Nutritional Content Analysis and Organoleptic Test of Catfish (*Clarias Batrachus*) Floss Modified with *Moringa Oleifera* and *Sauropus Androgynus* Leaves as Fe Fortification for Anemic Pregnant Women in Malang City

Sayuti*[1], Qotimah[2], and Donna Dwinita Adelia[3], and Putri Sandrawati Rambu May[4]

[1,2,4] Midwifery Study Program, Wira Husada Nusantara Health Polytechnic Malang, Malang, Indonesia
[3] Health Information Management Study Program, Wira Husada Nusantara Health Polytechnic Malang, Malang, Indonesia

sayutiakbidwhn@gmail.com

Abstract. Anemia is one of the largest contributing factors to the Maternal Mortality Rate in Indonesia. This research is urgent because the incidence of anemia among pregnant women in Malang city has increased over the past 2 years, and Malang city ranks third highest in East Java. One approach that can be taken is developing catfish-based floss with moringa and *Sauropus androgynus* leaf modifications at various concentrations as Fe fortification. This study aims to determine the nutritional content and acceptance level of anemic pregnant women toward moringa- and *Sauropus androgynus*-modified catfish floss formulations. Nutritional content data were analyzed through laboratory testing, while preference levels were assessed using organoleptic tests. The results showed that the highest levels of Fe, protein, and calcium were found in the 22.5-gram moringa-modified floss, with values of 5.11 mg, 33.86 mg, and 284.96 mg respectively, while the highest fat content was found in the 7.5-gram katuk-modified floss, with a value of 24.37 mg. The organoleptic test results showed that in terms of taste, texture, and color, the 7.5-gram moringa-modified catfish floss was more preferred by panelists, while in terms of aroma, panelists preferred the pure catfish floss. It was concluded that the 22.5-gram moringa-modified floss had the highest iron content, and panelists preferred the 7.5-gram moringa-modified floss.

Keywords: Nutritional content, Organoleptic test, Catfish floss, Sauropus Androgynus, Moringa.

© The Author(s) 2026
K. M. Ariesaka and D. Fauziah (eds.), *Proceedings of the 3rd Malang International Conference on Medical and Health Sciences (MICROMEDHS 2026)*, Advances in Health Sciences Research 96,
https://doi.org/10.2991/978-94-6239-807-8_6

1 Introduction

In East Java in 2024, the prevalence of anemia among pregnant women reached 54,217 people (43.76%), and Malang City ranked third with 2,126 cases of anemia out of 2,447 pregnant women with complications [1]. Pregnant women with anemia face a higher likelihood of complications such as premature birth, low birth weight, increased susceptibility to infection, impaired fetal growth and development, hyperemesis gravidarum, antepartum hemorrhage, and premature rupture of membranes [2]. One approach that can be taken to reduce the incidence of anemia is developing catfish-based floss modified with moringa and *Sauropus Androgynus* leaves at various concentrations as Fe fortification. Research by Hanila Wetri, et al. [2022] explained that catfish and moringa flour can serve as an alternative complementary food because they contain sources of protein and iron. Floss is a processed meat product in the form of shredded strips that are seasoned and fried; making catfish floss represents a diversification of processed food that can also increase added value and shelf life, since floss is dry in form [3]. Floss products are ready-to-consume food products that are practical and long-lasting [4] Catfish (*Clarias gariepinus*) is a fairly popular fishery commodity among the public [5]. African catfish contains 78.5 grams of water content, 90 grams of calories, 18.7 grams of protein, 1.1 grams of fat, 15 grams of calcium (Ca), 260 grams of phosphorus (P), 2 grams of iron (Fe), 150 grams of sodium, 0.10 grams of thiamine, 0.05 grams of riboflavin, and 2.0 grams of niacin per 100 grams [6]. Research by Hanila Wetri, et al. [2022] explained that catfish and moringa flour can serve as an alternative complementary food because they contain sources of protein and iron [7]. Moringa leaves are characterized by imperfectly pinnate, small, egg-shaped leaflets about the size of a fingertip [8]. Moringa leaves contain very high amounts of vitamin A, vitamin C, vitamin B, calcium, potassium, iron, and protein that are easily digested and assimilated by the human body [9]. *Sauropus Androgynus* is rich in provitamin A, which plays an important role in eye health and reproductive health in humans and animals, vitamin C as a natural antioxidant, and iron as a prevention against anemia [10]. The iron content in Sauropus Androgynus leaves can serve as an alternative treatment for iron deficiency anemia [11]. Catfish floss modified with moringa and *Sauropus Androgynus* is expected to increase the hemoglobin (Hb) levels of pregnant women. This study aimed to determine the nutritional content and the acceptance level of anemic pregnant women toward the formulation of catfish floss modified with moringa and *Sauropus Androgynus* leaves.

2 Methods

This research was conducted from April to June 2026. Analysis of the nutritional content of the vegetable-modified catfish floss was carried out at the Food Chemistry Laboratory of Universitas Widyagama Malang. The organoleptic test was conducted at TPMB (Independent Midwife Practice) in Malang City. The main materials of this study were catfish meat, moringa leaves, and *Sauropus Androgynus* leaves. Additional materials used in this study were seasonings, cooking oil, and chemical analysis

reagents. The equipment used in this study included kitchen tools, a meat shredder, a floss dryer, packaging plastic, and chemical analysis instruments. This study used a Completely Randomized Design (CRD) consisting of 6 treatments and 1 control. The design layout is as follows:

Table 1. Completely Randomized Design Layout

Replication	Treatment						
	A	B1	B2	B3	C1	C2	C3
1	A1	B11	B21	B31	C11	C21	C31
2	A2	B12	B22	B32	C12	C22	C32

Description:
A: Pure catfish floss 250 g
B1: Catfish floss 250 g + moringa 7.5 g
B2: Catfish floss 250 g + moringa 15 g
B3: Catfish floss 250 g + moringa 22.5 g
C1: Catfish floss 250 g + *Sauropus Androgynus* 7.5 g
C2: Catfish floss 250 g + *Sauropus Androgynus* 15 g
C3: Catfish floss 250 g + *Sauropus Androgynus* 22.5 g

2.1 Research parameters

Floss content test included moisture content, nitrogen content, fat content, protein content, iron content, and calcium content. The organoleptic test included taste, aroma, texture, and color.

2.2 The processing procedure

The processing procedure for vegetable-modified catfish floss is as follows. Take the moringa leaves and *Sauropus androgynus* leaves and remove them from their stems. Wash, drain, and air-dry the leaves, then finely chop them. Prepare the seasonings: shallots, garlic, ginger, turmeric, coriander, galangal, and pepper. Wash the catfish thoroughly, remove the innards, and then remove the skin. Rub the catfish with lime juice to reduce the fishy smell, then separate the head from the fish and let it stand for approximately 5 minutes. Wash the catfish, then steam for approximately 30 minutes. Once cooked, take the meat and separate it from the bones, if any remain, then shred it. Grind the seasonings—shallots, garlic, ginger, turmeric, coriander, galangal, and pepper—until smooth. Sauté the ground seasonings with cooking oil, then add kaffir lime leaves, lemongrass, seasoning powder, salt, and sugar; sauté until fragrant. Once the seasonings are cooked, add the shredded catfish meat and continue frying until golden brown and dry. When the floss is almost done, add the moringa or *Sauropus androgynus* vegetables, stir briefly, then remove the floss and turn off the stove. Place the floss into a spinner machine to remove the oil.

3 Results

3.1 Proximate Test

Based on the results of the proximate analysis, the nutritional content of the catfish floss modified with moringa and *Sauropus Androgynus* vegetables can be seen in the following table.

Table 2. Results of Proximate Analysis of Catfish Floss Modified with Moringa and *Sauropus Androgynus*

Test Parameter	SNI	Sample Code and Test Results						
		A (mean±SD)	B1 (mean±SD)	B2 (mean±SD)	B3 (mean±SD)	C1 (mean±SD)	C2 (mean±SD)	C3 (mean±SD)
Moisture content (%)	Max 15%	7.34±0,31	7.56 ± 0,11	6.29±0,09	4.83±31	8.62±0,39	6.64±0,17	5.52±0,09
Protein content (%)	Min 30%	28.52±0,61	30.95±0,21	34.20±0,13	33.19±0,95	30.25±1,84	29.28±0,37	29.72±0,56
Fat content (%)	Max 25%	22.99±0,32	23.41±0,42	22.64±0,27	20.75±0,31	26.61±0,32	20.75±0,47	21.60±0,37
Fe content (mg/100 g)	4-8mg/100 g	2.89±0,00	4.09±0,65	4.90±0,35	5.11±0,00	3.59±0,35	4.05±0,42	4.56±0,16
Calcium content (mg/100g)	100 mg/100g	139.89± 1,36	160.66± 1,10	188.95± 1,99	283.12± 2,61	146.90± 1,80	167.30± 1,25	218.71± 2,06

[12,13]

Moisture Content.

The results above show that, overall, catfish floss with a higher addition of vegetables tends to have a lower moisture content. The proximate analysis results showed that catfish floss modified with 7.5 grams of *Sauropus Androgynus* (C1) had the highest moisture content compared to pure floss and the other vegetable-modified floss samples, at 8.62%. Nevertheless, this value indicates that the moisture content of floss modified with 7.5 grams of *Sauropus Androgynus* has not exceeded the moisture content standard set by SNI 7690:2019 [12], which is 15%. The lowest moisture content was shown by catfish floss modified with 22.5 grams of moringa, at 4.83%. These research results indicate that both pure catfish floss and catfish floss modified with moringa and *Sauropus Androgynus* vegetables have good quality in terms of moisture content. The moisture content of floss must meet the standard, because excessive water content can damage the product's characteristics; this is because water plays an important role in the growth of microorganisms that can cause product spoilage [14]. Below is a graph of the moisture content of catfish floss modified with moringa and *Sauropus Androgynus* vegetables.

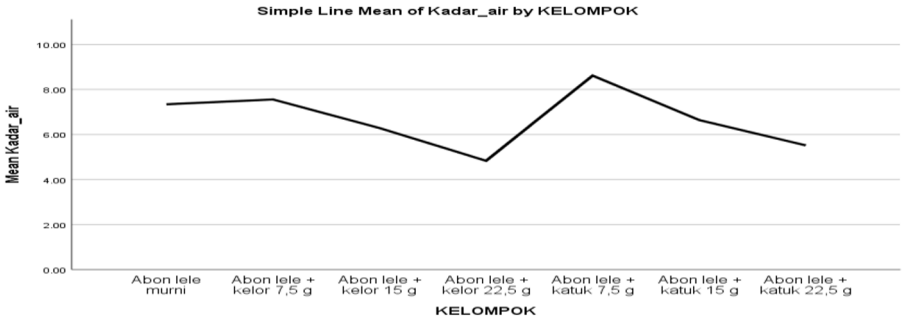


Fig. 1. Graph of Moisture Content in Floss Modified with Moringa and *Sauropus Androgynus* Vegetables

Protein Content.

The results of this study showed that pure catfish floss and catfish floss with 15 grams and 22.5 grams of *Sauropus Androgynus* fell below the SNI 7690:2019 [12] standard value, while catfish floss modified with moringa had good protein content, where the protein content results of this floss were above the minimum SNI 7690:2019 [12] value of 30% minimum protein. The proximate test results showed that the addition of moringa and *Sauropus Androgynus* vegetables can increase the protein value of the floss; however, this increase was shown more prominently in floss modified with 7.5 grams of moringa (B1) at 30.95%, catfish floss with 15 grams of moringa (B2) at 34.2%, and catfish floss with 22.5 grams of moringa (B3) with a protein content of 33.19%. For catfish floss with 7.5 grams of *Sauropus Androgynus* (C1), the protein content was 30.25%, catfish floss with 15 grams of *Sauropus Androgynus* (C2) was 29.28%, and catfish floss with 22.5 grams of Sauropus Androgynus (C3) had a protein content of 29.72%. This is consistent with what was stated by Riskia Embun [15] and Adinda R [16], that the protein content of moringa leaves is 9.4 grams/100 grams of moringa leaves and 4.2 grams/100 grams of *Sauropus Androgynus* leaves. Protein content can also be seen in Figure 2. Below is a graph of the protein content in catfish floss modified with moringa and *Sauropus Androgynus* vegetables.

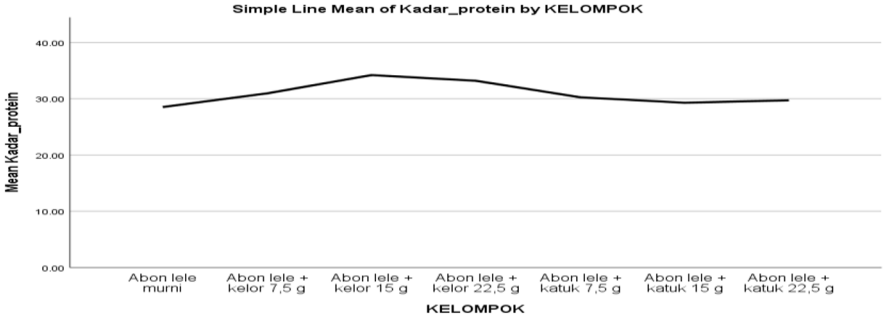


Fig. 2. Graph of Protein Content in Floss Modified with Moringa and *Sauropus Androgynus* Vegetables

Fat Content.

The proximate analysis results showed that the fat content in pure catfish floss and catfish floss modified with moringa and Sauropus Androgynus vegetables complied with the SNI 3703:2013 [13] standard, where the fat content value of the floss was below 25%. The lowest fat content was found in catfish floss with 22.5 grams of moringa (B3) at 20.75%, and in catfish floss with 15 grams of Sauropus Androgynus (C2) with a fat content value of 20.75%. On average, the addition of moringa and Sauropus Androgynus vegetables was able to reduce the fat content of the catfish floss, where the average fat content with the addition of moringa became 22.26%, and the average fat content with the addition of *Sauropus Androgynus* to the catfish floss became 22.98%. This indicates that although both vegetables can reduce the fat content in the modified floss, moringa modification appears to reduce the fat content of the floss further. Fat content can also be seen in Figure 3. Below is a graph of the protein content in the floss.

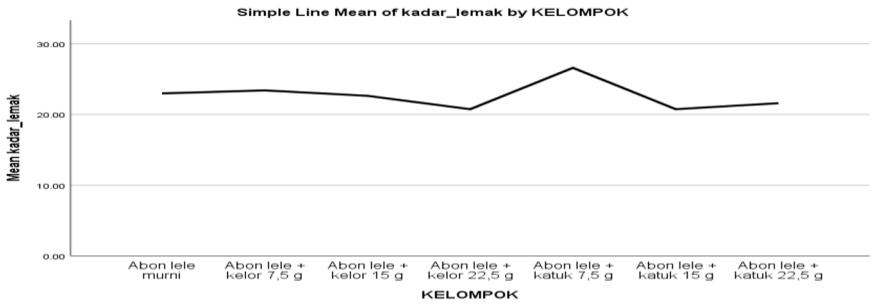


Fig. 3. Graph of Fat Content in Floss Modified with Moringa and *Sauropus Androgynus* Vegetables

Fe (Iron) Content.

The proximate test results showed that catfish floss modified with moringa and *Sauropus Androgynus* vegetables had iron content within the SNI range of 4–8 mg/100 grams, indicating that vegetable modification can increase the iron value of catfish floss. In this study, pure catfish floss (A) and catfish floss with 7.5 grams of *Sauropus Androgynus* (C1) showed iron content values below the SNI standard, at 2.89 mg and 3.59 mg respectively. Among the vegetable-modified floss samples, the highest iron fortification was found in the 22.5 g moringa sample, with an Fe content of 5.11 mg, while the lowest was found in catfish floss with 7.5 g of *Sauropus Androgynus* (C1), with an iron content of 3.59 mg. This indicates that the addition of *Sauropus*

Androgynus vegetable at 7.5 grams has not yet been able to increase the iron content of the catfish floss to meet the SNI standard. However, broadly speaking, the addition of vegetables to catfish floss can increase its iron content. These research results are consistent with research conducted by Wetri [2022], which stated that another food ingredient containing iron is moringa leaves; fresh moringa leaves contain 3 times more iron than spinach, while moringa leaves that have been processed into flour have a much higher content of 28.2 milligrams/100 grams, or 25 times more than spinach, and are absorbed into the blood 1.77 times more [17]. This is consistent with Harahap in Dieningsih S [2025], which stated that moringa is said to provide 7 times more vitamin C than oranges, 10 times more vitamin A than carrots, 17 times more calcium than milk, 9 times more protein than yogurt, 15 times more potassium than bananas, and 25 times more iron than spinach [18]. Iron content can also be seen in Figure 4. Below is a graph of the iron content in catfish floss modified with moringa and Sauropus Androgynus vegetables:

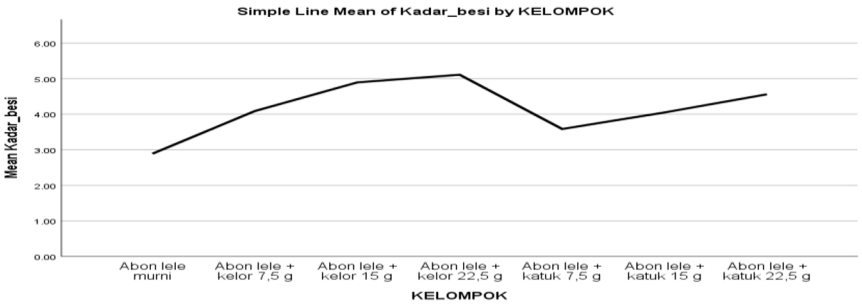


Fig. 4. Graph of Iron (Fe) Content in Floss Modified with Moringa and *Sauropus Androgynus* Vegetables

Calcium Content.

The results of this study showed that the calcium content in pure catfish floss and catfish floss modified with moringa and *Sauropus Androgynus* vegetables was very good, as the calcium value in all floss samples was above the SNI 3703:2013 [13] standard of 100 mg/100g. The highest calcium content was found in floss modified with 22.5 grams of moringa (B3), at 283.15 mg/100gram, followed by 15 grams of moringa (B2), 22.5 grams of Sauropus Androgynus, 15 grams of *Sauropus Androgynus*, 7.5 grams of moringa, 7.5 grams of *Sauropus Androgynus*, and the lowest was pure catfish floss, at 139.89 mg/100g. This shows that vegetable modification of catfish floss can increase its calcium content. This is consistent with Purwati [2019], who stated that 15 types of macro and micro minerals were found in moringa leaves, including P, S, K, Ca, Ti, Cr, Mn, Fe, Ni, Cu, Zn, Mo, Sr, Ba, and Re, with respective concentrations of 12.84; 23.45; 264.96; 603.77; 1.05; 1.52; 2.68; 20.49; 22.60; 7.59; 2.87; 11.69; 14.52; 10.04; and 13.62 mg/100g, with the highest mineral concentrations in moringa leaves being calcium and potassium. In this study, the highest calcium content was found in floss

modified with 22.5 grams of moringa, with a calcium value of 283.15 mg/100g [19]. The calcium content of the vegetable-modified floss can be seen in the figure below.

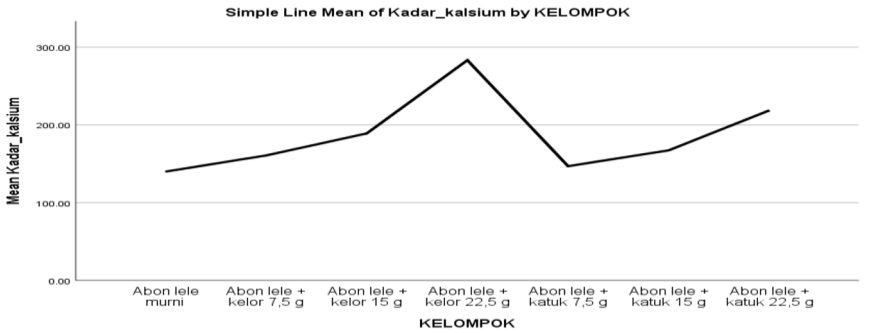


Fig. 5. Graph of Calcium Content in Floss Modified with Moringa and Sauropus Androgynus Vegetables

3.2 Organoleptic Test

Based on the results of the organoleptic test research on the parameters of taste, aroma, texture, and color, conducted by 45 panelists, the mean values ranged from 2.68 to 3.68. The testing was carried out by panelists using a scale of 1–4, namely 4 (strongly like), 3 (like), 2 (somewhat dislike), 1 (dislike). The organoleptic test results for pure catfish floss (A), catfish floss + 7.5 grams moringa (B1), catfish floss + 15 grams moringa (B2), catfish floss + 22.5 grams moringa (B3), catfish floss + 7.5 grams *Sauropus Androgynus* (C1), catfish floss + 15 grams *Sauropus Androgynus* (C2), and catfish floss + 22.5 grams *Sauropus Androgynus* (C3) can be seen in the following table.

Table 3. Results of Organoleptic Test Analysis of Catfish Floss Modified with Moringa and *Sauropus Androgynus* Vegetables

Test Parameter	Sample Code and Organoleptic Test Results						
	A (mean± SD)	B1 (mean± SD)	B2 (mean± SD)	B3 (mean± SD)	C1 (mean± SD)	C2 (mean± SD)	C3 (mean±SD)
Taste	3,60±0,49	3,69±0,47	3,27±0,45	2,71±0,55	3,18±0,78	2,98±0,62	2,84±1,02
Aroma	3,53±0,50	3,4±0,50	3,13±0,69	2,84±0,82	2,87±0,66	2,62±0,49	2,6±0,93
Texture	3,42±0,50	3,6±0,50	3,36±0,48	3,02±0,75	2,89±0,53	2,69±0,67	3,09±0,87
Color	3,47± 0,69	3,6±0,50	3,36±0,48	2,67±0,48	3,22±0,64	3,11±0,53	2,91±0,82

Taste.

Taste is an important factor in determining whether a food product is accepted by consumers, as assessed through the sense of taste. Even if other parameters have good values, if the taste of the product is not liked by consumers, the product will not be

accepted by them. Based on Table 2, it can be seen that the taste of pure catfish floss (A), catfish floss with 7.5 grams of moringa (B1), catfish floss with 15 grams of moringa (B2), and catfish floss with 7.5 grams of *Sauropus Androgynus* (C1) had values of 3.27–3.69, meaning the taste of these floss samples fell within the range of "like" to "strongly like," indicating that panelists preferred the taste of these samples, with the most preferred being catfish floss with 7.5 grams of moringa (B1) at 3.69. Meanwhile, catfish floss with 22.5 grams of moringa (B3), catfish floss with 15 grams of *Sauropus Androgynus* , and catfish floss with 22.5 grams of *Sauropus Androgynus* had values ranging from 2.71–2.98, meaning the taste of these floss samples fell within the range of "somewhat dislike" to "like," with the lowest value found in catfish floss with 22.5 grams of moringa (B3) at 2.71, meaning that this floss modified with 22.5 grams of moringa was less preferred by the panelists in terms of taste. This research is in line with research conducted by Nurlaila et al., in Wetri [2022], which explained that in the development of a sausage product based on mackerel and moringa leaf flour, panelists' preference levels decreased as the amount of moringa leaf flour used increased [17]. This research is also in line with research by Dita A in Nurlaila [2018], which stated that the higher the addition of moringa leaf flour to a food ingredient, the more it produces a bitter taste, and the resulting green color creates a clearly visible difference. In terms of taste, the most preferred floss was catfish floss modified with 7.5 grams of moringa (B1), and the least preferred was catfish floss with 22.5 grams of moringa (B3) [20]. These results can be seen in the figure below.

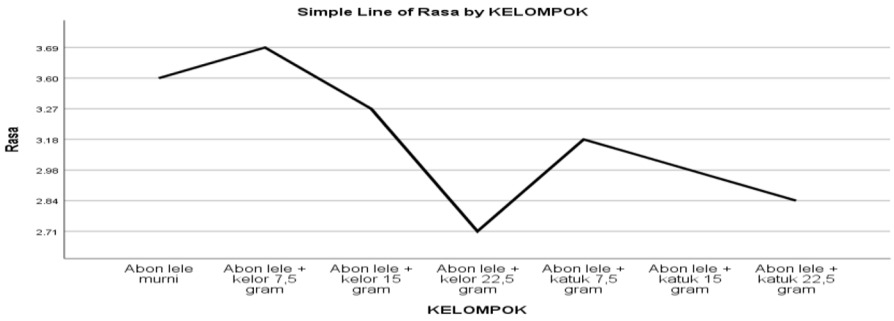


Fig. 6. Graph of Organoleptic Test Results by Taste for Vegetable-Modified Catfish Floss

Aroma.

The aroma emitted by food is a very powerful attraction capable of stimulating the sense of smell, thereby arousing appetite; this food aroma is caused by the formation of volatile compounds resulting from enzymatic reactions, or it can also form without the aid of enzymatic reactions [21]. In this study, the aromas preferred by panelists were pure catfish floss (A), catfish floss with 7.5 grams of moringa (B1), and catfish floss with 15 grams of moringa (B2), with a scale range of 3.53–3.13, meaning this range of values falls between "like" and "strongly like," and among these three floss samples, the most preferred by panelists was pure catfish floss, with a scale value of 3.53.

Meanwhile, floss with 22.5 grams of moringa, catfish floss with 7.5 grams of *Sauropus Androgynus*, catfish floss with 15 grams of *Sauropus Androgynus* , and catfish floss with 22.5 grams of *Sauropus Androgynus* were less preferred by panelists, as shown by mean values ranging from 2.6–2.84, meaning the aroma of these four floss samples fell within the range of "like" to "somewhat dislike," with the least preferred floss having the lowest value being catfish floss with 22.5 grams of *Sauropus Androgynus* (C3) at 2.6. This can also be seen in the graph below:

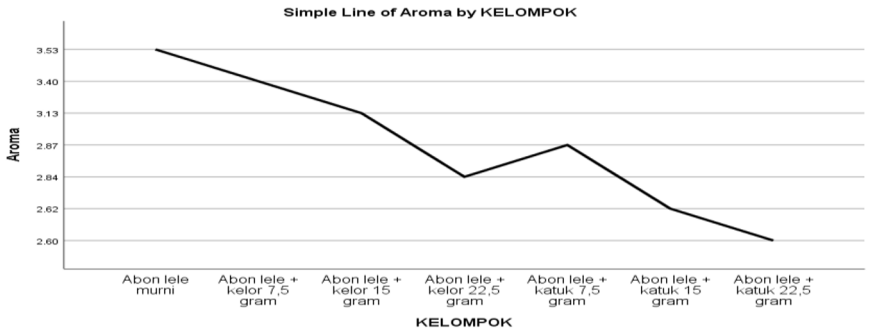


Fig. 7. Graph of Organoleptic Test Results by Aroma for Vegetable-Modified Catfish Floss

From Figure 7 above, it can be seen that in terms of aroma, the most preferred floss was pure catfish floss, while the least preferred was floss with 22.5 grams of *Sauropus Androgynus*. These research results are in line with research conducted by Suci in Febrianti N. H., et al. [2024], which found that in observations of aroma preference levels for cupcakes substituted with moringa leaf flour, the higher the addition of moringa leaf flour, the lower the aroma preference level of the moringa leaf cupcakes, due to the cupcakes' aroma becoming increasingly grassy/raw-smelling [22]. These research results are also consistent with research by Torry et al. [2022], which stated that there were differences in the aroma aspect between tuna floss with the addition of 73 grams and 125 grams of *Sauropus Androgynus*, as well as differences in the aroma aspect between tuna floss with 100 grams of *Sauropus Androgynus* and 125 grams of *Sauropus Androgynus* [23] .

Texture.

Based on Table 2, it can be seen that panelists preferred the texture of pure catfish floss (A), catfish floss with 7 grams of moringa (B1), catfish floss with 15 grams of moringa (B2), catfish floss with 22.5 grams of moringa (B3), and catfish floss with 22.5 grams of *Sauropus Androgynus* (C3), with values ranging from 3.09–3.60; among these four floss samples, the most preferred by panelists was catfish floss modified with 7.5 grams of moringa (B1), at 3.6. Meanwhile, catfish floss with 7.5 grams *of Sauropus Androgynus* (C1) and catfish floss with 15 grams of *Sauropus Androgynus* (C2) were

less preferred by panelists, at 2.89 and 2.69. These results can also be seen in the graph below.

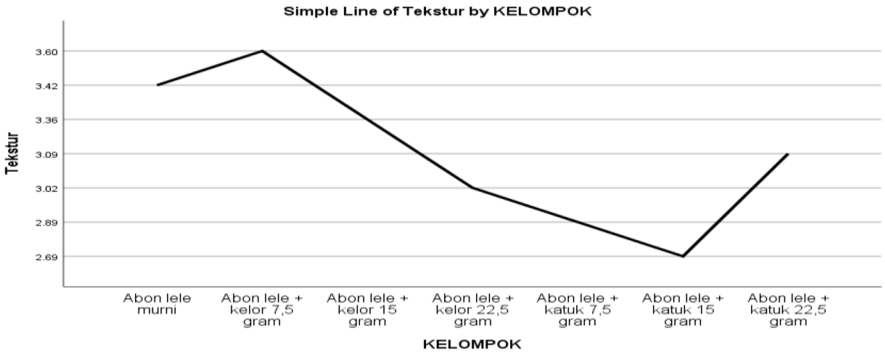


Fig. 8. Graph of Organoleptic Test Results by Texture for Vegetable-Modified Catfish Floss

From the graph above, it can be seen that in terms of texture, panelists preferred catfish floss modified with 7.5 grams of moringa (B1), with a value of 3.6.

Color.

Based on Table 2, it can be seen that panelists preferred pure catfish floss (A), catfish floss with 7.5 grams of moringa (B1), catfish floss with 15 grams of moringa (B2), catfish floss with 7.5 grams of *Sauropus Androgynus* (C1), and catfish floss with 15 grams of *Sauropus Androgynus* (C2), with values ranging from 3.11–3.60; among these five floss samples, the most preferred by panelists was catfish floss modified with 7.5 grams of moringa, at 3.60. Meanwhile, the least preferred floss samples were catfish floss with 22.5 grams of moringa and catfish floss with 22.5 grams of *Sauropus Androgynus*, at 2.67 and 2.69. These results can also be seen in the graph figure below:

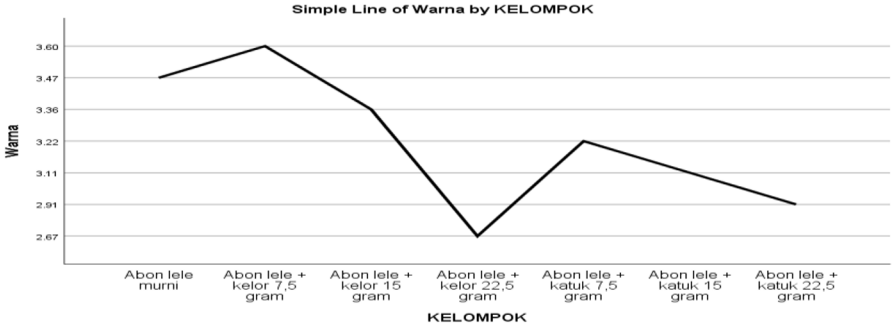


Fig. 9. Graph of Organoleptic Test Results by Color for Vegetable-Modified Catfish Floss

From Graph 9 above, it can be seen that the vegetable-modified catfish floss most preferred by panelists was catfish floss with 7.5 grams of moringa, at a value of 3.6, while the least preferred by panelists was catfish floss with 22.5 grams of moringa.

Panelists' dislike of the floss modified with 22.5 grams of moringa vegetable is possibly due to its black color. These research results are in line with Puyanda et al. (2023), who stated that the higher the concentration of moringa leaf addition, the more concentrated/darker the green color of wet noodles becomes, and the lower their acceptability [24].

4 Conclusion

Catfish floss modified with moringa and *Sauropus Androgynus* vegetables has an influence on the characteristics of the floss content as well as on its organoleptic properties. From the proximate analysis, the highest moisture content and highest fat content were found in catfish floss with 7.5 grams of *Sauropus Androgynus* (C1), while the highest iron content, protein content, and calcium content were found in catfish floss modified with 22.5 grams of moringa (B3). From the organoleptic analysis, the floss most preferred by panelists in terms of taste, texture, and color was catfish floss modified with 7.5 grams of moringa (B1), while in terms of aroma, the floss most preferred by panelists was pure catfish floss (A).

Acknowledgments. The researchers would like to express their gratitude to the Ministry of Higher Education, Science, and Technology for funding this research, as well as to Politeknik Kesehatan Wira Husada Nusantara Malang and the various parties who assisted in the research process.

Disclosure of Interests. None declared.

References

1. Profil Kesehatan Provinsi Jawa Timur. TIM PENYUSUN Koordinator Anggota. East Java Provincial Health Profile. (2024).
2. Sayuti, Qotimah, Susana, Rokhamah. Information Education Communication (IEC) in Efforts to Prevent and Address Anemia in Women of Reproductive Age (WUS) in Banjararum Village. JPM, Vol. 4, No. 6. (2024).
3. Majid, J. A., Marniza, M., & Susanti, L. The Effect of Sangkuriang Catfish Meat Substitution. Agroteknika, 7(September), 433–446. (2024).
4. Sundari S.R., Kusmayadi A., Fitriadi W.B. Technology for Producing Fishy-Smell-Free Catfish Floss (Counseling and Implementation). JPM, Vol. 6, No. 1. (2021).
5. Fatmawati N., Zulviana Y., Arisendha R.S.D. Processed Catfish (Clarias Batrachus) Content on Nutritional Status (Literature Review). Journal of Fundus, Vol 4, No. 2, 29-35. (2024).
6. Miranti, Danil, M., Nuh, M., Novrini, S., Barus, W. B. J., & Apriawati. Processing of Catfish Floss Products to Increase the Income of Penen Village Community, Sibiru-Biru District. Jurnal Pertanian, 2(2), 27–32. (2014).
7. Hanila Wetri; Milliyantri Elvandari; Linda Riski Sefrina. Quality of Moringa Leaf Flour (Moringa Oleifera L) Addition to Catfish Floss as an Alternative Food for Anemia Prevention. Ghidza: Jurnal Gizi Dan Kesehatan, 6(1), 120–127. (2022).
8. Marhaeni S.L. Moringa Leaves (Moringa Oleifera) as a Source of Functional Food and Antioxidants. JURNAL AGRISIA, Vol. 13 No. 2, 40-53. (2021).

9. Satriyani P.P.D. Article Review: Antioxidant Activity of Moringa Leaf Extract (Moringa oleifera Lam.). Jurnal Farmasi Malahayati, Vol 4 No 1, 31-41. (2021).
10. Siswanto B. The Effect of Ethanol Extract of Sauropus Androgynus Leaves (Sauropus androgynus) on Red Blood Cell Count (HR), Hemoglobin (Hb), and Hematocrit (Ht) of Rats Exposed to Emission. Pharmacogn J. 2021; 13(4): 860-865. (2021).
11. Dewi DP, & Astriana K. Administration of Catfish Nuggets (Clarias Batrachus) Mixed with Sauropus Androgynus Leaves. Fe Fortification on Hemoglobin Levels of Anemic Pregnant Women. Journal of Nutrition College, 11(1), 35–41. http://ejournal3.undip.ac.id/index.php/j (2022).
12. BSN. SNI for Fish, Crustacean, or Mollusk Floss. Standard Implementation and Conformity Assessment System - BSN. (2019).
13. BSN. SNI for Floss. Standard Implementation and Conformity Assessment System - BSN. (1995).
14. Ramadhani A.A., Safitri, Saragih W.F. Analysis of the Physical and Chemical Properties of Home Industry Beef Floss in Surabaya City, East Java. Jurnal Peternakan Sabana, Vol. 3 No. 3, 128-135, https://ojs.unkriswina.ac.id/index.php/sabana. (2024).
15. Riskia E. Nutritional Content of Moringa Leaves per 100 Grams — Complete Details. https://ngobrolsehat.com/kandungan-gizi-daun-kelor-per-100-gram-ini-rincian-lengkapnya/#kandungan-gizi-daun-kelor-per-100-gram. (2025).
16. Adinda R. Sauropus Androgynus Leaf Nutrition: Nutritional Content, Benefits, & Side Effects. https://www.ruangbunda.com/nutrisi/nutrisi-daun-Sauropus Androgynus - kandungan-gizi-manfaat-efek-samping/. (2026).
17. Wetri H., Elvandari M., Sefrina L.R. Quality of Moringa Leaf Flour (Moringa Oleifera L) Addition to Catfish Floss as an Alternative Food for Anemia Prevention. GHIDZA: JURNAL GIZI DAN KESEHATAN, Volume 6 Issue 1 (120–127) July 2022. https://doi.org/10.22487/ghidza.v6i1.506, (2022).
18. Dinengsih S., Kundaryanti R., Nuhaniar R. The Effect of Feeding Sauropus Androgynus Leaves and Moringa Leaves on Milk Production. DOI 10.33024, http://ejurnalmalahayati.ac.id/index.php/kebidanan. (2025).
19. Purwati. Evaluation of Moringa Leaves (Moringa oleifora) as Functional Food. Abdimas Mahakam Journal, Vol 3 No 2, http://dx.doi.org/10.24903/jam.v3i2.504. (2019).
20. Nurlaila, Sukainah A., Amiruddin. Development of Functional Sausage Products Based on Mackerel Fish (Scomberomorus sp.) and Moringa Leaf Flour (Moringa oleifera L). Jurnal Pendidikan Teknologi Pertanian, Vol. 2 (2016): 105-113. (2016).
21. Ardiyah D., Yusmita L., Wijaya R.. Sensory Quality Analysis of Cinnamon Syrup with Modified Concentration Ratio of Palm Sugar and Granulated Sugar. Jurnal Hasi Penelitian Dan Pengkajian Ilmiah Eksakta. Vol.01 No.02 (2022)
22. Febrianti N., Hardianti. Organoleptic Characteristics and Nutritional Content Analysis of Local Food Dangke Moringa Sticks. J. Sains dan Teknologi Pangan Vol. 9, No. 6, P. 8004-8012. (2024).
23. Torry R.D., Mas'ud H., Nursalim, Adam A. Acceptance Level, Protein Content, and Iron Content of Tuna Fish Floss (Thunnus sp.) with the Addition of Sauropus Androgynus Leaves (Sauropus androgynus). (2022).
24. Puyanda I.R., Suhartatik N., Nuraini V., Setyorini I. Addition of Moringa Leaf Flour (Moringa oleifera) with Variations in Drying Temperature and Concentration to Increase the Nutritional Value of Tempeh. Jurnal Pengolahan Pangan 8(2), 125-132. (2023).

Open Access This chapter is licensed under the terms of the Creative Commons Attribution-NonCommercial 4.0 International License (http://creativecommons.org/licenses/by-nc/4.0/), which permits any noncommercial use, sharing, adaptation, distribution and reproduction in any medium or format, as long as you give appropriate credit to the original author(s) and the source, provide a link to the Creative Commons license and indicate if changes were made.

The images or other third party material in this chapter are included in the chapter's Creative Commons license, unless indicated otherwise in a credit line to the material. If material is not included in the chapter's Creative Commons license and your intended use is not permitted by statutory regulation or exceeds the permitted use, you will need to obtain permission directly from the copyright holder.

