Chemical analysis and organoleptic properties of banana blossoms (*Musa paradisiaca*) as filler for catfish (*Clarias sp.*) fish floss

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**Abstract.** Meat floss or known as Abon (Indonesian) made from dried meat and has a fluffy texture similar to cotton coarse. The crude protein content of meat floss was less than 15%. Catfish (*Clarias sp.*) has rough fiber and does not contain many bones that are ideal for the main ingredients for meat floss. Catfish (*Clarias sp.*) cultivated from freshwater can be used as main ingredients for meat floss. To raise the economic value of meat floss, some use banana blossoms (*Musa paradisiaca*) as a filler. This study aims to determine the effect of banana blossoms as a filler and frying temperature on the chemical quality and organoleptic properties of catfish meat floss. The Method of this research is to make catfish meat floss with various banana blossoms and various frying temperatures. The method used is the analysis of variance or the factorial pattern of analysis of variance (ANOVA). The result showed the most preferred sample was the treatment sample with 60% banana blossoms filling and a frying temperature of 170 °C. The samples have the moisture content of 6.8%, the protein content of 14.91%, and fat content of 9.73%, as well as the preferred parameters of color, fragrant, flavor, and texture. The results showed that the use of banana blossoms as a filler in catfish floss improved the quality of shredded and has the potential to be used as a form of food product diversification.

1. **Introduction**

Catfish is one that is widely cultivated in Indonesia. This catfish is one of the leading cultivated fishery commodities being developed. Therefore, catfish has a pretty good market prospect seen from the advantages of catfish, which is that it can survive in minimum water conditions so that people cultivate it a lot. Also, these fish can be spawned throughout the year, grow faster, can live in dirty and less oxygenated environments, and can reach larger sizes, and can be given various kinds of additional feed [1].

So far, catfish are usually consumed as a side dish by being processed whole as catfish, for example, fried, catfish pecel, penyet catfish, mangut catfish, and so on. Not many industries have optimized the diversification of catfish processing considering that catfish only has an edible portion of meat as much as 40% of its total weight. So the meat that can be processed is relatively small, for example, if one kilogram of catfish only has 400 g of meat [2].

The diversification of aquatic products is intended to provide added value to catfish. Added value is all forms of process, both manual and mechanical, which change to a new form, in terms of appearance,
texture, taste and flavor or taste, and so on. The added value in this research plan will be achieved by the process of developing a diversified catfish product. One of them is making fish floss. The problem that occurs in the making of fish floss is a less fibrous texture. This is because fish meat has less fiber. The addition of fillers can improve the texture of the fish floss product [3].

Banana blossoms are one of the vegetable ingredients used to increase the texture and fiber of fish floss. The addition of vegetable ingredients expected to increase the benefits of catfish floss as an addition to food fiber that can facilitate digestion as well as economic aspects to minimize production costs compared to using fiber from animals [4].

The aim of this study is to determine the effect of banana blossoms as a filler and frying temperature on the chemical quality and organoleptic properties of catfish floss.

2. Material and methods

The ingredients used in this study were catfish, bananas blossom, spices (seasonings) including galangal, brown sugar, salt, shallots, garlic, bay leaves, coriander, cooking oil. Then chemical analysis materials. The analysis parameters carried out include: proximate analysis (protein content, water content, fat content), and acceptance test (hedonic quality organoleptic).

Preliminary research on the manufacture of catfish shredded products by knowing the proper steaming method for catfish to obtain the best quality catfish floss by comparing the steaming time at 90°C between 15 minutes and 45 minutes. Chemical analysis for the preliminary research were fat content using Soxlet method, water content, and protein content using Kjedhal method. The results of making catfish floss with different steaming times were then tested for organoleptic testing to find out which steaming time the consumer liked the most.

This main research is to make catfish floss products with the addition of several levels of banana blossom substitution as a supporting material for making catfish floss and different frying temperatures. The ratio of adding banana blossoms is 40%, 50%, 60% with each frying temperature of 150°C, 160°C, 170°C. The experimental design used in the main study was a 3x3 factorial pattern with three replications for each treatment combination in a randomized block design (RBD) [5].

3. Results and discussion

3.1. Preliminary research

The preliminary research was conducted to determine the results of the catfish floss steamed at 90 °C for 15 minutes and 45 minutes on the moisture content, protein content, fat content and preference level of the panelists to be used as a reference in the process of making catfish floss in the main study.

In the preliminary study, the water content of catfish floss steamed for 15 minutes was 7.05% while steamed catfish floss at 45 minutes had a water content of 6.98%. The results of the protein content analysis showed that the steaming time for 15 minutes and 45 minutes did not give too much difference, namely 15.89% and 15.74%. Analysis of fat content at the steaming time of 15 minutes and 45 minutes was 11.31% and 11.26%, respectively. Organoleptic analysis based on the panelists' preference for a steaming time showed that the most preferred catfish floss with a steaming time of 45 minutes. Furthermore, in the main research of making catfish floss, the steaming process will be carried out for 45 minutes.

3.2. Main research

The main research was conducted to determine the quality of catfish floss with added banana blossoms with various variations and variations in frying temperature. The variations in the concentration of banana blends were added, namely 40%, 50%, and 60% with variations in frying temperatures of 150°C, 160°C, and 170°C.

In this main research, the expected result of catfish shredded is shredded which has the least water content with high protein content and low-fat content and the most acceptable fish floss for consumers. The results of the analysis of water content showed that the catfish floss which had the lowest water
content was the sample with the addition of banana hearts as much as 40% with a frying temperature of 170 °C. Furthermore, the results of the analysis of the highest protein content showed that the sample with the addition of banana hearts as much as 40% which was fried at a temperature of 170 °C was 15.69% and the lowest fat content in the sample with the addition of banana blossoms as much as 60% which was fried at a temperature of 170 °C was 9.73%.

Organoleptic analysis carried out on catfish floss products showed that the addition of banana blossoms by frying temperature did not affect the color and aroma. The addition of banana heart and frying temperature affects the taste of catfish floss, respectively in the sample addition of 60% banana blossom and 170°C of frying temperature. The sample with the texture that the panelists liked the most was the sample with the addition of banana blossoms as much as 60% and a frying temperature of 170 °C.

3.3. Discussion
Fish floss from catfish (Clarias sp.) is a form of food diversification. Catfish are known to have a high nutritional content. Every 100 grams of catfish has a water content of 78.5 grams, 18.7 grams of protein, 1.1 grams of fat, several minerals including calcium, phosphorus, iron, sodium, thiamin, riboflavin, and niacin [6]. The use of catfish for fish floss has several drawbacks, one of which is its soft texture and crumbles easily. Therefore, other ingredients are needed as fillers to improve the texture of the resulting catfish floss. one source of fiber that can be used is banana blossoms. Banana blossoms are part of the banana plant which has quite good nutritional value. Every 100 grams of banana blossom contains 8.31 grams of carbohydrates, 1.25 grams of protein, 0.35 grams of fat, and several minerals such as calcium, iron, phosphorus, vitamin A, vitamin B, and Vitamin C. Another advantage that banana blossom has is its bioactive compounds are known to prevent heart disease and stroke and have a high anthocyanin content [3].

The frying process is a process of heating the product using cooking oil as the medium. During the frying process, changes occur both physically, chemically, and affect the resulting sensory properties [7]. The frying temperature factor will greatly affect the quality of the shredded fish. The higher the frying temperature, it will change the characteristics of the catfish floss. The aim of this research to determine the effect of adding banana blossom and frying temperature on the chemical and organoleptic characteristics of catfish floss. (Clarias sp.).

The results showed that the best sample which had a low water content, high protein content was a sample with the addition of banana blossoms as much as 40% and a frying temperature of 170 °C. Meanwhile, the shredded fish sample that the panelists liked the most and had a low fat content was the sample with the addition of banana blossom as much as 60% and a frying temperature of 170 °C. This shows that the more banana blossoms added will affect the nutritional content and consumer acceptance.

Water content analysis is performed to determine the quality of a food product. By knowing the moisture content of the product, we can find out how long the product can be stored. The moisture content of a product will affect the quality of the material where the higher the water content, the more easily the material or product will be damaged.

Proteins are macromolecular compounds that have several functions in food and determine the quality of food during processing, storage, and serving. Protein has the ability to react with other food components such as fat, reducing sugars, and others. This causes a brown color and affects the taste caused by these reactions [8].

4. Conclusion
This research shows that the use of banana blossom as additional fiber in catfish floss products can improve the texture and nutritional content of catfish floss. Besides, the use of banana blossoms in making catfish floss can increase the economic value of the final product. Another thing that needs to be developed from this research is how to store and pack the catfish floss products so that they can maintain quality and extend the shelf life of the catfish floss products.
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