A mini review on characteristic of depik fish (*Rasbora tawarensis*) and its processed products

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**Abstract.** Depik fish (*Rasbora tawarensis*) is a typical endemic freshwater fish of Laut Tawar Lake in Central Aceh, Aceh Province. This lake has become the pride of the Gayo community as a source of clean water for various needs, a source of livelihood for residents and a tourist destination. Laut Tawar Lake and depik fish have become the trademark of the city of Takengon, Central Aceh. However, it is unfortunate that due to several reasons such as environmental degradation, introduction of foreign fish, destructive fishing techniques, pollution and climate change globally, depik fish population is currently decreasing drastically. Even depik fish has been appointed as a fish with a threatened status. Studies on the existence of depik fish as local food, form of presentation and nutrition are still rarely carried out. This article tries to review the existence of depik fish and its processed products through several existing studies including classification, distribution, morphological and genetic characteristics of depik fish as well as processing and characteristics of processed products.

1. Introduction

*Depik* fish (*Rasbora tawarensis*) is a typical endemic freshwater fish of Laut Tawar Lake in Central Aceh, Aceh Province. The lake covered with an area of about 5472 hectares, 17 km long and 3219 km wide has become the pride of the Gayo tribe who live around it. This lake is a source of clean water for various needs, a source of livelihood for residents and a tourist destination. With a beautiful panoramic view of the lake and the peculiarities of its depik fish, Laut Tawar Lake and depik fish (Figure 1) have become the trademark of the city of Takengon, Central Aceh [1]-[2].

This small fish typical of Laut Tawar Lake can be found any time (can be caught throughout the year). However, there are times when *depik* fish rise to the surface or appear in large numbers. Gayo people call it *depik* season. The *depik* season usually appears at the beginning of the rainy season and the dry season. *Depik* fish season occurs in months with high rainfall, ranging from April to June and October to December. In the *depik* season, there is a natural symptom such as the wind blows colder with drizzling rain (Gayo: *kuyu ni depik*). The growth and development of *depik* fish is influenced by several factors, such as the availability of springs, clean water and food availability [2]-[3]-[4].
Figure 1. Laut Tawar Lake and depik fish that became the icon of Takengon city.

Depik fish has been designated as a threatened species by IUCN and based on the latest evaluation results by CBSG, this fish has been categorized as critical endangered [5]-[6]. Muchlisin [4] stated that one of the factors that caused the declining of depik fish population was environmental degradation caused by deforestation for plantations and illegal logging which caused the lake water supply decreased, especially in the dry season. In addition, the introduction of foreign fish, destructive fishing techniques, pollution and global climate change also contribute to the decline in depik fish populations. Furthermore Ayuniara [3] found that the main factor affecting the reduction of depik fish population is the pollution originating from household waste and fishing gear (nets) with a very small diameter.

The decline in the depik fish population has an impact on the high selling price of depik fish, reaching 100 thousand-120 thousand/kg. However, the community preference for this fish remains high, both in its fresh and processed [1]. In the food sector, fish is well-known as a source of animal protein. Studies on the presence of depik fish as local food, form of presentation and nutrition are still rarely carried out. This article attempts to review the existence of depik fish and its processed products through several existing studies.

2. Classification, distribution, morphology and genetic characteristic of Depik fish (Rasbora tawarensis)

According to Weber, the depik fish classification belongs to the Cyprinidae family and the Rasbora genus. The Rasbora clan is known as a genuine freshwater inhabitant, living in small rivers at the foot of mountains, lakes and swamps [5]-[7]. The complete classification of depik fish is as follows:

Kingdom : Animalia  
Phylum : Chordata  
Class : Actinopterygii  
Ordo : Cypriniformes  
Family : Cyprinidae  
Genus : Rasbora  
Species : Rasbora tawarensis

Depik fish has a narrow and limited (endemic) distribution (spread) in Laut Tawar Lake and the distribution pattern follows the water depth and distance from the shore. This causes depik fish which caught in shallow waters relatively less than those caught in deeper waters [8]-[9]. Depik fish is a tiny fish that almost similar to anchovies (Stolephorus sp). This fish is characterized by a small body about the size of a human finger, oval shaped, the back is black and also has soft and shiny white belly. Research by [10] stated that the maximum length of this fish around 120 mm.

Depik fish has two color bands, the first color band is silver in live fish or dark in preserved species, this band is located on both sides of the body starting from the edge of the operculum to the tail shaft. The second band is dark (blackish) along the spine. This fish has a perfect lateral line which
is located under the band of color on both sides of the body, the dorsal fin is located in the middle of the body and the tip of the pectoral fin reaches half the length of the pelvic fin. The position of the mouth is terminal and non-protractile, the caudal fin has a deep forked type with a faint black spot at the tip of the caudal shaft. The belly is white to form the elbows, the jaw joints form a hollow, and the dorsal fins are not hard fingered. The beginning of the fin is in the middle between the nose and the caudal fin and has a complete rib line [11].

The genetic characterization of depik fish based on the 16S mitochondrial gene has been investigated by Faizah [12]. In this study, a sample of wader fish from West Nusa Tenggara was used as a comparison because it has morphological similarities with depik fish and is assumed to be a member of the Genus Rasbora. The results of the analysis using the BLASTN program showed that the depik fish samples had 98% similarity with Rasbora sumatrana, while the wader fish had a 98% similarity with Barbodes rhombeus. Phylogeny analysis showed that the depik fish and wader fish studied had a very distant relationship.

3. Depik fish processing

Fresh depik fish is usually processed into a variety of dishes by the Gayo people, who are indigenous to Central Aceh Regency. Common types of dishes made from depik dedah, masam jing, depik pengat, pepes depik and depik tangkap (depik fish fried with spices and curry leaves). Apart from being fresh, processed products from depik fish were found like dried depik and fermented depik. These two products are often used as souvenirs for the Gayo people who live outside areas such as Banda Aceh, Medan and Jakarta [1]. The product of depik fish processing and the type of food produced varies as shown in Figure 2.

Figure 2. Depik fish processed product.

The purpose of processing depik fish by drying and fermentation, as generally the case with other products, is to save catch yields by increasing storage capacity and product diversification. Good fish processing can maintain quality to improve nutrition aspect such as fermentation [13]. Apart from the quality aspect, the existence of a food processing process can also increase the added value in the form of shelf life and product sales rate. This explanation is in accordance with [14] statement which states that processing is one of the proper handling methods to maintain the quality of fish.

Dried depik fish obtained by drying in the sun for 2-3 days. The depik belacan is obtained through fermentation of dried depik fish with a number of special spices [1]-[15]. The initial process of making belacan depik started with depik fish that has been dried, pounded slightly coarsely, salted and added
various spices such as galangal as the main seasoning and other additional seasonings like turmeric, curry leaves and others. The mixture is then put in the jars, buckets, plastic or burlap sacks, tightly closed and fermented (brooded) for 1-4 weeks. According to the manufacturer, the duration of this aging process is different, the longer it is ripened the better the quality of the belacan produced. The form of the belacan product produced is in the form of pasta (such as shrimp paste), usually the Gayo people consume belacan as a side dish in the form of chili sauce with a distinctive taste [1]-[15]-[16].

Based on the process and ingredients used, this belacan is different from fish fermentation products that are known in other regions. Pekasam and shrimp paste in Malaysia are made using fresh fish/prawns [17]-[18] whereas belacan uses dried fresh fish (depik) as raw material. Relatively less fermented products use dried fresh fish as raw. The slightly similar in the use of raw materials in the form of dried fresh fish is a fermented fish product typical of Manipur, namely Ngari and Hentak [19].

4. Characteristic of Depik fish processed products
The characterized depik processed fish product is belacan depik. This product is sold in the form of a paste wrapped in leaves or in a plastic box (Figure 3). Chemical and microbiological characteristics of belacan depik obtained from several traders in the market in the city of Takengon [15]-[16] can be seen in the Table 1.

![Figure 3. Belacan depik in traditional market.](image-url)

| No | Characteristics                  | Mean ± Std       |
|----|----------------------------------|------------------|
| 1  | Moisture (%)                     | 58.23 ±1.26      |
| 2  | Protein (%)                      | 16.25 ±1.13      |
| 3  | Fat (%)                          | 4.24 ±1.25       |
| 4  | Ash (%)                          | 12.50 ±0.97      |
| 5  | pH                               | 5.29 ±0.17       |
| 6  | Lactic acid bacteria (CFU/g)     | 6.2 ±3.24 x10^7  |

Data from 4 local cottages [15]-[16].

The moisture content of belacan depik (58.23 ±1.26%) is almost similar to common fermented fish and shrimp paste from Asia (56.1-70.9%) [20]. Fat and protein content of fish and fish product depend on type of fish. Fat content of belacan depik (4.24 ±1.25%) is relatively similar to Korean shrimp paste (4.89%), whereas protein value of belacan depik (16.25 ±1.13%) is lower than common fermented fish and shrimp paste (30.38%). Just like protein, ash content of belacan depik is lower than common fermented fish and shrimp fish. The ash content depend on salt number addition during manufacturing process [21].

Belacan depik has a pH value of 5.29 ±0.17, which indicate the taste of this product is little sour. It is suspected that pH has correlated to microorganisms activities. In present study, the total count of lactic acid bacteria is 6.2±3.24 x10^7 CFU/g. Lactic acid bacteria is one of bacteria that usually contained in fermented fish product. The primary role of lactic acid bacteria is to ferment the available
carbohydrates and thereby cause a decrease in pH. The combination of low pH and organic acids (mainly lactic acid) is the main preservation factor in fermented fish products [22]-[23].

5. Conclusions

Depik fish is a typical endemic fish of Laut Tawar lake, belonging to the Crypinidae family and the Rasbora genus. The fish population is currently decreasing and it is designated as a fish with a threatened status. However, the people's preference for this fish remains high, both in fresh and processing product, namely dry depik (drying) and belacan depik (fermentation). The characteristics of belacan depik obtained from market in Takengon city have moisture content of 58.23 ± 1.26%, protein 16.25 ± 1.13%, fat 4.24 ± 1.25%, pH 5.29 ± 0.17 and the total lactic acid bacteria reached 6.2 ± 3.24 x10^7 cfu/g.

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