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## The Effect of Kluwih (*Artocarpus communis*) Fruit Flesh Addition to the organoleptic properties of Mackerel Tuna Fish Abon

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**Abstract.** One of the Indonesian natural resources that are not yet optimally utilized is Kluwih, a fruit similar too jackfruit that has high fiber content, which is 2.3% that makes it worth being tried as a substitute for meat/ fish in Abon production. This study was a substitute fish ingredient in fish Abon making with Kluwih. There are three different concentrations of Kluwih addition tried. The Abon product then organoleptically tested (aroma, color, taste, and texture). This research resulted Abon products that were generally liked by panelists. The conclusion of this study was the results of organoleptic tests on Abon for the parameters of taste, aroma, and color in each treatment favored by the panelists while the most preferred texture was A3 treatment (25% tuna + 65% Kluwih + 10% seasoning). So, it can be concluded that treatment three can be used as the best treatment, in addition to the panelists' preference also because the high concentration of Kluwih used so that when used as a recipe for Abon making, it can reduce production costs

### 1. Introduction

Abon is an Indonesian food that usually made of shredded meat that combining with several typical Indonesian spices. Astawan defines Abon as dried meat and has been sliced into fine fibers and is generally made from beef [1]. However, over time, Abon already also made from fish, including tuna fish, mackerel tuna, and also other types of fishes. The fact that it is made of meat and fish highly contributes to the high price of Abon. Whereas, many natural resources also contain fiber that is good for Abon production and not yet utilized optimally.

As a tropical country, Indonesia is rich with flora and fauna as natural resources. Many of them are not well exploited, which could be due to the limited knowledge of the resources. One of them is Kluwih, a fruit similar too jackfruit that has high fiber content, which is 2.3% [2]. The fiber content in Kluwih fruit makes it worth being tried as a substitute for meat/ fish in Abon production.

As the main ingredient that highly affects the price of Abon product is the meat and fish itself, this study tried to reduce the fish used and substitute it with Kluwih fruit and tested it organoleptically to see the panelist response to the resulted product.



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## 2. Methods

This paper is a part of a project that has been published previously [3]. So all the procedures used, including seasoning sauce making, fish steaming, Kluwih steaming, and Abon production as well as the research design, were exactly following the procedure in the mentioned paper.

### 2.1. Observational parameters

Observational parameters used in this study consisted of organoleptic tests, including aroma, color, taste, and texture, conducted by 15-25 semi-trained panelists with an age range of 19-25 years old male or female students. The numerical scale with sensory value (1 = extremely dislike), (2 = dislike), (3 = slightly like), (4 = like), (5 = extremely like) was applied in this study [4].

### 2.2. Data analysis

All parameters tested using analysis of variance (ANOVA) with three replications. The difference between treatments was tested with Duncan test using Microsoft Excel 2010 dan SPSS version 22 Software.

## 3. Results and discussion

Organoleptic testing (hedonic test) is a sensory test conducted to determine the level of panelist acceptance of a product. This test is used to produce, measure, analyze, and interpret reactions to the characteristics of food received by the senses of sight, smell, taste, and touch using a certain scale. This study used a numerical scale with sensory value (1 = extremely dislike), (2 = dislike), (3 = slightly like), (4 = like), (5 = extremely like). The result of the hedonic test is presented below.

### 3.1. Aroma

Aroma has a great influence on determining the level of panelist acceptance of a product. A good or distinctive aroma will increase consumer appetite. Through aroma, panelists or people can find out the ingredients contained in a product. The aroma usually arises from volatile compounds contained in the food that comes out during the processing or certain treatment, especially for food containing essential oils.

Soekarto (1985) stated that the aroma produced from food ingredients determines the delicacy of the food [5]. The food industry considers it very important to do the aroma test because it can quickly provide an assessment of whether a product is liked or disliked. The results of the panelist organoleptic test on aroma in Abon ranged from 3.56 (liked) to 3.76 (liked) and can be seen in Figure 1.

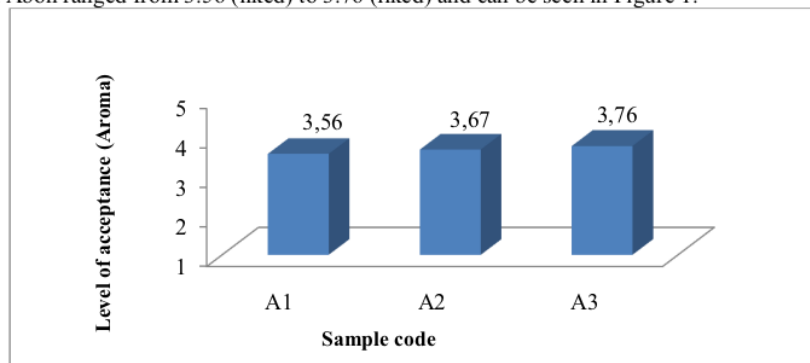


Figure 1. The aroma acceptance level of Abon product in different ratio of Fish and Kluwih

The results of the analysis of variance showed that the difference in the percentage of the addition of Kluwih in Abon fish had a very significant effect on the aroma acceptance level at the level of 5% and 1% so that further testing was carried out.

The panelist preference level on product aroma is at A1 treatment (65% tuna + 25% Kluwih + 10% seasoning) is 3.55, at A2 treatment (45% Kluwih + 45% tuna + 10% seasoning) is 3.65 and in treatment A3 (25% tuna + 65% Kluwih + 10% seasoning) is 3.75. The aroma produced in Abon products is generally influenced by the seasoning used, while other factors that influence the frying process. During the frying process, volatile compounds will form due to the degradation of food by heat. The aroma produced in the Abon product is influenced by the addition of spices that have volatile substances at room temperature so that when processed, they will emit a distinctive aroma. The aroma that arises during the processing is caused by the softening of the texture and loss of tissue/cell integrity so that the essential oil contained in the cavities in the tissue in the herbs or spices used will come out as a result of damage from heating so that the chemicals in the material will react and cause changes in flavor [6].

Another factor that influences the aroma is the frying process. During the frying process, in addition to reducing the water content that will be replaced by oil, it will also cause changes in color, aroma, texture, and taste as well as the formation of volatile compounds that are generally derived from aromatic compounds. The aroma obtained is a natural flavor content in oil and the results of the reaction with food that is fried so that it evaporates and produces aroma [7].

### 3. 2. Color

Color is the first organoleptic parameter in its presentation. Color is the first impression because it uses the sense of sight. Attractive colors will attract panelists or consumers to taste the product. After appearance or color, the taste of food is the second factor that determines the taste of the food itself. If the appearance of the food served stimulates the nerves through the sense of sight so that it can arouse appetite, then in the next stage, the taste of the food will be determined by the stimulation of the smell and sense of taste [8].

Color is the first impression captured by panelists before other parameters such as taste. Attractive colors will affect consumer acceptance. Besides that, the color can also provide clues about the occurrence of chemical changes in food, such as browning and caramelization [9]. The results of the panelists' assessment of the color of Abon products ranged from 3.56 (likes) to 3.76 (likes) and can be seen in Figure 2.

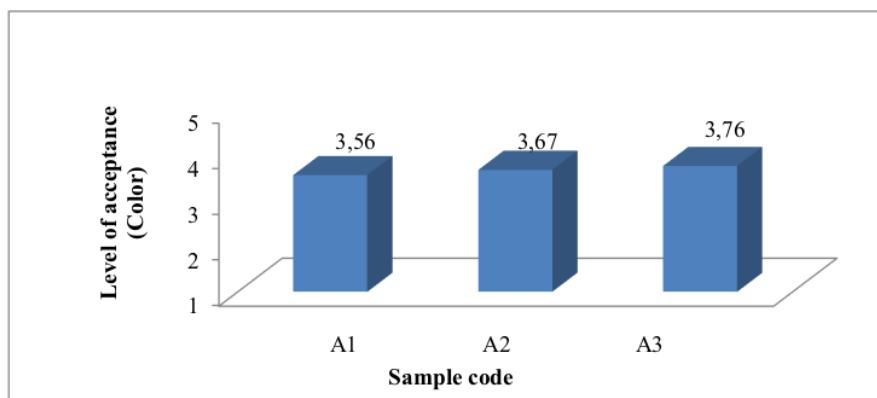


Figure 2. The color acceptance level of Abon product in different ratio of Fish and Kluwih

The results of the analysis of variance showed that the difference in the percentage of the addition of Kluwih in Abon fish had a very significant effect on the color acceptance level at the level of 5% and 1% so further testing was carried out.

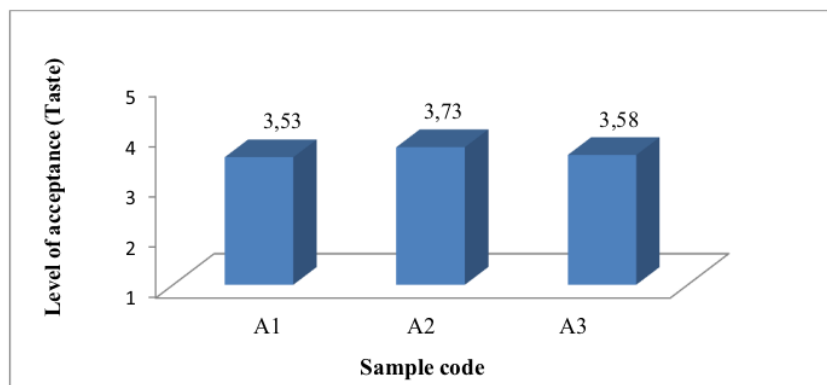
Figure 2 shows that the panelist's response to the color of the Abon product gives different assessment results for each treatment, but all treatments are liked by panelists with a preference level ranging from 3.36 to 3.76. Panelist response to color in treatment A1 (65% tuna + 25% Kluwih + 10% seasoning) is 3.36 (likes) in treatment A2 (45% Kluwih + 45% tuna + 10% seasoning) is 3.67 (like) and for treatment A3 (25% tuna + 65% Kluwih + 10% seasoning) is 3.76 (likes).

This is presumably because all treatments received the same frying process so that the color change that occurred did not differ much and all favored by panelists. In the frying process, there will be a color change to brownish-yellow as in Abon products in general. Brownish-yellow color that occurs during the frying process due to the reaction between amino acids and reducing sugars. The Maillard reaction begins with the reaction of an amino group on amino acids, peptides, or proteins with the glycosidic hydroxyl group on sugar. The reaction sequence ends with the formation of a brown nitrogen polymer. In addition, the factors that influence color are that most plant oils contain carotenoid pigments, so they produce attractive colors (golden yellow). The resulting color depends on the temperature and length of frying done. The longer time used in frying causes the oxidation process in oil will increase, which will cause the color change in the oil to darken and will affect the color of the frying results. This is in accordance with the statement of [9], that color changes in processing such as frying are caused by Maillard and non-enzymatic reactions. This is also consistent with the statement of Ketaren (1986) that the appearance of the color on the surface of the material is caused by the browning reaction or the Maillard reaction [7]. This color intensity level depends on the time and temperature of the frying pan and also the chemical composition of the outer surface of the food while the type of oil used has very little effect. Since all the samples received the same treatment for frying, it resulted in a slightly different color that all of them were favored by panelist.

### 3. Taste

Taste is one of the quality attributes that determine the consumer's acceptance of a product. Taste can be obtained by adding additional ingredients such as herbs or from the raw materials of the product itself or because of the processing. Generally, products like Abon have a distinctive taste with the addition of certain spices.

According to Vinarno (2006), that the taste of food is a factor that also determines consumer acceptance [8]. Taste is influenced by several factors, namely chemical compounds, temperature, concentration, and interactions with other taste components. Food taste is the second factor that determines food acceptance after the appearance of the food itself. If the appearance of the food served stimulates the nerves through the sense of sight so as to be able to arouse the appetite for tasting the food, then in the next stage, the taste of the food will be determined by the stimulation of the smell and sense of taste. The taste organoleptic test results of Abon products ranged from 3.53 (likes) to 3.73 (likes) and can be seen in Figure 3.



**Figure 3.** The taste acceptance level of Abon product in different ratio of Fish and Kluwih

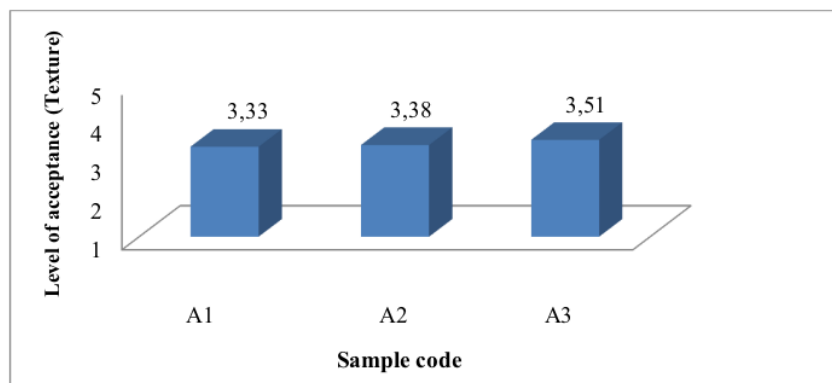
The results of the analysis of variance showed that the treatment of Abon products did not significantly affect the taste of Abon by panelists at the level of 5% and 1%, so no further tests were conducted.

Panelist assessment of Abon products for each treatment, namely treatment A1 (65% tuna + 25% Kluwih + 10% seasoning) is 3.53 (likes) in A2 treatment (45% Kluwih + 45% tuna + 10% seasoning) is 3.73 (likes) and in A3 treatment (25% fish + 65% Kluwih + 10% seasoning) is 3.58 (likes).

The taste in the Abon product in each treatment was generally accepted by the panelists. The taste of Abon meat is influenced by the flavor of the spices used and the processing process of steaming and frying so as to reduce the fishy odor from fish. At the frying stage, absorption of oil will occur in the material. The oil contains high fat, which can add a savory taste to Abon. The taste produced after frying depends on the type of material, temperature, and time used during frying. The longer the frying time, the temperature will increase so that changes or reactions in cooking oil that causes changes in compounds in the oil that affect the quality of the frying results. Generally, a frying pan that is too long with a high temperature will cause off-flavor. This is in line with Ketaren's (1986) statement that this savory taste is obtained because, during the frying process, some oil enters the food and fills the empty space that was originally filled with water [7]. Added by Muchtadi's (2008) statement, that during the frying process, physical, chemical, and sensory properties change occurred. In addition, the taste is greatly influenced by herbs or spices added to Abon [10]. The added spices will give a distinctive taste to the food. Each type of material used has a distinctive odor so that when consumed, it will describe the type of seasoning used. Adding these spices will mask the smell or natural taste of the fish. The addition of various types of seasonings will form a distinctive flavor from the combination of these herbs. This is in accordance with Winarno's (1997) statement that taste is influenced by several factors, namely chemical compounds, temperature, concentration, and interactions with other taste components [8].

#### 3. 4. Texture

The texture is one of the parameters in organoleptic testing that can be felt through the touch of the skin or in the mouth. The texture of the meat is quipped generally will be shaped like fine fibers. The texture is sensing that is connected with touch. Sometimes the texture is also considered very important, as is the case with smell, taste, and aroma because it affects the image of food. What is meant by texture is the smoothness of an incision when touched with a finger by a panelist [9]. The results of the organoleptic test of the panelist's level of evaluation of the texture of Abon products in this study ranged from 3.33 (slightly like) to 3.51 (like) and can be seen in the following Figure 4.



**Figure 4.** The texture acceptance level of Abon product in different ratio of Fish and Kluwih

The results of the analysis of variance showed that the difference in the treatment of the addition of Kluwih in the making Abon had a very significant effect on the level of 5% and 1% on the panelist's response to the product texture so that further tests were carried out.

Figure 4 shows the different responses of panelists to the texture of Abon products. Panelist assessment of Abon products in A1 treatment (65% tuna + 25% Kluwih + 10% seasoning) was 3.33 (slightly like) in A2 treatment (42% Kluwih + 45% tuna + 10% seasoning) was 3.38 (slightly like) and in the treatment A3 (25% tuna + 65% Kluwih + 10% seasoning) was 3.51 (like). The texture most preferred by the panelists was on the treatment of 25% tuna + 65% Kluwih + 10% seasoning. This shows that the more Kluwih used, the Abon will be dry enough and produce a lot of coarse fiber. Elliyasami and Hamzah (1997) observations found that half-old Kluwih can produce Abon fibrous well because the Kluwih fiber is long enough, the water content and tannins produced have gone down, but browning did not occur so as to produce a good taste, color, and appearance [11].

#### 4. Conclusion

The conclusion of this study was the results of organoleptic tests on Abon for the parameters of taste, aroma, and color in each treatment favored by the panelists while the most preferred texture was A3 treatment (25% tuna + 65% Kluwih + 10% seasoning). So, it can be concluded that treatment A3 can be used as the best treatment, in addition to the panelists' preference, also because the high concentration of Kluwih used so that when used as a recipe for Abon making, it can reduce production costs.

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