

DOI: <https://doi.org/10.32663/ja.v%vi%i.3599>

**INTRODUCTION OF PROSPECTIVE FISH AQUACULTURE
COMMODITIES *Kryptopterus palembangensis***
(*Mengenal Ikan Lais (Kryptopterus palembangensis), kandidat komoditi akuakultur*)

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ABSTRACT

Lais fish is one of the endemic fish with a fairly high demand in the market. Famous for its delicious taste, lais fish it be processed in various forms of cuisine such as pindang, pempek and salai (Palembang specialties). The high public interest in this fish provides promising business prospects. However, the fulfillment of the needs of lais fish still comes from natural catches. Sothat if done prolonged, it will cause a decline in the population which if not overcome by lais fish will experience extinction. The purpose of this article is to invite the public to preserve lais fish as endemic fish and make this fish a farming commodity by knowing some basic information about lais fish. The writing method used is a literature study. As for the results obtained, lais fish are related to 162iamese shark (*Pangasius* sp.) and catfish (*Clarias gariepinus*). It has several local names such as jam fish or wedge lais fish, the national name of lais fish and its international name sheat catfishes. The living habitat of lais fish is in fresh water, especially flooded swamp waters. This fish is classified as a carnivore because most of its food is small shrimps and insects. The sexuality of fish can be seen based on morphology, namely differences in body size and head shape. The sex ratio of lais fish in nature is in a less balanced state. Lais fish will spawn at the time of entering the rainy season, with a spawner total spawning pattern. Lais fish has several advantages and is of economic value so that it is worthy of being a candidate for aquaculture commodities.

Keywords: endemic fish, aquaculture commodities, kryptopterus, reproduction of lais

ABSTRAK

Ikan lais merupakan salah satu ikan endemik dengan permintaan cukup tinggi dipasaran. Terkenal dengan rasanya yang lezat, ikan lais bisa diolah dalam berbagai bentuk masakan seperti pindang, pempek dan salai (makanan khas Palembang). Tingginya minat masyarakat terhadap ikan ini memberikan prospek bisnis yang menjanjikan. Namun, pemenuhan kebutuhan dari ikan lais masih berasal dari tangkapan alam. Sehingga jika dilakukan berkepanjangan akan menyebabkan penurunan populasi yang apabila tidak diatasi ikan lais akan mengalami kepunahan. Tujuan dari artikel ini adalah untuk mengajak masyarakat melestarikan ikan lais sebagai ikan endemik serta menjadikan ikan ini sebagai komoditas budidaya dengan mengetahui beberapa informasi dasar mengenai ikan lais. Metode penulisan yang digunakan adalah studi pustaka. Adapun dari hasil yang diperoleh ikan lais berkerabat dengan ikan patin (*Pangasius* sp.) dan ikan lele (*Clarias gariepinus*). Memiliki beberapa nama lokal seperti ikan selais ataupun ikan lais baji, nama nasional ikan lais dan nama internasionalnya *sheat catfishes*. Habitat hidup ikan lais berada di air tawar khususnya perairan rawa banjiran. Ikan ini tergolong karnivora karena sebagian besar makanannya

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adalah udang kecil dan serangga. Seksualitas ikan dapat dilihat berdasarkan morfologi yaitu perbedaan pada ukuran tubuh dan bentuk kepala. *Sex ratio* ikan lais di alam dalam kondisi kurang seimbang. Ikan lais akan memijah pada saat masuk musim penghujan, dengan pola pemijahan *total spawner*. Ikan lais memiliki beberapa keunggulan dan bernilai ekonomis sehingga layak dijadikan kandidat komoditi akuakultur.

Kata kunci: ikan endemik, komoditi akuakultur, kryptopterus, reproduksi lais

PENDAHULUAN

Indonesia has enormous potential for aquaculture, with a total indicative land area of 17.2 million hectares and an estimated economic value of USD 250 billion annually (Putra *et al.*, 2022). With this area, there are various kinds of biota, especially fish. It was recorded that in 2020, Indonesia has 4782 native fish species consisting of 1248 freshwater fish species and 3534 marine fish. Aquaculture activities can be categorized according to their environment. In general, there are three types of cultivation environments: fresh, brackish, and marine. There are several economically important aquaculture commodities in each of these categories. Aquaculture commodities are fish species that can be traded and produced through cultivation activities.

Important economic commodities in seawater, include grouper, lobster, and pearl oysters (Junaidi *et al.*, 2020; Puspitasari *et al.*, 2020). While in brackish water commodities, there are milkfish, seaweed, and shrimp (Siswanto 2009). Furthermore, in freshwater commodities, there are catfish, patin fish, and nila fish (Effendi & Mulyadi, 2012). Additionally, there are several endemic fish that have economic value in freshwater commodities, including the lais fish (*Kryptopterus palembangensis*). Fresh lais fish has a price of IDR 80,000/kg, while if it has been processed into smoked fish (salai) it can reach IDR 150,000/kg (Yonarta *et al.*, 2023). With a high enough price, it

does not reduce consumer demand for lais fish in the market and even continues to increase. The high demand and price of this fish provide promising business prospects. In addition, the supply of lais fish still comes from natural catches, causing a decrease in population which, if not addressed, lais fish will become extinct. Although according to Retnowati (2011), fish is a natural resource that can be renewed, it does not mean that it can be over-exploited. Therefore, this article was created to introduce lais fish to the wider community with the hope that it will become an encouragement to continue to develop fish cultivation, especially lais fish so that it does not become extinct. As a result, this article was created to inform the public about lais fish.

MATERIAL AND METHODS

The data collection method used in compiling this article comes from interviews with fish farmers and various literature. There were several types of references used, namely national and international scientific journals. The topic of this scientific article discusses kinship, classification, habitat and distribution, feed and reproduction of lais fish. Literature study data analysis was carried out to collect data from various sources with predetermined themes and select articles according to relevant titles. Then the data was selected according to the topic of study

RESULTS AND DISCUSSION

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Classification

Kryptopterus palembangensis is a fish belonging to the phylum *Chordata*, class *Actinopteri*, order *Siluriformes*, family *Siluridae*, and genus *Kryptopterus*. The order *Siluriformes* has 12 families, namely Bagridae, Siluridae, Schibildae, Plotosidae, Loricariidae, Ariidae, Chacidae, Sisoridae, Parakysidae, Akysidae, Pangasiidae, and Clariidae; and has 35 genera that have the closest kinship including *Ompok*, *Kryptopterus*, *Phalacrotonotus*, and *Silurus*. Species from the *Pangasiidae* family include *Pangasius* sp (catfish), *Clariidae* family including *Clarias batrachus* (local catfish), and *Siluridae* family including *Kryptopterus palembangensis*, *Ompok miostoma*, and *Phalacrotonotus apogon*.

The genetic classification of *K. palembangensis* has been examined through mitochondrial DNA analysis and showed that this fish is related to other fish from the genus *Kryptopterus*, such as *K. bicirrhis* and *K. minor*. Phylogenetic analysis showed that *K. palembangensis* has a strong relationship with other fish of the genus *Kryptopterus* found in Southeast Asia. In addition, *K. palembangensis* has a higher degree of kinship with fish from the genera *Pterocryptis* and *Glyptosternon* compared to fish from other genera in the *Siluridae* family.

Local, National and International Names

Based on Greek etymology, *Kryptopterus palembangensis* means that *Kryptopterus* consists of two words *Kryptos* (hidden) and *pteron* (wing or fin), or means hidden fin, while *palembangensis* is the place where the fish was found, namely the city of

Palembang (site fishbase.org). There are several local names for this type of fish, namely the *lais baji* fish in Pulang Pisau Regency, Central Kalimantan, the *jamis* fish in Pekanbaru (Riau) and the *Lais* fish in Palembang (South Sumatra), although they are not widely known by the public because of its hard to distinguish morphology from other *Kryptopterus* fish. This fish has a national name taken from the local name of the city of Palembang, namely *lais* fish. Internationally these fish are known as sheat catfishes (Gustiano *et al.*, 2021).

Morphological Characteristics

Lais fish has a small head with a flattened body shape and a blackish-red silver body color. The back is bulging and the edge of the back is black. In the order *Siluriformes*, there are main characteristics that distinguish the *Siluridae* family from other families, based on the head and body which are flatter, the backbone is flexible, the spines on the pectoral fins are weak, and the pelvic fins are small (Diogo 2005; Nelson 2009). This fish has no scales. There is a pair of antennae on the top of his mouth. The special feature of this family is that it has no fat fins, no spines on the dorsal fin, and a very long anal fin consisting of 41 - 110 soft rays (Kottelat *et al.* 1993). The *lais* fish has transparent small fins with soft fingers, but it also has red-black pectoral and caudal fins (Sukmono *et al.*, 2010; Fajriati *et al.*, 2022). Adult *lais* fish can reach a length of 17 cm (Fishbase, 2019), 19,29-22,35 cm (Veronica & Elvince, 2021)

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Figure 1. *Kryptoterus palembangensis*

Habitat and Distribution

Lais fish are in the freshwater fish group, commonly found in lowland floodplain waters. According to Suhendra *et al.*, (2013), this flooded river ecosystem is affected by fluctuations in rainfall, during the rainy season the water is distributed throughout the plains, but during the dry season, only the main channel and the lower part of the waters remain filled or remain inundated. Lais fish are often found in calm water on floodplains and if they move to rivers, these fish will occupy vegetated riverbanks or depressions in the riverbed during dry periods. Flooded swamp rivers are unique and complex ecosystems, including watersheds, flooded lakes or oxbow lakes, swamps, natural embankments, dammed swamp deposits or back swamps and main rivers that have a unified function for the survival of fish in them (Elvyra, 2012). Lais fish live in waters such as lakes, swamps, and rivers (Fajriati *et al.*, 2022).

Lais fish spreads in several areas in Indonesia, including the Musi, Ogan, and Lematang rivers in South Sumatra (Yonarta *et al.*, 2023), the Kelekar River (Syaifudin *et al.*, 2021) and the Komerling River (Marson, 2012); in Central Kalimantan it is found in the Rungan River (Mingawati and Lukas, 2015), the Arut River (Kasayev & Arisuryanti, 2022), Batu Lake (Veronica and Elvince, 2021); in East Kalimantan it is found in the Mahakam River (Jusmaldi *et al.*,

2014), in South Kalimantan it is found in the Sambujur River (Prasetyo, 2005; Burnawi, 2016); in Riau it is found in the Kampar Kiri River (Charles *et al.*, 2008) and the Kumu River (Sari *et al.*, 2014); in West Tulang Bawang it is found in the Way Kiri river (Dwitasari *et al.*, 2016); in Jambi it is found in the Teluk lake (Sukmono *et al.*, 2010) and the Tembesi river (Muhammad *et al.*, 2020); and in Bangka it is found in the Pakil river (Lestari *et al.*, 2021).

Habitat Water Quality

The original habitat of the lais fish is flooded swamp waters. Swamp waters are highly influenced by the weather, flooding in the rainy season, and drying in the dry season (Utomo, 2016). The area of flooded swamp waters is very complex, consisting of several important types, namely gutters, rawang, lebak, lebung and main rivers. In the flooded swamp waters ecosystem, there are 2 types of fish groups, namely swamp fish (blackfish) and river fish (white fish). Lais fish belongs to the white fish. The productivity of flooded swamp waters is quite high because it is rich in nutrients derived from the decomposition of decaying swamp plants (Muslim, 2013). However, some flooded swamps also have relatively poor water quality due to a lot of decomposition processes, resulting in relatively high CO₂, low dissolved oxygen, and acidic pH levels (Akbar, 2017).

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Water quality is one of the important factors that need to be considered to support the growth and survival of lais fish. Several

previous studies have provided results of measuring water quality in places where lais fish are found.

Parameter	Musi River ¹	Batu Lake ²	Kayangan Lake ³
Suhu (°C)	28-31	30,64-31,32	30,6-31,0
DO (mg L ⁻¹)	3,1-3,3	2,60-6,90	5,5-11
pH	7,16-7,58	5,20-5,90	6,8-7,2

Sumber: ¹Syaifudin *et al.*, 2019

²Veronica *et al.*, 2021

³Nurmayani *et al.*, 2020

The water quality parameters in the form of temperature, DO and pH of the lais fish habitat in several references show differences but are still within the tolerance range. Lais fish can survive in a temperature range of 28.20-31.32°C, but according to Gunawan *et al.*, (2019), this fish will grow optimally at temperatures of 29°C. Temperature is a water physics parameter that has a role in the production of fish farming, temperature indirectly affects appetite, digestion rate, and fish metabolism and will have an impact on growth (Syaifudin *et al.*, 2021; Zonneveld *et al.*, 1991). Then for the pH range in Batu Lake, it is relatively acidic from 5.20 to 5.90 and in the Musi River or Kayangan Lake it is still in the neutral category. Generally, a suitable pH for fish life ranges from 6-8.

This is in accordance with Akbar's statement (2017) that the dissolved oxygen content in flooded swamp waters is quite low. Dissolved oxygen concentrations in good waters range from 5-7 mg L⁻¹ but there are some fish that can survive at DO concentrations below 4, but have the side effect of reducing the fish's appetite.

Jenis Makanan

There are three types of fish food namely, main food, complementary food, and additional food. The main food is food that is eaten in large quantities, which is around 12.4-39.10% of the digestive tract of fish. Complementary foods are foods that are often found in small amounts and complementary foods are foods that are found in the digestive tract in very small amounts.

Then the concentration of DO in the Musi River is quite low, while in the Batu and Kayangan lakes the range is quite far.

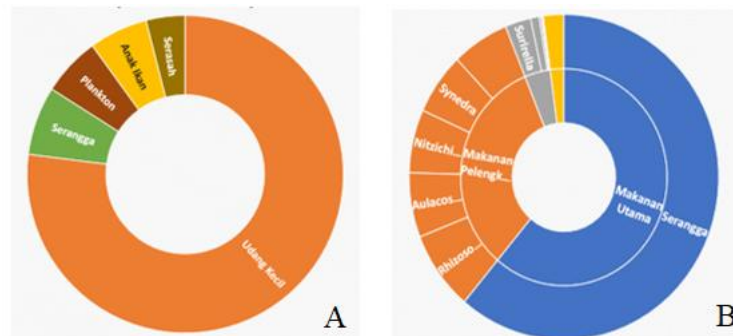


Figure 2. Composition of Lais Fish Food (A) According to Veronica & Elvince 2021, (B) According

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to Lestari *et al* 2021

The cumulative composition of food eaten is the most cumulatively based on the Relative Important Index (IRP). Based on the results of the IRP analysis conducted by Veronica (2021), the percentage of Lais fish food is dominated by small shrimp (77%), insects (7%), fish fry (7%), plankton (6%), and litter (4%). Meanwhile, according to Lestari *et al* (2021) the types of food found in the stomach of Lais fish are insects, phytoplankton, and cannot be identified, which are dominated by types of food in the form of insects as the main food with an IP value of 59.67%. Complementary foods for Lais fish in the form of phytoplankton with the genus *Synedra* 7.98%, *Rhizosolenia* 7.72%, *Aulacoseira* 6.27%, *Nitzchiace* 6.14%, and *Mastogloia* 5.83%, additional food for Lais fish in the form of phytoplankton with the genus *Surirella* 2.63%, *Ulotrix* 0.87%, *Tribonema* 0.21%, *Oscillatoria* 0.13%, *Anchanatidium* 0.08% and 2.41% unidentifiable material in the form of pieces of insect bodies and litter leaf. According to Handayani *et al.*, (2009), Lais fish have the main choice of food in the form of adult insects. Antony *et al.*, (2014), also reported that lais fish have a diet of adult insects. The contents of the fish's stomach describe the fish's preference for food, pieces or fragments of small fish, shrimp and insects are the most common types of natural food found, thus Lais fish is a type of carnivorous fish. This is supported by Prasetiyo (2005) that at the base of the digestive tract of lais fish there is a stomach, which is quite large and the intestine is not that long (1-1.5 total length). Due to characteristics like these in the digestive tract, fish are classified as carnivores.

Characteristics of Female and Male Fish

There are two types of sexuality in lais fish namely, primary sexuality and secondary sexuality. Primary sexuality is a characteristic that distinguishes male and female fish from each other based on their reproductive organs; for this reason, surgery is performed on the abdomen to separate them. Secondary sexuality is a characteristic that distinguishes between male and female fish based on body morphology.

Generally, fish can be identified by their reproductive organs, such as the testes and ovaries in males and females. The primary sexual characteristics of the male Lais Kaca fish are the testicles in the fish's body which vary from shape to color which indicates the stage of development of the gonads. The testicles of this fish are shaped like strands, milky white, jagged on the edges, have a smooth surface and are in pairs. The testicles hang below the spine and are near the kidneys and have a canal that ends in a discharge hole. Female fish have a pair of ovaries, located hanging below the spine, near the kidneys and next to the swim bladder, have a channel connected to the discharge hole, pink to red-brown in color with a smooth and oily surface.

Observations of secondary sexual characteristics can be used to distinguish males and females based on their morphology. Lais fish have morphological differences between male and female fish, including body size and head shape. Female fish have a body size that is wider and fatter than male fish. In addition, the shape of the head of the male fish is narrower and sharper when compared to the female fish (Suhendra *et al.*, 2013).

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Sex Ratio

The sex ratio is the ratio between the ratio of male fish and female fish. Research conducted over 6 months by Sari & Roza (2014) found 124 male fish and 200 female fish. The male and female sex ratio is 1:1.6. Likewise in the research conducted by Sari and Khoirul, (2022), the sex ratio of male and female lais fish is 0.34:1. The number of male fish is more than female fish, this shows that the sex ratio of lais fish does not follow a 1: 1 ratio pattern. Even in the research of Nopiri and Elvyra (2018), the sex ratio of male and female lais fish is 3: 1. According to Effendi (2002) the sex ratio of fish is not balanced (1:1), because it can be influenced by distribution patterns caused by food availability, population density and the balance of the food chain. This deviation in the sex ratio is thought to be due to differences in behavior, mortality rates, and distribution differences between male and female fish. The balance of sex ratios can change during spawning raids, before spawning, and after spawning (Sulistiono *et al.*, 2001).

Spawning Season

In general, fish in the tropics with mature gonads will spawn when the water level increases during the rainy season, causing a decrease in water temperature (Sihotang 2005). This situation also applies in the waters of the Sambujur River Fishery Reserve, Lais fish are thought to have a spawning season once a year with a total spawner spawning pattern at the time of the onset of the rainy season where the water level begins to rise and spawn in rock crevices (Suhendra *et al.*, 2013). Then according to the analysis conducted by Prasetyo (2005); Minggawati & Lukas (2015) gonad samples of lais fish with TKG

IV during the rainy season were more numerous than during the dry season, even if you look at the ovaries it is denser and the left and right parts are all ripe. This shows that the rainy season is a large spawning season when compared to the dry season. Fecundity of eggs from lais fish reached a total of 10,657 eggs (Nopiri & Elvyra, 2018). According to Elvyra *et al.*, (2010) that relatively equal egg sizes between the anterior, middle, and posterior ovaries indicate that fish eggs mature simultaneously or are total spawners, meaning they have one spawning season a year. According to Sari (2014), lais fish in Lampung have a total spawner spawning type.

Female fish are lithophilic, in the rainy season female fish migrate to swamps with vegetation to lay their eggs and protect their eggs from predators and waters that could threaten their survival (Welcomme, 1979). The number of female fish will increase when the food in the water increases while the number of male fish will increase when the food is reduced in the water (Nikolsky, 1963).

Aquaculture Commodity Candidates

Based on the characteristics of the lais fish, this fish is capable of being a candidate for cultivation commodities. Biologically, lais fish can live in water conditions with water quality with dissolved oxygen and low pH, even though their natural habitat is in extreme environments such as flooded swamplands which often experience fluctuations in water quality parameters. Lais fish are quite adaptive in the cultivation environment, several studies on lais production have been carried out and given positive results, one of which is the difference in density of lais fish in floating net cages (Agusnimar *et al.*, 2014).

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Lais fish has high economic value and lais fish demand continues to increase, but the population has declined so it will be very profitable if lais fish can be cultivated en masse. This means it will be very profitable to grow them in mass. The community is also able to process lais fish into delicious dishes such as the typical Palembang city, namely pindang lais, which can also be reprocessed into the main ingredient for making pempek. If the price of live lais fish (unprocessed) costs IDR. 80.000,-/kg than in the form of smoked fish (salaried) the price of fish doubles, reaching IDR.150,000,-/kg. Based on some of the descriptions above, lais fish species are suitable as candidates for aquaculture commodities.

KESIMPULAN

The results obtained by lais fish are related to catfish (*Pangasius* sp.) and catfish (*Clarias* sp.). It has several local names such as jamis or lais baji fish, the national name for this fish is lais and the international name is sheat catfishes. The living habitat of the lais fish is in freshwater, especially flooded swamp waters. This fish is classified as a carnivore because most of its food is small shrimp and insects. Fish sexuality can be seen based on morphology, namely differences in body size and head shape. The sex ratio of lais fish in nature is in unbalanced condition. Lais fish will spawn when it enters the rainy season, with a total spawner spawning pattern. The lais fish has several advantages and has great economic value, which makes it a worthy candidate for aquaculture commodities.

Acknowledgments

In writing this article, the author wishes to thank the Aquaculture Study

Program and the Department of Fisheries, Universitas Sriwijaya, and various target audiences like collectors and lais fish cultivators.

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