Density

ABSTRAK

Ekosistem mangrove merupakan habitat penting bagi kepiting biola (*Uca* spp.) mangrove menyediakan tempat berlindung, berkembang biak dan sumber makanan berupa bahan organik dari daun yang membusuk. Berkurangnya luasan hutan mangrove akan mempengaruhi keberlangsungan hidup kepiting biola karena pohon mangrove merupakan habitat alamai dari

kepiting biola dan juga penyedia makanan bagi kepiting tersebut. Adapun tujuan dari penelitian ini yaitu untuk mengidektifikasi keanekaragaman dan kepadatan populasi kepiting Biola (*Uca* spp.) dan juga menganalisis jenis-jenis mangrove dan kerapatan mangrove. Metode yang digunakan padapenelian ini yaitu metode survei di tiga stasiun pengamatan, menggunakan teknik pengambilan sampel manual (hand collecting), serta analisi keanekaragaman dengan indeks Shannor-Wiener dan kerapatan mangrove berdasarkan kriteria baku dari Kementrian Lingkungan Hidup. Hasil penelitian menunjukan adanya empat spesies kepiting biola (*Uca rosea, Uca Forcipata, Uca Coarctata, Uca Dussumeiri*) dan empat jenis mangrove (*Sonneratia alba, Rhizophora Mucronata, Avicennia alba dan Nypa Fruticans*). Indeks keanekaragaman kepiting biola tergolong sedang, sementara kerapatan mangrove bervariasi antar stasiun dengan kerapatan tinggkat pohon tergolong jarang, sedangkan tingkat pancang dan semai tergolong sedang dan padat. Penelitian ini memberikan informasi yang penting untuk upaya konservasi dan pengelolaan ekosistem mangrove yang berkelanjutan di wilayah tersebut.

Kata kunci: Kepiting Biola, Mangrove, Keanekaragaman, Kerapatan

INTRODUCTION

Indonesia is an archipelagic country consisting of numerous islands and coastal areas. The coastal areas of Indonesia are abundantly covered with mangrove trees. Indonesia has extensive mangrove forests, covering approximately 4.5 million hectares (Yanti, 2021). According to Ruwaidah *et al.,* (2021), a mangrove ecosystem is a coastal ecosystem that is routinely submerged by seawater and affected by tides. This ecosystem is characterized by muddy and sandy soil. In Jambi Province, one area with mangrove vegetation is Tungkal I Village, West Tanjung Jabung Regency. Geographically, Tungkal I Village covers approximately 46.78 km2, with a mangrove area covering 21 km2 (Shalehati *et al.,* 2023).

According to research by Achmad *et al.,* (2020), the mangrove ecosystem in West Tanjung Regency experiences a decline in mangrove cover density every year. Mangrove cover density decreased from 1989 to 2018. In 1989, the mangrove area was recorded at 74,4239 km2, then decreased to 46,5975 km2 in 2000, and continued to decline to 32,7507 km2 in 2018. The mangrove ecosystem in Tungkal I village has undergone significant changes caused by human activities. According to data from the Jambi Natural Resources Conservation Agency (BKSDA) in 2019, the mangrove forest area in the area is located near the mouth of the Pengabuan River and experiences substrate sedimentation caused by river flow.

The mangrove ecosystem serves as a habitat for various aquatic fauna, including crabs of the genus *Uca*. The *Uca* spp. crab, also known as the fiddler crab, has a unique claw shape and distinctive body color. Fiddler crabs (*Uca* spp.) are a type of crab belonging to the order Decapoda and the family Ocypodidae. This species is a fauna that is highly dependent on the mangrove ecosystem. Crabs from the Ocypodidae family generally live in coastal tidal areas, while fiddler crabs use mangroves as a breeding ground and to undergo all stages of their life cycle (Murniati, 2009).

Uca species are often found and thrive in mangrove habitats. There are 97 species of fiddler crabs worldwide, and 19 species of fiddler crabs have been identified in Indonesia. Several studies related to fiddler crabs in the mangrove ecosystem of Jambi Province have been conducted in West Tanjung Jabung by (Suprayogi *et al.*, 2014) and in East Tanjung Jabung by (Ardiyanti *et al.*, 2018). Suprayogi's research identified three species of fiddler crabs: *Uca* forcipata, *Uca* rosea, and *Uca* dussumieri. Ardiyanti also identified three species of fiddler crabs: *Uca* dussumieri, *Uca* annulipes, and *Uca* forcipata.

The fiddler crabs are *Uca* dussumieri, *Uca* annulipes, and *Uca* forcipata. The abundance of fiddler crabs and mangrove density is negatively or inversely related, as higher mangrove density leads to lower fiddler crab abundance (Septiani *et al.*, 2019). However, dense and dense

mangrove forests provide an ideal environment for the crabs to forage, shelter from predators, and reproduce. Intertwined mangrove roots form a complex network within the mud, creating numerous safe crevices and burrows for nesting. The denser the mangrove cover, the more shelter and hiding areas are available, thus supporting the growth of the fiddler crab population (Ar'Rizky, 2024). The purpose of this study is to determine the level of diversity of fiddler crab species and also to determine the types and density of mangroves, therefore data is needed regarding the diversity of fiddler crabs, so that a study entitled "Diversity of Fiddler Crabs in the Parit 9 Mangrove Forest Area, Tungkal I Village, Tungkal Ilir District, West Tanjung Jabung Regency is needed".

RESEARCH METHODS

This research was conducted in the Kelapa Beach mangrove tourism area, Parit 9, Tungkal 1 Village, Tungkal Ilir District, West Tanjung Jabung Regency, Jambi Province, from February 1 to March 1, 2025.

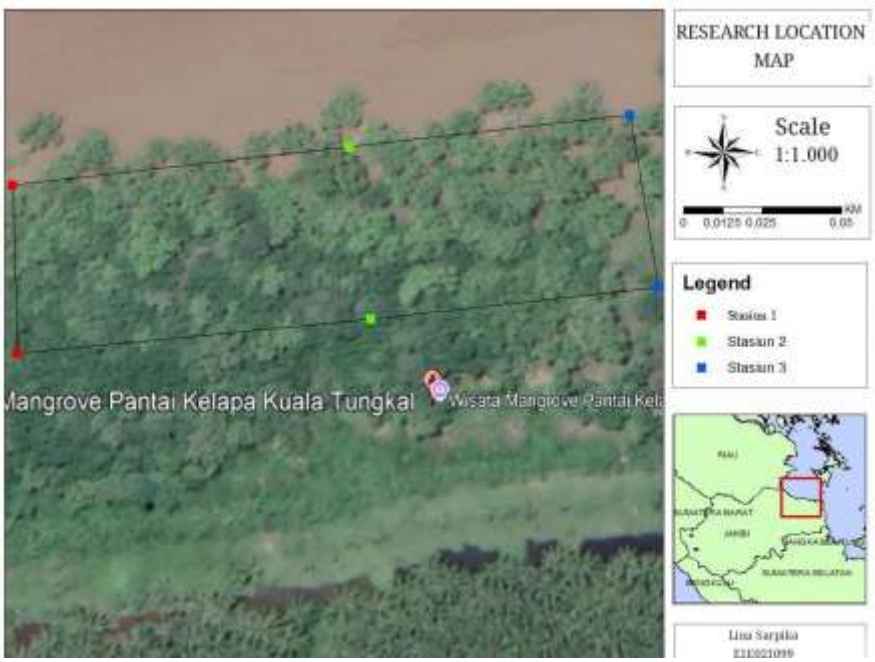

Figure 1. Research Location Map

The materials used in this study were fiddler crabs and mangroves. The tools used were a 100-meter roll, raffia rope, plastic sample bags, sandals, a shovel, scissors, a GPS, a laptop, a test board, and a camera. The materials used in this study were tracing paper, stationery, label paper, and tissues.

The sampling stations were determined using a random sampling method consisting of three stations with a distance of 50–100 m between them. A 50-m transect line was then drawn from sea to land, each station consisting of three plots. Crab sampling was only carried out within the plots at the lowest tide, using the hand-collecting method, which involves manually digging a 30-m-deep hole with a shovel or piece of wood (Ruwaidah *et al.*, 2021). Mangrove sampling was conducted by installing lines at three stations, each consisting of three plots measuring 10 x 10 m (for the tree stage), 5 x 5 m (for the sapling stage), and 1 x 1 m (for the seedling stage), with a spacing of 10 m per plot.

Mangrove vegetation data was categorized based on growth stage: trees, saplings, and seedlings. For the tree stage, data was collected from individual mangroves with a minimum diameter of 10 cm and a height of more than 1.5 m. Diameter measurements were taken by

encircling the mangrove trunk at breast height using a cloth tape measure. Meanwhile, the sapling stage included mangroves with a diameter between 2 and 10 cm and a height of 1.5 m, while the seedling stage consisted of mangroves less than 1.5 m in height (Sahami, 2018).

Data Analysis

1. Population Density

   Density is the number of individuals in a certain area (Krebs, 1989) and the formula can be calculated using the following formula:

$$Di = \frac{ni}{A}$$

   Information:
   Di = Density of individuals of the i-th species
   ni = Number of individuals of species I (ind/ha)
   A = Sampling area size (ha)

2. Species diversity index

   The species diversity index (Shannon & Wiener) has several categories according to Odum (1996) as follows:

$$H' = -\sum_{i=1}^{s} pi.\ln pi$$

   Information:
   H' = Shannon-Wiener species diversity index
   Pi = (ni / N) = proportion of each species (I = 1,2,3….)
   Ni = Number of individuals per species
   N = Total number of all individuals

   The Diversity Index (Shannon-Wiener) according to Odum (1993) is divided into three categories based on the condition of the organisms, namely as follows:
   Jika H' ≤ 1 : Low diversity
   Jika 1 ≤ H' ≤ 3 : Moderate Diversity
   Jika H' ≥ 3 : High Diversity

3. Mangrove plant density analysis

   The density of mangrove plants can be analyzed using the formula according to Deviliyana, (2022) as follows:

$$C = \Sigma \frac{ni}{Su}$$

   Information:
   C = Density
   Ni = Number of individuals of type I (ind/ha)
   Su = The sum of the areas of all sampling units or plots (ha)

   Based on the results of the analysis according to the formula above, the density of each type of mangrove is then assessed using standard density criteria.

Table 1. Mangrove density criteria

Criteria	Closing (%)	Density (trees/ha)
Very dense	≥ 75	> 1500
Moderate	≥ 50 -< 75	> 1000 - < 1500
Rare	< 50	< 1000

Source: (Minister of Environment Decree, 2004)

RESULT

Research conducted in the Pantai Kelapa mangrove tourism area revealed four species of fiddler crabs: *Uca* rosea, *Uca* forcipata, *Uca* coarctata, and *Uca* dussumeiri. Four species of mangroves were also found: Sonneratia alba, Avicennia alba, Rhizophora mucronata, and Nypa fruticans. Mangrove vegetation data was categorized based on growth stage: trees, saplings, and seedlings. The table below shows the diversity and density index values for fiddler crabs and mangrove density:

Table 2. Diversity and Density Values

No	Type	Amount	H'			Density (Ind/ha)		
			ST 1	ST 2	ST 3	ST 1	ST 2	ST 3
1.	*Uca* rosea	40	1,517	1,681	1,685	100,00	566,66	666,66
2.	*Uca* forcipata	58				200,00	800,00	933,33
3.	*Uca* dussumeiri	28				66,66	433,33	433,33
4.	*Uca* coarctata	1				33,33	0	0

Table 3. Density of mangrove species at tree level

Station	Number of individuals	Density (Ind/ha)	Criteria
1	11	366,66	Rare
2	11	366,66	Rare
3	23	766,66	Rare

Table 4. Density of mangrove species at the sapling level

Station	Number of individuals	Density (Ind/ha)	Criteria
1	23	3066,66	Dense
2	8	1066,66	Medium
3	15	2000,00	Dense

Table 5. Density of mangrove species at seedling level

Station	Number of individuals	Density (Ind/ha)	Criteria
2	3	10000,00	Dense

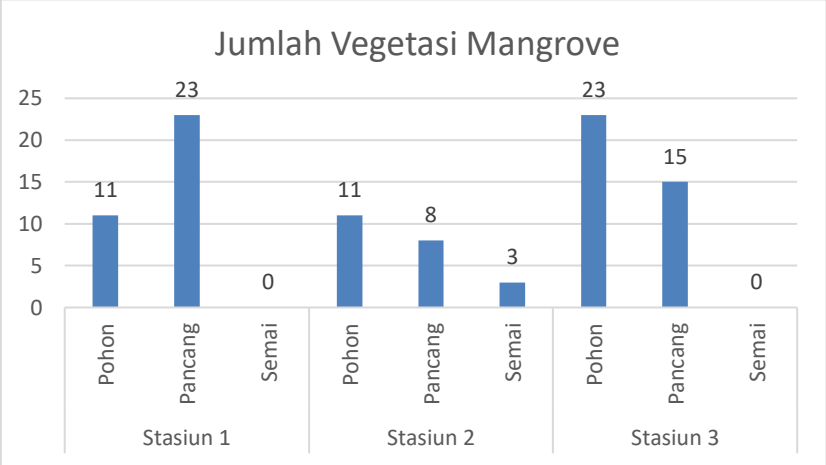

Figure 1. Graph of mangrove tree vegetation

DISCUSSION

Based on the data analysis results in Table 1, the diversity index for fiddler crabs in the Kelapa Beach mangrove tourism area falls into the moderate category. This is due to a decline in diversity at the study site due to changing environmental pressures and the influence of human activities. Diversity tends to decrease along with declining environmental quality (Shanmugam & Vairamani, 2008).

Fiddler crab density in the Kelapa Beach mangrove tourism area at stations 1, 2, and 3 is classified as low. The species with the highest density is *Uca* forcipata, while the species with the lowest density is *Uca* coarctata. The low density of fiddler crabs is influenced by several factors, one of which is the substrate. Krisnawati *et al.*, (2018) explained that fiddler crab abundance is closely related to the organic matter content in the substrate. The higher the organic matter content, the greater the abundance of fiddler crabs in an area.

Of the four fiddler crab species found, the one with the highest density is *Uca* forcipata. The fiddler crab species found at each station varied. Four species were found at station 1, while only three were found at stations 2 and 3. This is because each crab species has a different habitat. Density is influenced by many factors, including environmental factors, predators, water quality, human activity, vegetation, habitat conditions, sunlight intensity, and food availability (Ar'Rizky, 2024).

The species with the highest density was *Uca* forcipata, found at each station. This species can survive in black muddy substrates caused by human waste and rotting mangrove leaves. This finding aligns with Sawitri *et al.,* (2019) finding that this type of crab can thrive in black muddy substrates, especially in areas with abundant litter and fallen and decaying mangrove leaves. These conditions cause the mud to become black and damp.

Uca coarctata is the species with the lowest density, found only at station 1 plot 1. This is because this type of crab is only found in locations with aqueous mud substrate (Winanti, 2014). This opinion is also supported by the statement from Penha-Lopes *et al.,* (2009) that *Uca* coarctata is the least abundant *Uca* compared to other crab species, because this species has difficulty adapting to dry habitats and low salinity.

As can be seen in Table 2 above, the density of mangrove species at the tree level in the study location ranged from 366.66 ind/ha to 766.66 ind/ha, which is classified as rare based on the Decree of the Minister of Environment, 2004, which states that mangroves with a density of <1000 can be categorized as rare.

As seen in Table 3 above, the very dense mangrove density at the sapling level is found at stations 1 and 3, ranging from 2,000 to 3,066.66 individuals/ha. According to the Minister of Environment Decree (2004), a density value of 1,500 individuals is categorized as very

dense. Meanwhile, at station 2, the mangrove density is only 1,066.66 individuals/ha, which is categorized as sparse.

The high density at station 1 indicates that many trees are growing and developing to tree level. The lowest density is at station 2, at only 1,066.66 individuals/ha, which is categorized as moderate. The low density of mangroves can be seen from their relatively sparse growth, which is caused by environmental conditions such as sediment and salinity, these factors affect mangrove growth so that it is less than optimal (Farid *et al.,*, 2022).

Table 4 above shows that the density of mangrove seedlings in this study can be categorized as very dense. This refers to the Decree of the Minister of Environment, 2004, which states that a mangrove density value of ≥ 1,500 is categorized as very dense. The large number of mangrove seedlings at station 2 indicates that the mangrove ecosystem in the area is recovering. This is similar to Devi, (2023) statement that a large number of seedlings indicates that the ecosystem in the area has good regenerative capacity and is recovering.

Figure 1 above shows the number of mangrove stands at the study site. As can be seen at stations 1 and 3, no mangrove seedlings were found. This is due to the obstruction of sunlight, which is essential for photosynthesis, caused by large trees blocking sunlight. This makes it difficult for seedlings to grow and their numbers are limited (Usman *et al.,* 2013). The number of mangrove stands at station 2 is the smallest compared to stations 1 and 3, which is only 22 stands. This is because station 2 is close to the tourist area, indicating a lot of mangrove trees have been cut down and converted to build tracking. The number of mangrove stands at station 1 reached 34 stands and station 3 reached 38 stands. This is because stations 1 and 3 are far from the tourist area, indicating that there have not been many changes caused by human activities. Similar to the opinion (Prasetyo 2007) who explained that mangrove areas with high values indicate the condition of the mangrove ecosystem is still good and has not experienced degradation or significant changes.

CONCLUSION

In the Kelapa Beach mangrove tourism area, ditch 9, Tungka 1 Village, four species of fiddler crabs (*Uca* spp.) were found: *Uca* rosea, *Uca* forcipata, *Uca* coarctata, and *Uca* Dussumeiri, with a moderate diversity index. The highest density was achieved by *Uca* forcipata, while *Uca* coarctata was the least frequently found species. In addition, four mangrove species were found, with tree densities classified as sparse, but sapling and seedling densities classified as moderate to dense, indicating potential for ecosystem recovery. However, tree felling and environmental changes remain conservation challenges in this area.

ACKNOWLEDGEMENT

We are very grateful to the management of the Kelapa Beach mangrove tourism and the residents of Tungkal 1 Village who have accepted and helped and provided the opportunity to conduct research in the Kelapa Beach mangrove tourism area.

REFERENCES

Achmad, E., Nursanti, Marwoto, Fazriyas, & Jayanti, D. P. (2020). Studi Kerapatan Mangrove dan Perubahan Garis Pantai Tahun 1989-2018 di Pesisir Provinsi Jambi. *Jurnal Pengelolaan Sumberdaya Alam dan Lingkungan, 10*(2), 138–152. https://doi.org/10.29244/jpsl.10.2.138-152

Ardiyanti, S., Hamidah, A., & Sukmono, T. (2018). Keanekaragaman Kepiting Biola (Infraordo: Brachyura) di Ekosistem Mangrove Desa Lambur Kabupaten Tanjung Jabung Timur. *Jurnal Pendidikan Biologi, 14*(1), 1–10.

Ar'Rizky, A. W. (2024). Struktur Komunitas Biota Asosiasi mangrove di Kawasan Pangkal Babu Kabupaten Tanjung Jabung Barat. *Skripsi*, Universitas Jambi.

Balai Konservasi Sumber Daya Alam Jambi. (2019).

Devi, I. K. (2023). Kondisi Komunitas Mangrove dan Potensi Regenerasi Alami Vegetasi Mangrove di Kawasan Ekosistem Esensial (KEE) Muara Kali Ijo Kebumen. *Skripsi*, Universitas Jendral Soedirman.

Deviliyana. (2022). Jenis dan Kerapatan Tumbuhan Mangrove di Kawasan Wisata Mangrove Kelurahan Kabonga Besar dan Pemanfaatannya Sebagai Sumber Belajar. *Skripsi*, Universitas Tadaluko.

Farid, A., Rosi, M. F., & Arisandi, A. (2022). Struktur komunitas Mangrove di Ekosistem Mangrove Lembung Kecamatan Galis Kabupaten Pemekasan. *Jurnal Kelautan Nasional, 3*(1), 231–242.

Kepmen Lingkungan Hidup. (2004). Kriteria Baku dan Pedoman Penentuan Kerusakan Mangrove.

Krebs, C. J. (1989). *Ecological methodology*. New York, NY: Harper and Row Publishers Inc., 654 p.

Krisnawati, Y., Arthana, I. W., & Dewi, A. (2018). Variasi Morfologi dan Kelimpahan *Uca* spp. di Kawasan Mangrove Tuban-Bali. *Journal of Marine and Aquatic Sciences, 4*(2), 236–243.

Murniati, D. C. (2009). Perbandingan Luas Tutupan Spoon Tiped Setae Maksiliped Kedua pada *Uca* spp. (Brachyura: Ocypodidae). *Jurnal Fauna Tropika, 8*(1), 1–8.

Odum, E. P. (1996). *Dasar-Dasar Ekologi. Edisi Ketiga*. Gajah Mada Universitas Press. Yogyakarta

Penha-Lopes, G., Bartolini, F., Limbu, S., Cannicci, S., Kristensen, E., & Paula, J. (2009). Are Fiddler Crabs Potentially Useful Ecosystem Engineers in Magrove Watewater Wetlands? *Marine Pollution Bulletin, 58*(11), 1694–1703. https://doi.org/10.1016/j.marpolbul.2009.06.015

Prasetyo. (2007). Distribusi Spasial Vegetasi mangrove di Kecamatan Tanjung Palas Timur Kabupaten Bulungan Kalimantan Timur. *Skripsi*, Jurusan Parikanan Universitas Muhammadiyah Malang. Surabaya.

Ruwaidah, Marjanah, & Mawardi, A. L. (2021). Keanekaragaman Kepiting Biola (*Uca* spp.) di Kawasan Hutan Mangrove Kuala Langsa Provinsi Aceh. *Jurnal Jeumpa, 8*(1), 1-12.

Sahami, F. (2018). Penilaian Kondisi Mangrove Berdasarkan Tingkat Kerapatan Jenis. *Jurnal Ilmiah Perikanan dan Kelautan, 6*(2), 33–40.

Sawitri, N., Sunarto, & Setyono, P. (2019). Keanekaragaman dan Preferensi Habitat Kepiting Biola di Daerah Mangrove Pancer Cengkrong Kabupaten Trenggalek, Jawa Timur. *Jurnal Lingkungan Hidup, 17*(1), 82–89. https://doi.org/10.14710/jil.17.1.81-89

Septiani, M., Sunarto, Mulyani, Y., Riyantini, I., & Prihadi, D. J. (2019). Pengaruh Kondisi Mangrove Terhadap Kelimpahan Kepiting Biola (*Uca* sp.) di Karangsong Kabupaten Indramayu. *Jurnal Perikanan dan Kelautan, 10*(1), 84–91.

Shanmugam, A., & Vairamani, S. (2008). Molluscs in Mangroves: A Case Study. *Center of Advanced Study in Marine Biology, 2*(1). 371-382

Shalehati, F., Kartika, W. D., Siburian, J., Wulandari, T., & Oktaviani, N. (2023). Keanekaragaman Crustacea Ordo Decapoda di Kawasan Mangrove Pangkal Babu Desa Tungkal 1, Tanjung Jabung Barat. *Jurnal Biologi Universitas Andalas, 11*(1), 46–53. https://doi.org/10.25077/jbioua.11.1.46-53.2023

Suprayogi, D., Siburian, J., & Hamidah, A. (2014). Keanekaragaman Kepiting Biola (*Uca* spp.) di Desa Tungkal I Tanjung Jabung Barat. *Biospecies, 7*(1), 22–28.

Usman, L., Syamsudin, & Hamzah, N. (2013). Analisis Vegetasi Mangrove di Pulau Dudepo Kecamatan Anggrek Kabupaten Gorontalo Utara. *Jurnal Ilmiah Perikanan dan Kelautan, 1*(1), 11–17.

Winanti, R. W. (2014). Struktur Komunitas Kepiting Biola (*Uca* spp.) di Kawasan Mangrove Pantai Damas Kecamatan Watulimo Kabupaten Trenggalek. *Skripsi*, Fakultas Perikanan dan Imu Kelautan.

Yanti, R. (2021). Komposisi Jenis dan Keanekaragaman Mangrove di Kawasan Hutan Mangrove Desa Sriminosari Kecamatan Labuhan Maringgai Kabupaten Lampung Timur. *Skripsi*, Universitas Islam Negeri Raden Intan Lampung.