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STUDY OF PHYSICOCHEMICAL AND ORGANOLEPTIC PROPERTIES OF WET NOODLE WITH THE ADDITION OF KELAKAI LEAVES EXTRACT (*Stenochlaena palustris*)

Vanti Gustiani[1*], Rizky Febriyani Putri[2], Ratna Yulinda[3]
[1,2,3]Universitas Lambung Mangkurat
E-mail: [1)] gustianivanti@gmail.com

Abstract

Kelakai (Stenochlaena palustris (Burm F) Bedd) is a fern plant found in swampy or wetlands. This study aims to determine the effect of adding kelakai extract to the production process of wet noodles on the physicochemical properties of elasticity, water absorption, and moisture content, as well as the organoleptic properties of aroma, color, and texture, in order to determine the optimal formula for kelakai extract in making wet noodles. This study was designed using a completely randomized design (CRD), which consisted of 4 treatments, namely F0 (0%), F1 (60%), F2 (80%), and F3 (100%). The data were analyzed using the Analysis of Variance (ANOVA) statistical test with a confidence level of α = 0,05. If there is a significant difference between the treatments, then continued with the Duncan Multiply Range Test (DMRT) to test the Physico-Chemical properties, and the Kruskal-Wallis statistical test with a confidence level of α = 0,05 for the organoleptic test. If there is a significant difference between the treatments, then proceed with the Mann-Whitney follow-up test using SPSS 25. The results showed that wet noodles with the addition of kelakai extract had a significant effect on elasticity and water absorption where the more extracts, the higher the elasticity and water absorption. Besides, it also having a significant effect on water content, where the more extracts, the lower the water content. The results of the research on the preference level test or organoleptic data showed no significant effect on the panelists' preference for color, aroma and texture. In general, the F2 treatment is the most ideal formulation.

Keywords: Kelakai Extract, Organoleptic, Physicochemical, Wet Noodles

1. INTRODUCTION

Kelakai (*Stenochlaena palustris* (Burm F)Bedd) is a fern plant found in swampy or wetlands (MacKinnon et al. in (Maharani et al., 2006)). Kelakai according to empirical studies can treat anemia and has efficacy as an antioxidant. Kelakai can be found in a number of different locations throughout South Kalimantan; however, they are not frequently utilized and are not cultivated. This plant is only used for vegetables and it is explained that it is food for proboscis monkeys (*Larvatus nasalis*) (Maharani et al., 2006).

According to TAD (1981) in MacKinnon (2000), Kelakai is a plant used as a food source by the Dayak Kenyah tribe in Long S Barang (Apo Kayan) and Long Segar (S. Telen) in East Kalimantan, with the stems and leaves being taken. Specifically, Kelakai provides empirical evidence in the treatment of anemia by Dayak tribes, but research has never been done. Kelakai contains enough Fe for nursing mothers and toddlers, treating skin ailments, reducing fever, and washing the stomach. It is widely assumed that the concentration of active compounds in the form of alkaloids and steroids plays a role in skin function. In

addition to the alleged presence of flavonoids, another suspicion is the presence of antioxidant compounds in the form of vitamins A and C. Other options that can be developed as superior commodities or basic ingredients for industrial commodities, especially in the food industry, which currently indicates a tendency to return to nature, require scientific research and investigation with the correct methodology and refer to the applicable SOP.

Based on nutritional analysis, red kelakai can contain a lot of Fe (41.53 ppm). Kelakai also contains Cu (4.52ppm), Vitamin C (15.41mg/100g), Protein (2.36%), Beta-Carotene (66.99ppm) and Folic Acid (11.30ppm). In addition, it also contains flavonoids. Flavonoids are a group of phenolic compounds that have two main functions, namely as antioxidants and antibacterial. As antioxidants, flavonoids have a role in neutralizing free radicals (Habibah et al., 2022).

Noodles are one of the most popular foods in various countries, despite the fact that their names, ingredients, shapes, and methods of preparation vary. Noodles are now an alternative food to replace rice which is loved by almost all groups, from children to adults. This is because the nutritional value of noodles is almost the same as that of rice, especially in terms of carbohydrates used to meet daily energy needs so eating noodles makes the stomach feel quite full compared to eating rice (Dewi et al., 2015).

One of the vegetables that can provide healthy noodles that can be consumed is the Kelakai leaves (*Stenochlaena palustris*) in the wetlands of South Kalimantan. South Kalimantan has extensive wetlands. Residents of the area must be able to develop the most appropriate lifestyle (Wasita, 2016).

Based on these various explanations, it is necessary to do more about the utilization of Kelakai as a food ingredient. Hence, this study aims to determine the effect of adding kelakai extract to the production process of wet noodles on the physicochemical properties of elasticity, water absorption, and moisture content, as well as the organoleptic properties of aroma, color, and texture, in order to determine the optimal formula for kelakai extract in making wet noodles.

2. RESEARCH METHOD

The research design used was a Completely Randomized Design (CRD) with 1 factor, namely the proportion of Kelakai extract in processed wet noodles which was carried out with 4 (four) treatments and 5 (five) repetitions as follows:

F0 : Treatment 0 (control), namely the processing of wet noodles without adding Kelakai leaves extract + 130 mL of water
F1 : Treatment 1, namely processing of wet noodles with 78 mL of Kelakai leaves extract + 52 mL of water
F2 : Treatment 2, namely processing of wet noodles with 104 mL of Kelakai leaves extract + 26 mL of water
F3 : Treatment 3, namely processing of wet noodles with 130 mL of Kelakai leaves extract + 0 mL of water

This research was conducted at the FKIP ULM Science Education Laboratory located at Jalan Brigjen H. Hasan Basri, Pangeran, North Banjarmasin District, Banjarmasin City, South Kalimantan Province which was carried out from February – March 2022.

2.1. Research Procedure

Making wet noodles begins with mixing high protein wheat flour, water, salt, eggs and vegetable extracts according to the concentration of each treatment as in the method above. Then the sheet is kneaded and shaped with a roller press, to form a 1mm sheet. Then the formed sheets are cut with a cutting machine, resulting in a spiral-shaped noodle. The resulting noodles were followed by an analysis of the physical and chemical properties of the wet noodles as well as the organoleptic properties.

2.2. Observation Parameters

As for parameters observed in this study include:

a. Physical Characteristics
   1) Water Absorbency, Rehydration Power
   2) Elasticity, Flexibility
b. Chemical Characteristics
   Moisture content, heating method
c. Organoleptic
   1) Color
   2) Aroma
   3) Texture

2.3. Data Analysis

a. Physicochemical Properties Test
   In this study, the type of analysis was analysis of variance (ANOVA) to find out the differences followed by Duncan's test in making a decision on the hypothesis to draw conclusions. The data taken can be said to be significantly different if a sig. smaller than 0,05 or H0 is rejected.
b. Oranoleptic Test
   The data analysis technique used on the organoleptic test results used the Kruskal Wallis test to see if there were significant differences between the dependent and independent variable groups, then continued with the Mann-Whitney test if there were significant differences. The data is said to have a significant difference if the P value is less than 0,05.

3. RESULT AND DISCUSSION

Based on the research that has been done, the research results obtained for each measurement parameter are as follows:

3.1. Elasticity

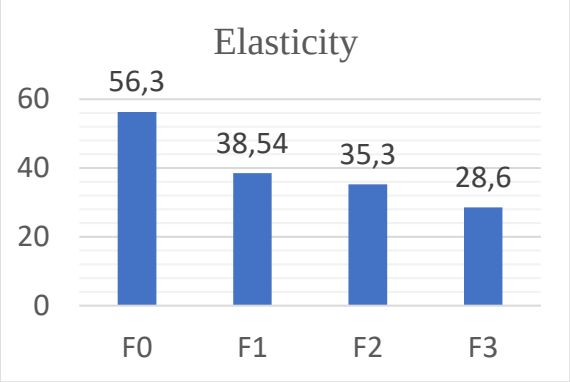

Figure 1 Histogram of elasticity of Kelakai extract wet noodles

The results of the elasticity analysis of wet noodles are shown in Figure 1, the average value of wet noodle elasticity ranges from 28.6 cm – 56.3 cm. The highest elasticity was owned by the treatment without the addition of Kelakai extract or F0, and the lowest elasticity was owned by the treatment with the addition of 100% Kelakai extract or F3. Based on the analysis of the test data using the analysis of variances (ANOVA), it can be seen that the treatment has a significant effect on the elasticity of the Kelakai extract wet noodles. Duncan's test at the 5% level showed that there was a significant difference between treatments (F0-F3).

The results of the research shown in Figure 1 show that the value of elasticity varied between treatments, and with the addition of the plant extract there was a decrease in elasticity from F0 to F3. The high elasticity value of this treatment is influenced by the protein content of wheat flour. This is supported by Akbar (2018) which states that “wheat flour contains high levels of protein (gluten). Gluten consists of the proteins gliadin and glutenin, which gliadin serves as glue to make the dough elastic”. This is also in line with Astuti (2013) and Pontoluli et al. (2017), the more gluten in the flour used, the greater the elasticity of the dough. Besides, the presence of fibrous components in the material affects the elasticity of the noodles. In general, noodles with the addition of Kelakai extract had lower physical properties of elasticity compared to noodles without the addition of Kelakai extract.

3.2. Water Absorbency

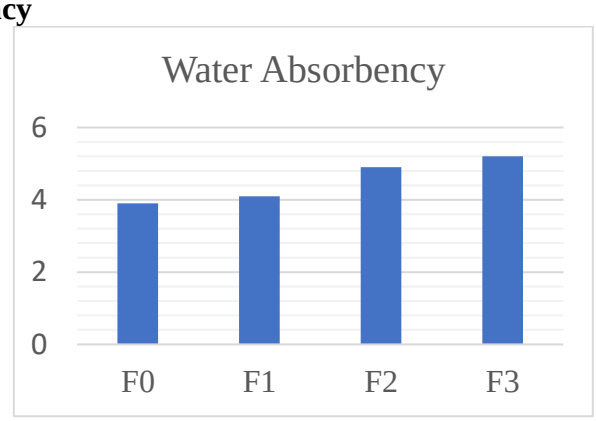

Figure 2 Histogram of Water Absorbency of Wet Noodles with the addition of Kelakai Extract

Water absorption is the change in the weight of the noodles after gelatinization compared with their original weight. Figure 2 shows a relationship between the processing of wet noodles and the rate of water absorption. The absorption rate of wet noodles from research results is between 0.39 and 0.52. If the index is 1, then the noodle is considered to be able to absorb as much water as the weight of the noodle raw material (Effendi et al., 2016). Data from the histogram were obtained after an analytical test was carried out using the one way ANOVA test at the 5% level. These data indicate that the wet noodles produced by the F0-F3 treatment were significantly different. Then proceed with Duncan's test at the 5% level which shows a significant difference between treatments (F0-F3). The water absorption rate of noodles with the addition of Kelakai extract is higher because it is believed that the starch portion of the dough is less and the high fiber in the Kelakai extract makes the noodles absorb more water compared to noodles without Kelakai extract.

The absorption capacity of noodles in this study was lower when compared to the results of Indriani et al. (2019) on high-fiber noodles made from HMT-modified suweg flour, the absorption values ranged from 26.88 to 157.05%. And higher than the 22.09-25.32% found in Rahim et al. (2021) study on wet noodles made from black sticky rice flour substitutions.

Based on the percentage results of the absorption capacity of the wet noodles with the addition of theelakai extract, we can conclude that the wet noodles with the addition of theelakai extract have good water absorption. This can be seen in the percentage of data that is not too high or too low but is in the middle so that it can affect the quality of the noodles to become wet noodles with good absorption. The increased fiber content of the mixture itself undoubtedly contributed to this satisfactory result.

3.3. Water Content

Based on the results of the one-way ANOVA analysis of variance, wet noodles with the addition of Kelakai extract showed that there was a significant effect of the treatment factor on the water content of the resulting wet noodles or H0 was rejected. Then, proceed with Duncan's test at the 5% level which shows a significant difference between treatments (F0-F3). This can be seen in Figure 3, where wet noodles have different measurement results namely, wet noodles with the addition of 100% of the water content are lower than wet noodles with the addition of 0% Kelakai extract or the control treatment. The decrease in the water content of wet noodles is influenced by the ingredients used in making wet noodles (Billina et al., 2014).

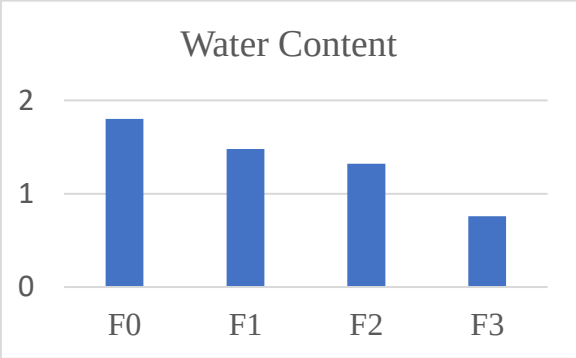

Figure 3 Histogram of Moisture Content of Wet Noodles with the Addition of Kelakai Extract

The decrease in water content in the F0 – F3 treatment was influenced by the high content of Kelakai fiber. The high fiber content of the material affects the water content of the material. In accordance with Pontoluli et al. (2017), who found that "high-fiber materials are hydrocolloids that are able to bind water added during the noodle-making process".

The water content produced in the F1-F3 treatment has an average percentage range of water content in noodles of 15.2% - 29.6% for raw wet noodles. Meanwhile, the quality requirements for wet noodles according to SNI 2987-2015 are a maximum of 65% for cooked wet noodles and 35% for raw wet noodles. Hence, we can conclude that the addition of Kelakai extract to the manufacture of wet noodles meets the requirements and has a significant effect on the entire treatment because it is below the maximum of 35% according to SNI.

3.4. Organoleptic

The overall organoleptic data is presented in the form of a histogram to find out the highest and lowest research results obtained. These results can be seen in the histogram in Figure 4 below.

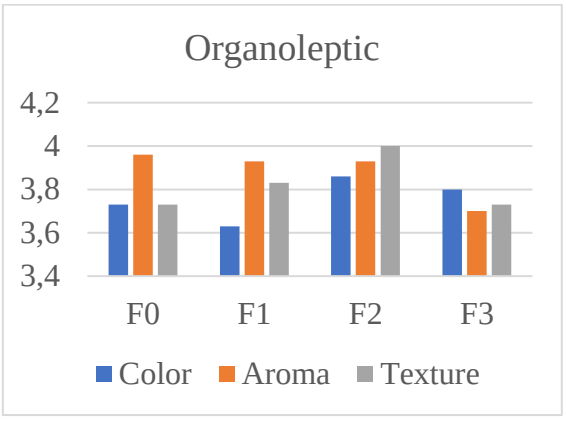

Figure 4 Histogram of Organoleptic Data of Kelakai Extract Wet Noodles

3.4.1. Color

The results of wet noodle data processing with the addition of Kelakai extract at the color preference level showed that the highest preference level was found in noodles with the addition of 100% extract of 3.8, lower than 0.06 from the panelists' preference level for noodles without additional extract or 0% of 3,86 (figure 4). This shows that the use of high concentrations of Kelakai extract does not significantly affect the level of preference for the color of the wet noodles. This can be seen from the level of preference among the panelists who prefer the favorite color for wet noodles without extract or F0 samples. It is said that it does not affect taste too much because the level of color preference in the sample given the Kelakai extract at 100% concentration (F3) is also high, although not as high as the level of preference in the F0 sample. Thus, this is in line with the statement of Mardesci & Melisa (2020) research that "the greater the concentration used, the panelists' preference parameter will increase".

3.4.2. Aroma

Organoleptic test data on the aroma parameter in Figure 4 shows an average score of 3.70 to 3.96. The highest organoleptic score was wet noodles without the addition of Kelakai extract or 0% extract. While the lowest score was shown by wet noodles with the addition of 100% Kelakai extract. The analysis of variance used was the Kruskal-Wallis test with the Mann-Whitney follow-up test if there were differences. The results revealed that there was no statistically significant difference between all treatments (F 0 - F 3).

The results of the analysis of the data in Figure 4 for the aroma parameter, the addition of Kelakai extract plays a role in the panelists' preference for noodles, where it is influenced by the aroma produced by the Kelakai extract. The more Kelakai extract is added, the more the savory aroma of the eggs is replaced by the very distinct aroma of Kelakai extract. Thus, the level of preference in the sample with the addition of the highest concentration of Kelakai extract becomes the data with the lowest level of preference. In line with the statement of Zaldiansyah et al. (2018), namely that "aroma determines whether a food is accepted or not, because aroma tests can be used in the food industry to determine consumer ratings of a product".

3.4.3. Texture

Texture organoleptic data were analyzed using the Kruskal-Wallis test and the Mann-Whitney follow-up test, the data showed that there was no significant difference between all treatments (F0-F3). The data in Figure 4 shows an average preference of 3.73 to 4.00. The highest organoleptic texture rating was shown in the treatment with the addition of 80% Kelakai extract. While the treatment with 100% Kelakai extract and the control had the lowest score. Statistical analysis of variance showed that the treatment of adding Kelakai extract during the preparation of wet noodles did not significantly affect the test subject's preference for the texture of the noodles.

3.5. General Favorites

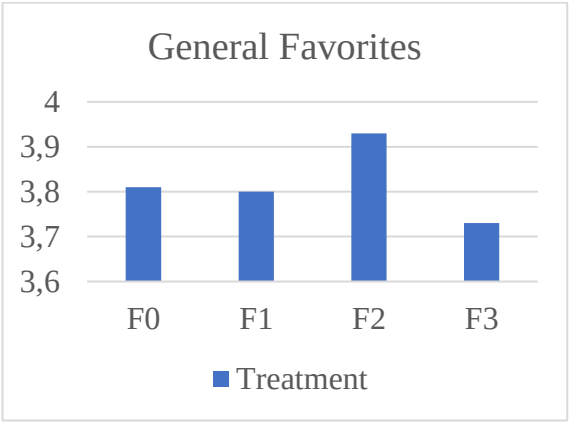

Figure 5 General Favorite Histogram

The findings of the general preference study show that wet noodles, specifically noodles with an elakan content of 80%, are the most popular, with a score of 3.93. Wet noodles with the addition of 100% Kelakai extract had the lowest preference level, namely 3.74. The statistical test results of the Kruskal-Wallis test showed with 95% confidence that there was no significant difference (P>0.05) between the addition of the extract and the treatment with the highest preference, namely the F2 treatment. Assessment of color, aroma and texture in general reached the highest average, namely F2. Because the number of points obtained from the four points as a parameter already represents the assessment of the person being tested, the formulation with 80% Kelakai extract was chosen for making the best Kelakai extract wet noodles.

4. CONCLUSION

The conclusions based on the results of the research that has been done are:

1) The addition of Kelakai extract to the manufacture of wet noodles is based on the results of the SPSS data analysis, namely the presence of a significant effect on the physicochemical properties in the form of elasticity, water absorption and moisture content of wet noodles.
   a. Giving Kelakai extract to the manufacture of wet noodles in the elasticity parameters has a real effect where more and more extracts cause the noodles' elasticity to decrease.

b. The administration of Kelakai extract in the production process of wet noodles in terms of parameters of water absorption gave or had a real effect where more and more extracts made the noodles' water absorption capacity increase.
c. Giving Kelakai extract to the manufacture of wet noodles has a real effect in terms of water content, where more and more extract causes the water content of the noodles to decrease.

2) The addition of Kelakai extract in the manufacture of wet noodles for organoleptic based on data analysis with SPSS did not have a significant effect on the panelist's preference level.
   a. The panelists' preference for the wet noodle color parameter was highest in treatment F2 and lowest in treatment F1, higher than the control.
   b. The highest panelist preference for aroma parameters was in treatment F2 and the lowest was in treatment F3, slightly lower than the control.
   c. The highest panelist preference for texture parameters was in treatment F2 and the lowest was in treatment F3, higher than the control.

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