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Behavioral Patterns and Benefits of Fiddler Crab (*Uca pugnax*) for Mangrove Plants in Kuala Langsa

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ABSTRACT

This research aims to discover the behavior patterns and benefits of the Fiddler Crab (*Uca pugnax*). This study was carried out in the Kuala Langsa Mangrove Forest Area, Aceh Province, between May and June 2022. This research aimed to look into the behavior and benefits of fiddler crabs for mangroves in Kuala Langsa. This study combined an exploratory, descriptive method using a survey methodology and direct field observation. The data was gathered in two stages: (1) Environmental adjustment stage to assess the state of seawater in Langsa City's Mangrove area. (2) The observation stage, in which the Fiddler crab's behavior patterns are observed. The research was carried out at three distinct places every two hours. According to the findings, there are male and female Fiddler crabs in varying quantities and types at each site, resulting in different activity patterns. Fiddler crabs (*Uca pugnax*) can be seen sunning, excavating holes and producing balls of sediment, carrying sediment balls out of their holes, and lifting and waving their claws to seek the attention of female Fiddler crabs.

Pola Tingkah Laku Dan Manfaat Kepiting Fiddler (Uca pugnax) Bagi Tumbuhan Mangrove Di Kuala Langsa

ABSTRAK: *Penelitian ini bertujuan untuk mengetahui pola tingkah laku dan manfaat Kepiting Fiddler (Uca pugnax). Penelitian ini dilaksanakan dari bulan Mei dan Juni 2022 di kawasan Hutan Mangrove Kuala Langsa, Aceh. Tujuan penelitian ini untuk melihat pola tingkah laku dan manfaat kepiting fiddler bagi tumbuhan Mangrove di Kuala Langsa. Metode yang digunakan pada penelitian ini, yaitu metode Deskriptif Eksploratif dengan pendekatan survei serta observasi langsung ke lapangan. Pengumpulan data diperoleh melalui dua tahap: (1) Tahap penyesuaian lingkungan, untuk melihat keadaan air laut di kawasan Mangrove Kota Langsa. (2) Tahap Observasi, untuk mengamati polah tingkah laku darikepiting Fiddler (Uca pugnax). Penelitian dilakukan pada 3 stasiun yang berbedadi setiap 2 jam sekali. Dari hasil observasi, diketahui bahwa adanya kepiting Fiddler jantan dan kepiting Fiddler betina yang berbeda-beda jumlah dan jenisnya di setiap stasiun, sehingga menyebakan pola tingkah laku yang berbeda pula. Terlihat bahwa kepiting Fiddler (Uca pugnax) melakukan aktivitas keluar dan masuk dari lubangnya, berjemur, menggali lubang dan membentuk bola-bola dari sedimen, mengangkut bola-bola sedimen keluar dari lubangnya, serta mengangkat dan melambaikan capit untuk menarik perhatian kepiting Fiddler betina.*

INTRODUCTION

Indonesia has 13,667 islands and a coastline of approximately 54,716 kilometers. There is various mangrove forest in such a large coastal area (Karimah, 2017:52). Mangrove forest is one of the plant ecosystems in coastal locations that are inundated by seawater and is influenced by tides as well as muddy and sandy soil conditions (Ruwaida et al., 2021).

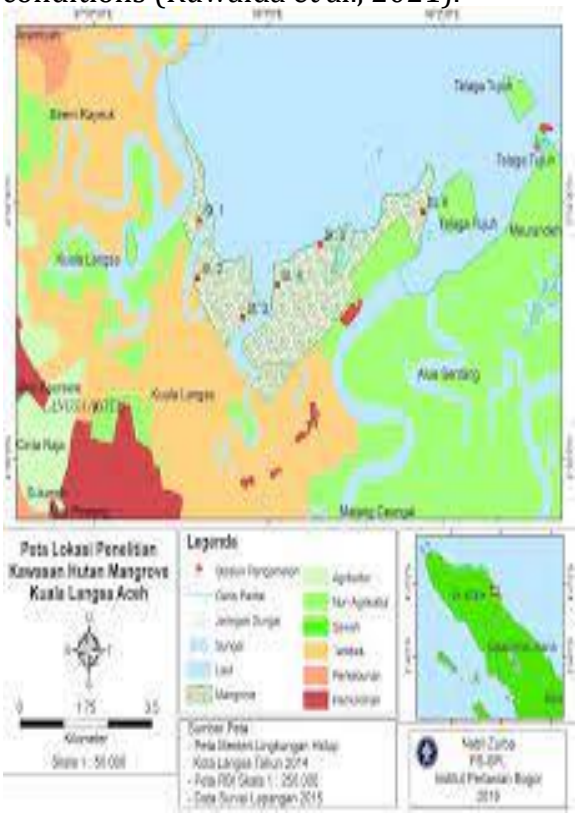

Figure 1. Peta

Mangrove forests are one form of ecosystem that is constantly inundated by seawater, and the presence of sea tides has a significant impact on soil conditions that are sandy, muddy, or sandy mud (Rahayu et al., 2018); (Arbiastutie et al., 2021). Aceh is a province with many mangroves, mainly on the east coast, which covers the coasts of East Aceh, Aceh Tamiang, and Langsa City, and has an area of roughly 63,832.99 Ha. Aceh Province's mangrove environment contains 301 species with an average tree density of 1,811 Ha. The Fiddler Crab (*Uca pugnax*) is one of several living organisms in the mangrove habitat. Fiddler crabs can be found on the beach near the land. Therefore they are more adapted to arid settings (Zanetti et al., 2022).

Mangrove environments support a diverse range of aquatic wildlife, including crabs of the genus Uca. The claws and body color of the crab, often known as the violin crab, vary significantly. The male crab has two claws of different sizes because one is enormous, whereas the female crab has two claws that are either small or the same size (Lavezzo et al., 2020). The Fiddler Crab (*Uca pugnax*) is a crab that lives in holes, soaks in the substrate, and is only found in the Mangrove area. *Uca pugnax* will dig a hole as a place to live and a location for its body to seek refuge from the high environmental temperatures. The seawater in the dug hole will assist Fiddler crabs in maintaining their body temperature through evaporation (Lim et al., 2022). The size of the substrate grains greatly influences Fiddler crab dispersal; this Fiddler crab will demonstrate how morphological adaptation to the substrate state is related to the holes formed (Neylan et al., 2019).

Figure 2. Crabs' Image

Classification

Kingdom	: Animalia
Division	: Arthropods
Subphylum	: Crustacea
Class	: Malakostraka
Order	: Decapod
Infrared	: Brachyura
Family	: Ocypodidae

Mangrove ecosystems are plant communities that live in Kuala Langsa water and are influenced by sea tides. Mangrove

ecosystems are a group of numerous plant families that share comparable morphological and physiological tolerance to tide-influenced settings (Lose et al., 2015). Mangrove ecosystems do not form densely in soft mud, and many crabs of the genus *Uca pugnax* can be found. So more research on this Fiddler crab is needed to determine the behavioral patterns and benefits of Fiddler crab (*Uca pugnax*) in the Mangrove area of Kuala Langsa, Aceh. As a result, this research will be valuable in informing the public, particularly those in the Kuala Langsa area, about the benefits and behavior patterns of the Fiddler Crab (*Uca pugnax*) so that the community is aware of the existence of a one-of-a-kind and advantageous habitat for the growth of Mangrove trees in the area (DiNuzzo et al., 2020).

METHOD

This study was carried out in the Mangrove Ecosystems area of Kuala Langsa, Aceh, between May and June 2022. This study used a descriptive explorative strategy through a survey methodology and direct field observations. The following approach is carried out in two stages: (1) The environmental adjustment stage, where the goal is to see the condition of seawater in the Mangrove area, Kuala Langsa, whether high or low tide. (2) Observation stage, to obtain results, study the behavior patterns of Fiddler crabs (*Uca pugnax*). The research was conducted over three days at three separate places. Each station has male and female Fiddler crabs that differ in appearance and behavioral habits.

This study began with observations at station 1 from 15:00 to 17:00 in the Mangrove area of Kuala Langsa, when the sea water level was receding. The second station is located on Kilometer 5 in Kuala Langsa and operates from 13:00-17:00 when seawater conditions are receding. The final observation was made at the third station, located in front of the Kuala Langsa harbor, between 14:00 and 16:00, when the sea water was also receding. Many types of Fiddler Crab (*Uca pugnax*) can be found around Mangrove, Kuala Langsa, when the sea water recedes. Fiddler crabs (*Uca pugnax*) activities' patterns are also influenced by the environment, including saltwater conditions, weather, and the mangrove ecosystem. Each crab's behavior patterns have several unique and different variations (Darwati et al., 2022);(Sari et al., 2018).

RESULTS AND DISCUSSION

The results of three days of field observations at these three places revealed that there were male and female Fiddler crabs of various sorts and quantities. Fiddler crabs' behavioral habits change every several hours (Saputra & Anwari, 2021). These crabs were observed immediately from above the ground. On the first day of investigation, from 15:00-17:00 for 2 hours at the first station. The Fiddler crab's (*Uca pugnax*) behavior pattern begins in a peaceful state where it pays attention to the holes around it and then returns to its burrow when it feels frightened or disturbed by its environment (Kurniawan et al*.,* 2020). Another Fiddler crab may be seen creating sediment balls from its burrow and removing them. The researchers began their observations at the 2nd site between 13:00-17:00 on the second day. Fiddler crabs (*Uca pugnax*) exhibit diverse behavior patterns, with female Fiddler crabs walking about to approach male Fiddler crabs that have attracted his attention in the first two hours. On the third day, the researchers observed at the third station, which was carried out from 14:00-16:00, and Fiddler crabs had the same behavior pattern as Fiddler crabs in stations 1 and 2. The difference is that Fiddler crabs are more active at the third station, and it appears that male Fiddler crabs are attempting to attract the attention of female Fiddler crabs by moving and waving their claws. The female Fiddler crab will come to the male Fiddler crab to carry out the mating procedure in the male crab's

hole after being attracted to one of the male Fiddler crabs (Chou et al., 2019);(Colpo & López-Greco, 2018).

Table 1. Observation of Male and Female Fiddler Crabs

Station	Male	Female	Total
1	22	32	54
2	27	35	62
3	40	32	72
Total	49	99	188

The amount of Fiddler crabs at each station varies. The number of Fiddler crabs is determined by the number of crabs visible on the ground, whether they are resting, sunning, or interacting with others. Station 1 included 54 Fiddler crabs, including 22 male and 32 female crabs of various varieties. There were 62 crabs at the second site, comprising 27 male crabs and 35 female crabs of various sorts. Station 3 has a total of 72 crabs, including 40 male crabs and 32 female crabs of various varieties. According to this statistic, the station with the most crabs is at the third station because the sea water was retreating at the time, so many of these Fiddler crabs did not hide in their holes and engaged in rather active activities.

The Fiddler crab (*Uca pugnax*) exhibits a distinct behavior pattern at each station, ranging from staying still and basking around its burrow to walking, hiding, digging holes, and retrieving little balls from the sediment to gaining the attention of female Fiddler crabs for mating. The most common Fiddler crab (*Uca pugnax*) behavioral patterns observed are hiding, walking, and moving their claws (Wong et al., 2021).

Figur unbathing, B. Walking, C. Hiding, D. Mating, E. Throwing Out alls, F. Digging Holes

The fiddler crab (*Uca pugnax*) will use its pincers to pick up a bit of silt, then direct it to its mouth to sort it (Septiani et al., 2019). Fiddler crabs will evacuate sediment by making little balls after obtaining food particles in the soil, such as algae, bacteria, fungi, or other decaying detritus (Smithers et al., 2019). When the Fiddler Crab (*Uca pugnax*) emerges from the hole, it scans the surrounding area for danger and returns to the hole if there is a harmful movement (Riswandi et al*.,* 2022). Fiddler Crabs have a spreading behavioral pattern, move quickly, and prefer to swim in seawater (Pena & Levinton, 2021). So, during this study, the researchers observed his behavior patterns every 2 hours. Fiddler crabs show varied activity patterns when monitored every 2 hours. Some are highly active, walking and doing activities, while others sit on the surface of their burrows, sunbathing and paying attention to their surroundings (Heatwole et al*.*, 2018).

It is not rare for Fiddler Crab to be traded because of its distinctive and beautiful shape, but it is usually done by foreigners who are sold at quite high prices. Therefore it has a role for humans as a source of money (Rahayu et al., 2018). The most frequent form of crab found in salt marshes is the fiddler crab (*Uca pugnax*), which plays a vital role in salt marsh populations. Fiddler crabs also preserve coastal wetland ecosystems by burrowing deep into marsh mud. Furthermore, Fiddler crabs will construct a maze of tunnels that will supply oxygen to submerged marshes (Masiyah et al., 2021).

The benefits of Fiddler crabs (*Uca pugnax*) for mangrove plants in Kuala Langsa include their ability to dig holes into the center of the silt, allowing oxygen to permeate deep into the sediment layers (Krisnawati et al., 2018). Mangrove plants are plants that grow along the seashore to prevent erosion with the help of their roots. Mangrove plant habitats require oxygen to thrive in marine environments. As a result, Fiddler crabs (*Uca pugnax*) aid in providing oxygen to mangrove plants by digging holes through which oxygen can reach the sediment layer. The next advantage is that the Fiddler crab (*Uca pugnax*) will produce an inorganic nutrient cycle.

If this Fiddler crab has a huge population, its existence will have a significant impact. Because the holes he digs can provide ventilation, allowing the sediment to be reworked. This revision can avoid the buildup of minerals at the bottom of the sediment, ensuring that the nutrient content remains steady and that the fertility of the sediment maintains the growth of nutrients and flora (Malichatin et al., 2022)

The fiddler crab (*Uca pugnax*) is an important indicator of sediment fertility in the mangrove ecosystem. Their activity in digging holes and eating allows them to maintain nutrient stability, the continuity of the carbon cycle, and aerobic conditions. The presence of Fiddler crabs supports not only mangrove vegetation but also other mangrove wildlife (Nur & Kuntjoro, 2020).

CONCLUSIONS AND SUGGESTIONS

The Fiddler Crab (*Uca pugnax*) is a species of crab that lives in the mangrove habitat by excavating holes around mangrove plants to live. Mangrove forests are often impacted by tides and inundated by sea water in sandy, muddy, or sandy mud conditions. When seen firsthand in the field at three separate sites and times, *Uca pugnax* exhibits different behavioral features. Fiddler crab (*Uca pugnax*) behavior routines include being silent, walking, sunbathing, paying attention to the holes around it, feeding with its claws, moving and waving its claws to attract the attention of the opposing sex, and mating in its hole. The benefits of Fiddler crab (*Uca pugnax*) for Mangrove plants include their function in inserting oxygen into the sediment layer by excavating a hole in the middle of the silt, creating a cycle of inorganic nutrients and air circulation to produce an overhaul in the

sediment that prohibits mineral formation at the bottom of the sediment, hence maintaining nutrient content.

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