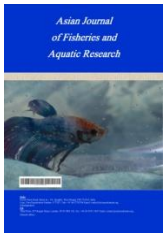

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The Effect of Additional Cayenne (*Ananas comosus* [L]. Merr) Solution on the Prefferencelevel Red Tilapia Shredded

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Authors' contributions

This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.

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ABSTRACT

This research aims to determine the right concentration of cayenne solutionso the red tilapia product most liked. The method used in this study was experimental. The research consisted of 4 treatments and 20 panelists as replicates. The treatments were addition of pineapple fruit extract solution as much as 0% (control), 10%, 20%, and 30% of the total weight of the fish meat filet and the soaking process for each treatment for 30 minutes.Based on the calculation of the value of the criteria in the form of color, aroma, taste, and texture obtained, the most important is the taste that determines the final decision of the panelists in choosing the processed product of shredded fish meat with a weight value of 0.46.Based on the parameters of preference, the product of red tilapia shredded with 20% pineapple solution was the best treatment and the most preferred by the panelists, with organoleptic values: color 6.5; fragrance 6.3; taste 7.2; and texture 6.0. The results of the proximate test of red tilapia with the addition of a 20% pineapple solution in the soaking process for 30 minutes was the most preferred treatment by the panelists. The results were 6.2% water content, 30.18% protein, 17.72% fat and carbohydrates 41.97%.

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Keywords: Shredded; fish meat fillet; pineapple extract; aroma; bromelain enzyme.

1. INTRODUCTION

Fish is one of the foodstuffs that are relatively easy to find in Indonesia. This issue causes the high consumption of fish per capita per year. Red tilapia (*Oreochromis niloticus*) is one of the freshwater fish species that has opportunities in its marketing. The Ministry of Maritime Affairs and Fisheries (2018) declared that the production of red tilapia in Indonesia was increasing from year to year. Red tilapia production in 2015 reached 567,085 tons and zoom to 640,568 tons in 2016. In 2017 tilapia production reached 890,909 tons. (Ministry of Marine Affairs and Fisheries, 2018) Besides that, fish is a source of animal protein to meet the nutrition of the Indonesian people [1]. In 2015, the Ministry of Health stated that red tilapia appertained as high protein fish (18.4% per gram).

Fish is produced in large quantities every year, but fish is not a food that has a long shelf life. So that the processing of red tilapia into shredded fish is a way out to increase selling power [2]. Red Tilapia (*Oreochromis niloticus* Trewavas) is a type of freshwater fish chosen as raw material because it has thick, compact flesh and is separated easily from the bones and spines. In addition, red tilapia has a fat content of 4.1% and includes medium-fat fish (Astawan, 2003), so it is suitable for use as raw material for shredded fish.

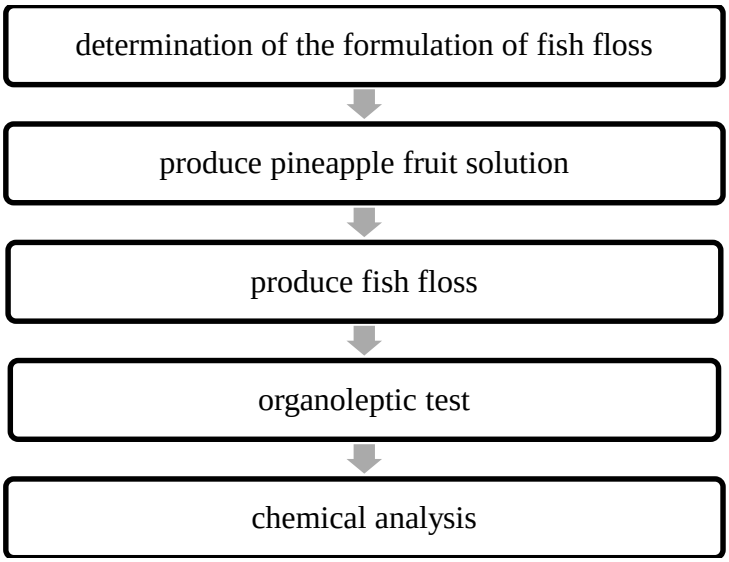
One of the weaknesses of shredded fish is its fishy aroma, originated the problem, the researcher added pineapple solutiont with various concentrations in the processing of shredded fish by soaking fresh tilapia in pineapple solutiont for 30 minutes. Pineapple fruit was choosing based on the results of Meliana's research [3], that the cayenne solution produced more significant organoleptic values (aroma and taste) than other types of pineapple. The bromelain enzyme contained in pineapple is used as an antibacterial that terminates bacterial growth both bactericidal and bacteriostatic, thereby reducing the fishy odor caused by fish TMA. In addition, to reduce the fishy smell of fish, soaking with pineapple solution is expected to add nutritional value to processed red tilapia meat products.

Based on the weaknesses in processed fish floss products on the market, it is necessary to research the concentration of adding pineapple fruit solution to tilapia shredded processed products to produce fish floss processed products which has a fishy aroma and improve their organoleptic characteristics.

2. METHODS AND MATERIALS

2.1 Procedure

The research procedure to be carried out consists of several stages, namely, (1) determining the formulation of shredded red tilapia, (2) making pineapple fruit, (3) making red tilapia floss, (4) organoleptic testing, and (5) chemical analysis. The research procedure flow chart is present in Fig. 3.



2.1.1 Determination of the red tilapia shredded formulation

Determination of the red tilapia shredded formulation refers to the formulation that has been through experiments in previous studies.

Table 1. Modified Formulation

Spices	Percentage (%) of seasoning weight per kg of fish meat shreds	Seasoning Weight (gram)
Shallot	5	50
Garlic	8	80
Tamarind	1	10
Sugar	20	200
Lime leaf	2	20
Coriander	1	10
Galangal	1	10
Coconut milk	25	250
Bay leaf	2	20
Lemongrass	2	20
Salt	5	50

Source: Hardoko [4]

2.1.2 Produce Pineapple Fruit Solution

According to Falahudin [5], a pineapple fruit solution is produced by smoothing the pineapple's pulp and separating the pulp and the solutiont using gauze to get pineapple solutiont.

2.1.3 Making Shredded Red Tilapia

The determination of the method of making shredded tilapia is heading on the experiment's result conducted by Hardoko [4]. The procedure for making shredded tilapia is as follows:

- Tilapia fish meat is steamed for 10 minutes and then shredded using a fork
- Puree all the spices, such as onion, garlic, bay leaf, lemongrass, turmeric, galangal, salt, and sugar.
- Put the coconut milk and ground spices into the frying pan
- When it smells good, add the shredded fish to the frying pan. Stir occasionally, until it becomes slightly dry.
- Until slight dry, put the shredded into the press/spinner to reduce the oil content in the shredded.
- Abon that has been dried, then packaged according to the desired packaging.

2.1.4 Organoleptic Test

- Samples are presented in different codes.
- The characteristics of the four samples be evaluated using a hedonic scale by panelists consisting of color, aroma, taste, and texture.
- Assessment of organoleptic characteristics is written on the assessment sheet provided.

2.1.5 Determination of the selected formula

The determination of the selected formula was obtained from the results of organoleptic tests on the characteristics of color, taste, aroma, and texture with the highest average value. Determination of this selected formula will be carried out further testing to determine its content through a proximate test.

2.1.6 Chemical analysis

Chemical analysis was carried out on the selected product through the proximate test. The proximate test carried out included water content, fat content, protein content, and carbohydrate content.

2.2 Methods

The method used in this research is the experimental method. The analysis consisted of 4 treatments and 20 panelists as replicates. The research process used the addition of pineapple fruit solutiont as much as 0% (control), 10%, 20%, and 30% of the total weight of fish meat fillets, and soak each treatment for 30 minutes.

2.3 Research Parameters

Parameters observed during the research were organoleptic and chemical characteristics

2.3.1 Organoleptic characteristics

Organoleptic characteristics were held through hedonic tests. The hedonic test aims to determine the panelists' responses to shredded fish products based on organoleptic characteristics, include color, aroma, taste, and texture. Based on his level of preference, this hedonic test was conducted with 20 semi-trained panelists.

The score of the panelists' preference level used ranges from 1 to 9, namely:

- 1 = very dislike
- 3 = dislike
- 5 = neutral/normal
- 7 = likes
- 9 = really like

The rejection limit for this product is if the product gets a minimum score of five, the product is declared accepted by the panelists (Soekarto 1985 in Lailiyana 2012). Bayes test is an organoleptic test that aims to determine the comparison of determining criteria in a product. The processes produced by the Bayes test are a basis used in determining the most preferred output. The results of the Bayes test calculation will show that the element that has the highest priority value is the most preferred by the panelists (Marimin 2004).

2.4 Chemical Analysis

2.4.1 Moisture content

Empty porcelain dishes were dried in an oven at 105°C for 15 minutes. The porcelain cup is cooling in a desiccator. After cooling, the empty porcelain dish was weighed and recorded the weight. The sample was weighed 5g and placed in a porcelain dish. Samples were dried in an oven at 105°C for 3 hours. After the process, the specimen and the cup were cooling again in a desiccator. The dried sample and the cup were weighed again and writing down the weight. The moisture content percentage on a wet basis is calculated by the following formula:

$$\text{Moisture Content (\%)} = \frac{(cup\ weight + specimen) - weight\ after\ cooking}{specimen\ weight}\ x\ 100\%$$

2.4.2 Protein content

Protein analysis doing by the micro-Kjeldahl method. 0.1g sample was put into a 30mL kjeldahl flask. Added K2SO4 (1.9 g), HgO (40mg), H2SO4 (2.5mL), and some Kjeldahl tablets to the sample. The sample boiled until it is clear (1-1.5 hours), cooled and transferred to a distillation apparatus. Chill sample rinsed with water as much as 5-6 times with distilled water (20mL). 40% NaOH solution added to a 20mL test tube. The liquid was collect in 125 mL Erlenmeyer containing H3BO3 and three drops of indicator (a mixture of 0.2% methyl red in alcohol and 0.2% methyl blue in alcohol with a ratio of 2:1) under the condenser. This process ran until getting approximately 200 mL of distillate. The distillate was titrated using 0.1N HCl until the color changed to red. Protein content proceeds by the following formula:

$$\text{Nitrogen (\%)} = \frac{(mL\ HCL\ of\ sample - mL\ HCL\ of\ blanko}{mg\ of\ sample}\ x\ 100\%$$

$$\text{Protein content (\%)} = \%\ nitrogen\ x\ correction\ factor\ (6.25)$$

2.4.3 Fat content

A 0.5g sample was weighed, wrapped in filter paper and placed in a Soxhletsolutiontion apparatus mounted above the condenser and a fat flask beneath. The hexane solvent is poured into the fat flask sufficiently according to the size of the soxhlet used and refluxed for at least 16 hours until the solvent drops back into the fat flask. The solvent in the fat flask is distilled and collected. The fat flask containing the solutionted fat was dried in an oven at 105°C for 5 hours. The fat flask was cooled in a desiccator for 20-30 minutes and weighed. Calculation of fat content studied by the following formula:

$$\text{Fat Content (\%)} = \frac{tube\ weight\ with\ fat - empty\ tube}{Sample\ weight}\ x\ 100\%$$

2.4.4 Water content

Empty porcelain dishes were dried in an oven at 105°C for 15 minutes. The porcelain cup is cooled in a desiccator. After cooling, the empty porcelain dish was weighed and the weight was recorded. The sample was weighed 5g and placed in a porcelain dish. Samples were dried in an oven at 105°C for 3 hours. After the process, the sample and the cup were cooled again in a desiccator. The dried samples along with the cup were reweighed and their weights were recorded. The calculation of the percentage of moisture content on a wet basis can be calculated by the follo (%)

$$= \frac{(bobot\ cawan + sampel) - Bobot\ setelah\ oven}{bobot\ sampel}\ x\ 100\%$$

3. RESULTS AND DISCUSSION

3.1 Characteristic

3.1.1 Color

The panelist test results on organoleptic parameters of shredded tilapia color with pineapple fruit solutiont addition in various concentrations resulted in an average value of 4.4 to 6.5. The highest value is 6.5 by the

product with 20% cayenne added, while the lowest value is 4.4 indicated by the product with 30% cayenne added.

Table 2. Color Value of Shredded Fish Based on Concentration of Cayenne Solutiont

Treatment	Median	Mean
Control	5	4,6 a
Tilapia + 10% cayenne solution	6	6,2 bc
Tilapia + 20% cayenne solution	7	6,5 c
Tilapia + 30% cayenne solution	5	4,4 a

3.1.2 Aroma

The results of the aroma assessment by panelists on shredded fish products with added pineapple solutiont with various concentrations obtained an average value range of 4.1 to 6.3. The results of the highest aroma assessment are shown by red tilapia with 20% pineapple solutiont with an average value of 6.3. Meanwhile, the lowest average value proved in red tilapia meat products that added 30% pineapple solutiont with an average value of only 4.1.

Table 3. Aroma Value of Shredded Fish Based on theConcentration CayenneSolutiont

Treatment	Median	Mean
Control	5	5,6 ab
Tilapia + 10% cayenne solution	5	5,8 ab
Tilapia + 20% cayenne solution	7	6,3 b
Tilapia + 30% cayenne solution	5	4,1 a

Sukada, et al (2019) stated that soaking pineapple solutiont can reduce the fishy smell of meat and has a distinctive aroma that panelists like. Research conducted by Widawati [6] proves the three samples of eel fish sauce, the study shows that the more pineapple juice adds, the greater the hydrolysis process results. Budiarti [7] Bromelain enzyme will hydrolyze more connective tissue and cause the meat structure to be more tenuous. Myofibril proteolysis produces protein fragments with shorter peptide chains. The more pineapple juice put in, the greater the concentration of enzymes contained in it. The higher the bromelain enzyme, the higher the aroma of soy sauce produced. This phenomenon happens because the protein is broke down into free amino acids also peptides will convert into aroma-forming compounds.

3.1.3 Taste

Thepanelist test value based on the product taste with the addition of pineapple solutiont with various quantities of concentration reached the highest average grade of 7.2 and the lowest value of 3.8. The Tilapia product with 30% Cayenne solutionts shown the lowest average value, meanwhile, the highest average value reached by the red tilapia meat products was 20% with Cayenne solutiont with a value average of 7.2. Meanwhile, processed products of shredded fish that were not added with pineapple solutiont and added 10% pineapple solutiont got an average score of 6.1 and 6.4.

Table 4. Fish Shredded Taste Value Based on CayenneSolutiont Concentration

Treatment	Median	Mean
Control	6	6,1 ab
Tilapia + 10% cayenne solutiont	6	6,4 b
Tilapia + 20% cayenne solutiont	7	7,2 b
Tilapia + 30% cayenne solutiont	4	3,8 a

3.1.4 Texture

Table 5. Fish Shredded Texture Value Based on CayenneSolutiont Concentration

Treatment	Median	Mean
Control	5	4,9 ab
Tilapia + 10% cayenne solutiont	5	5,3 b
Tilapia + 20% cayenne solutiont	5	6,0 b
Tilapia + 30% cayenne solutiont	4	4,1 a

The results of the organoleptic assessment on texture points by panelists, processed products of shredded red tilapia meat with the addition of pineapple solutiont with various levels of concentration obtained an average value range of 4.1 to 6. The highest value was achieved by shredded red tilapia product with 20% Pineapple solutiont with a concentration of 20%, which is 6. Meanwhile, the lowest average value is achieved by processed red tilapia meat shredded products with the addition of pineapple solutiont with a concentration of 30% with an average value of only 4.1.

3.2 Decision Making with Bayes Method

Table 6. Criteria Weight Value of Red Tilapia Shredded with CayenneSolutiont

Criteria	Criterion Weight
Color	0,19
Aroma	0,20
Taste	0,46
Texture	0,15

Taste is the crucial criteria based on the counting result of the criteria weight value in Table 6 with a nominal of 0.46. The second criterion is aroma gets a value of 0.20. Color and texture in third and four-place, based on panelist test result with the following score are 0.19 and 0.15

The criteria above indicate that the panelists' attention is more on taste and aroma, but texture and color of the products have less intention. Aroma is assessed as the main attraction for a product to determine whether or not a product is feasible. In conclusion, taste has a critical role in determining the delicacy of the product [8].

Taste on food is a sensation received by consumers, especially from the taste and aroma of a food product. Flavor and aroma can create complex and interrelated effects [9].

The Bayes method is an analytical technique used in making the best decision from several alternatives to obtain an optimal decision. Final decisions are obtained by considering various criteria (Marimin 2004). The results of calculations to determine the best treatment done by considering the classification for color, aroma, texture, and taste of processed red tilapia meat shredded products with the addition of pineapple solutiont with different concentrations are provided in Table 6.

The Table 7 provided the results of calculations using the Bayes method and found that the addition of 20% Cayenne solutiont into the products of red tilapia obtained the highest alternative value, which was 6.7. The second rank is the processed product of shredded tilapia meat with the addition of pineapple solutiont as much as 10%, with an alternative value of 5.7. On the other hand, pure products of red tilapia reached a value of 5.5, and processed products of red tilapia shredded fish meat with added pineapple solutiont as much as 30% achieved the lowest value, which was 4.4.

Based on the parameters of predilection, red tilapia products with 20% pineapple solutiont were the best treatment and the most preferred by the panelists.

Table 7. Matrix of Decission Product Evaluation of Red Tilapia with Cayenne Solutiont

Treatment Code	Criteria				Alternative Value	Priority Value
	Color	Aroma	Taste	Texture		
Control	5	5	6	5	5,5	0,25
Red Tilapia + 10% Cayenne Solutiont	6	5	6	5	5,7	0,25
Red Tilapia + 20% Cayenne Solutiont	7	7	7	5	6,7	0,30
Red Tilapia + 30% Cayenne Solutiont	5	5	4	4	4,4	0,20
Criterion Value	0,19	0,20	0,46	0,15	22,2	1,00

3.3 Analysis

3.3.1 Moisture content

Table 8. Test Result of Moisture Content of Red Tilapia with CayenneSolutiont Product

Cayenne Solutiont Consentration	Moisture Content (%)
Control	6,8
Red Tilapia + 20% Cayenne Solutiont	6,2

Testing the moisture content of processed red tilapia fish meat shredded product with pineapple solutiont was carried out by drying a sample weighing 5 g and drying in an oven at 105°C for 3 hours and then weighing it again. The water content in red tilapia product with 20% Cayenne Solutiont is only 6.2%. 0,6% lower than the water content in control products which reaches 6.8%. With the resulting product, it can be ascertained that the processed product of red tilapia meat shredded which is added with pineapple solutiont as much as 20% has a longer shelf life because it has low water content.

These results are head to Tami et al (2013) research, declared that duration of immersion into pineapple solutiont did not find any significant impact on the moisture content of the output product. This is because the absorption ability of meat is not high in saturated environmental conditions.

3.3.2 Protein level

Table 9. Test Results of Protein Levels of Red Tilapia with Cayenne Solutiont

Cayenne Solutiont Consentration	Protein Level (%)
Control	32,45
Red Tilapia + 20% Cayenne Solutiont	30,18

The protein content computing in the red tilapia product was done by the Kjeldahl method, resulting in the protein content of the control sample being superior to the specimen of shredded tilapia with 20% pineapple solutiont. The processed product of pure red tilapia shredded meat has a protein content of 32.45%, while the red tilapia product with 20% pineapple solutiont only has a protein content of 30.18%.

Collagen proteolysis or degradation of protein structure into hydroxyproline, produce protein fragments with shorter peptide chains. This is what causes the sample added with pineapple solutiont to decrease protein levels. The more proteolysis, the lower the protein content. (Ketnawadan Rawdkuen, 2011)

3.3.3 Fat content

The test results of fat content in products of red tilapia showed that the fat content of shredded fish with pineapple solutiont was lower than the control product. The product of red tilapia with 20% pineapple solutiont has a fat content of 17.72%, this result proves that the fat content of the product of red tilapia with 20% pineapple solutiont is lower than the fat content of the control product which has 21.19% of fat content.

Table 10. Test Results of Fat Content of Red Tilapia Product withCayenne Solutiont

Cayenne Solutiont Consentration	Fat Content (%)
Control	21,19
Red Tilapia + 20% Cayenne Solutiont	17,72

3.3.4 Carbohydrate level

Table 11. Test Results for Carbohydrate Levels of red Tilapia Products with Cayenne Solutiont

Cayenne SolutiontConsentration	Carbohydrate Levels (%)
Control	36,23
Red Tilapia + 20% Cayenne Solutiont	41,97

The results of the carbohydrate test on red tilapia products showed that the sample with pineapple solutiont addition had a higher carbohydrate content than the pure shredded fish sample. The Red tilapia product with 20% Cayenne solutiont showed a carbohydrate content of 41.97%, while in the processed product of pure red tilapia meat shredded, the carbohydrate content was only 36.23%.

4. CONCLUSION

To sum up, the red tilapia product with the addition of 20% pineapple solutiont achieves the highest score based on the organoleptic parameters. The color value of 6.5, aroma 6.3, taste 7.2, and texture 6.0. Meanwhile, the taste is the crucial criteria based on the counting result of the criteria weight value in Table 6 with a nominal of 0.46. The second criterion is aroma gets a value of 0.20. Color and texture in third and four-place, based on panelist test result with the following score are 0.19 and 0.15 heading to computing result of the weight value from the criteria color, aroma, taste, and texture. Last, the product of red tilapia with 20% pineapple solutiont was the best treatment and the most preferred by the panelists.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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