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PEMANFAATAN LIMBAH SISIK IKAN MAS, SISIK IKAN NILA, SISIK IKAN GURAME MENJADI KERIPIK

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Abstrak— The components of fish scales include 70% water, 27% protein, 1% fat and 2% ash. The flour used during this study used 3 types of flour, namely rice flour, cornstarch, tapioca flour. This study was designed using a two-factor complete block design. The first factor is the type of fish scales, A1 = carp fish scales, A2 = tilapia fish scales, A3 = carp fish scales. The second factor is the type of flour, B1= cornstarch, B2= tapioca flour, B3 rice flour. Analysis of fish scales produced included: moisture content, ash, fat, protein, total color, texture analyzer, and color, taste, aroma and texture preference tests. The results of this study indicate that variations in the types of fish scales have a significant effect on organoleptic (color and taste), organoleptic (aromatic) significant effect. However, it did not significantly affect the moisture content, ash content, fat content, protein content, total color difference, texture (hardness, fracture, chewiness, and cohesiveness), and organoleptic (texture). Variations in the type of flour have a significant effect on organoleptic (color), significantly affect texture (fracture) organoleptic (taste). However, it did not significantly affect the moisture content, ash content, fat content, protein content, color, texture (hardness, chewiness, and cohesiveness), organoleptic (aromatic, and texture).

Kata Kunci— fish scales, flour type, chips, texture

I. PENDAHULUAN

Fish scales are waste that has not been utilized optimally. Fish scales on an industrial scale (obtained from the fish fillet industry) can be used as a source of collagen, while on a household scale they are usually just thrown away (Budirahardjo, 2010). Meanwhile, the problem is that until now not much research has been done on the use of carp, tilapia, and goldfish scales as food preparations, and many are used as souvenirs.

So far, scales are only thrown away and not used. The content of fish scales varies. Fish scales have organic compounds, including 41-84% which are organic proteins and the rest are mineral residues and inorganic salts such as magnesium carbonate and calcium carbonate (Vaz Souza et al., 2020). According to Budirahardjo (2010) components of fish scales include 70% water, 27% protein, 1% fat, and 2% ash. The high protein content in fish scales is even higher in catfish, only 17.7% (Hersoelistyorini, 2010). So that fish scales have the potential to be used as additional nutrition in food.

The characteristic of carp scales is that they are relatively large in size and are classified as cycloid or circular scales which are arranged in an orderly manner. The color of the scales on goldfish varies according to race. There are green, blue, red, golden yellow or a combination of these colors. The lateral line is composed of 27–30 porous scales. The number of scales above the lateral line is 7 pieces and below the lateral line is 5 pieces (goddesset al., 2014). Tilapia scales arestenoid type Where the character of the ctenoid scale cells has small serrations called ctenii and are found in teleost fish, one of the teleost fish is the red mullet (Parupeus heptacanthus) (Tihet al., 2017). Gourami fish scales are almost similar to the characteristics of tilapia fish scales, the only thing that distinguishes them is strong scales with slightly rough edges (Wijaya, 2021).

Chips are crackers that are dry, crunchy (crispy) and relatively high fat content. Chips are popular because of their distinctive texture, delicious taste, long shelf life, practical portability and storage. The flours that can be used to make fish scale chips are cornstarch, tapioca flour, rice flour and wheat flour.

Corn starch or what is commonly called cornstarch can be used as an ingredient in making chips, because it can also form a gel. Cornstarch is a source of carbohydrates used for making bread, pastries, biscuits, baby food, and possibly can be made fettuccine, and can be used in the pharmaceutical industry (Zainuddin, 2016), according to Rahayu (2017)The chemical composition of cornstarch per 100g contains Water (g) 8.12 Protein (mg) 10.26 Carbohydrates (g) 76.89 Total Fat (mg) 3.59 Crude Fiber (mg) 7.3 Ash (g) 1, 13 Maizena flour has content74 – 76% amylopectin and 24 – 26% amylose.

Tapioca is starch extracted from cassava. Tapioca has a high amylopectin content, so products made with tapioca flour tend to have a crunchy texture, are soluble in water, usually used as fillers and binders which produce a plastic, compact texture in the food industry

such as in the manufacture 5 chips (Selvi, 2016).), according to Natalie (2011) the nutritional content of tapioca flour per 100 g sample is 362 cal, 0.59% protein, 3.39% fat, 12.9% water and 6.99% carbohydrates, amylose22%, amylopectin 78%.

According to Ridawati (2019) rice flour is the easiest processed rice product to make. In this case, the rice was ground with a hammer mill grinder, then sieved through an 80 mesh sieve to become flour. This flour is then dried in the sun or dried until the water content reaches 14%. Some of the characteristics of rice flour are that it has a slightly transparent white color, feels soft and smooth when touched with the fingers, and contains about 20% amylose. Rice flour forms food products with a soft texture, but does not become sticky when cooked. The color of rice flour is opaque or not clear after cooking (Imanningsih 2012). In 100 gramsrice flour white, contained 80 grams of carbohydrates, seven grams of protein, 94 milligrams of phosphorus, 75 milligrams of potassium, 23 milligrams of magnesium (Ridawati, 2019).

Wheat flour is flour obtained from wheat seeds (Common wheat) were milled. The specialty of wheat flour when compared to other cereals is its ability to form gluten in this dough causing it to be elastic or not easily destroyed in the process of molding and cooking fish scales (Fajiarningsih, 2013), according to (Makmur, 2017) The nutritional content of wheat flour per 100g has a composition of water 13%, protein content 12-13%, carbohydrate content 72-73%, fat content 11/2.

In the manufacture of fish scale chips, there is a problem which is not yet known which type of flour produces crispy fish scale chips. So this research focuses on types of fish scales and types of flour.

4 our goal is to simulate the usual appearance of papers in a Journal of the Academy Publisher. We are requesting that you follow these guidelines as closely as possible. The manuscripts must be composed of the following scientific article components (subtitles-in order), as follows:

II. METODOLOGI

This research was conducted at the pilot plan and laboratory of the Faculty of Agricultural Technology INSTIPER Yogyakarta. This research was carried out for three months starting from January to March 2023.

Tools and materials

The tools used in making fish scale chips are stoves, knives, measuring cups, blenders, steamers, scales, frying pans, wood/iron silk, scoops, plastic cutting boards, stainless steel filters, spoons, large and small bowls. analysis is an analytical balance, test tube, glass funnel, measuring cup, beaker, thermometer, volumetric flask, erlenmeyer, measuring pipette, dropping pipette, spatula, water heater, soxhlet, oven, porcelain cup, desiccator,texture analyzer, aluminum foil, filter paper andchromameter.

The ingredients used in the manufacture of fish scale chips are fish scale chips, namely goldfish scales, tilapia fish scales, carp scales, cornstarch, wheat flour, shallots, garlic, ginger, turmeric, coriander, pepper, lime leaves, salt, granulated sugar , lime, and cooking oil. The materials used for analysis were N-hexane, distilled water, sulfuric acid, sodium acetate, methyl red indicator, sodium hydroxide, gallic acid, and sodium bicarbonate.

Experimental design

The experimental design used is RBL (Rancangan BLOK Lengkap) 2 factors.

The first factor is the type of fish scales (A) with 3 levels, namely:

A1 = Goldfish scales
A2 = They are crowded
A3 = Gurame fish scales

The second factor is type of flour (B) with 3 levels namely:

B1 = Cornstarch
B2 = Tapioca Starch
B3 = Rice Flour

From these two factors, 3 x 3 = 9 treatments were obtained. Each of these treatments was repeated 2 times as a repeat or block so that 3 x 3 x 2 = 18 experimental units were obtained.

Research procedure

This research procedure was carried out in 3 stages, namely: The first stage was the preparation of fish scales. The second stage of flour preparation. The third stage is the process of making fish scale chips.

Preparation of Fish Scales

Goldfish scales, tilapia fish scales, carp carp are washed using clean water so that the adhering dirt is removed, then do the first soaking carp, tilapia, carp carp scales that have been clean soaked in lime juice for 30 minutes. Refining spices such as shallots, garlic, ginger and turmeric, clean the skin and then mix it with coriander and pepper, then grind it using a blender, then wash it II and wash the scales of carp, tilapia, carp that have been soaked in lime juice with clean water and drain, do soaking II soak carp scales, tilapia fish scales, carp after draining with half of the spices that have been mashed for 3 hours so that the spices are absorbed, then steam carp scales, tilapia fish scales, carp been soaked with half the spices for 45 minutes then drain.

Flour Preparation

Prepare cornstarch, rice flour, and tapioca flour, in a different place and then combine with each flour in a ratio of 1: 1 (100 g: 100 g).

Making Fish Scale Chips

Referring to TLUE (Experimental sequence layout) for the first treatment is A1B2 is as follows A1 (carp scales) 100 g, then add tapioca flour 1: 1 (100 g: 100 g) wheat flour, after treatment 1 is complete continue the other treatment , and do it like the procedure above after the 1st repetition is finished, continue the 2nd repetition, stir then add 1 egg, stir again and after it is thoroughly mixed, let it stand for less than 1 hour. If you have done the frying until browned then drain.

III. HASIL DAN PEMBAHASAN

A. Analysis of Chemical Properties of Fish Scale Chips

1. Water Rate

Comparison of the type of fish scales and the type of flour as well as the interaction between the two did not significantly affect the water content. For more details, this can be seen in Table 1. The following averages.

Table 1. Average water content of fish scale chips (%)

Type of flour	Types of fish scales			Rerata B
	A1 (More)	A2 (Nila)	A3 (Gurame)	
B1 (Maizena)	5.35±3.3	5.03±3.2	6.04±3.5	5.47±5.7
B2 (Tapioca)	6.07±3.5	5.67±3.4	5.25±3.2	5.66±5.8
B3 (Rice)	4.12±2.9	5.02±3.2	4.46±3.0	4.53±5.2
Letter A	5.18±5.6	5.24±5.6	5.25±5.6	

From Table 1. it can be seen from the type of fish scalesdid not significantly affect the water content due to the size of the fish scales of the three typesrelatively the same size and classified into the type of cycloid scales (circles) so it doesn't have a real effect. According to Budihardjo (2010) the content of freshwater fish scales contains 70% water

The type of flour does not significantly affect the water content because wheat flour is hydrophilic or binds water (Maryono, 2013). For the highest treatment, A1B2 was 6.07%, then for the lowest treatment, A1B3 was 4.12%.

2. Ash Rate

Shows that the ratio of the types of fish scales and the types of flour as well as their interactions have no significant effect on the ash content, for more details can be seen in Table 2. The following averages.

Table 2. Average ash content of fish scale chips (%)

Type of flour	Types of fish scales			Rerata B
	A1 (More)	A2 (Nila)	A3 (Gurame)	
B1 (Maizena)	4.55±3.0	3.56±2.7	6.09±3.5	4.73±5.3
B2 (Tapioca)	4.33±2.9	4.90±3.1	5.32±3.3	4.85±5.4
B3 (Rice)	7.02±3.7	6.22±3.5	5.69±3.4	6.31±6.2
Letter A	5.30±5.6	4.89±5.4	5.70±5.8	

From Table 2. it can be seen that the type of fish scalesdid not significantly affect the ash content due to the high mineral content of fish scalesbasically, according to Ramadhani (2016) the nutritional components of freshwater fish scales have relatively the same ash content, namely 2%.

The type of flour does not significantly affect the ash content of fish scale chips, but from this average the ash content of chips with rice flour is higher because the mineral content in rice flour is high (Ningsih, 2018).

3. Fat Rate

Comparison of the type of fish scales and the type of flour as well as the interaction between the two did not significantly affect the ash content. For more details, this can be seen in Table 3. The following averages.

Table 3. Average fat content of fish scale chips (%)

Type of flour	Types of fish scales			Rerata B
	A1 (More)	A2 (Nila)	A3 (Gurame)	
B1 (Maizena)	64.64±8.0	64.12±8.0	70.12±8.4	66.29±14.1
B2 (Tapioca)	67.07±8.2	60.62±7.8	67.31±8.2	65.54±14.0
B3 (Rice)	66.36±8.1	68.03±8.2	69.40±8.3	67.93±14.3
Letter A	66.02±14.1	62,24±13.9	68.94±14.4	

From Table 3. it can be seen that the type of fish scales has no significant effect on the fat content because the fat content in freshwater fish scales is relatively the same, according to Budiraharjo (2010) the fat content in freshwater fish scales is 1%.

the type of flour does not significantly affect the fat content because the fat content in the type of flour is not much different according to Utomo (2019) the fat content of cornstarch ranges from 0.39-0.43%, then for rice flourThe fat content of secang wood rice flour ranges from0.15 to 0.20% (Ridawati, 2019), and for tapioca flourownfat contentby 0.2% (Sovyani, 2016).

4. How Much Protein

Comparison of the type of fish scales and the type of flour as well as the interaction between the two did not significantly affect the ash content. For more details, this can be seen in Table 4. The following averages.

Table 4. Average protein content of fish scale chips (%)

Type of flour	Types of fish scales			Rerata B
	A1 (More)	A2 (Nila)	A3 (Gurame)	
B1 (Maizena)	63.54±8.0	66.17±8.1	66.65±8.2	65.45±14.0
B2 (Tapioca)	62.57±7.9	61.34±7.8	64.66±8.0	62.85±13.7
B3 (Rice)	65.58±8.1	65.88±8.1	68.4±8.3	66.62±14.1
Letter A	63.89±13.8	64.46±13.9	66,57±14.1	

From Table 14, it can be seen that the type of fish scales has no significant effect on protein levels because freshwater fish scales have more or less the same protein, namely 27% (Budirahardjo, 2010).

The type of flour did not significantly affect the protein content, but from this average the protein content of fish scale chips with rice flour was higher because the protein content in rice flour was 7.78% (Wulandari, 2016).

B. Analysis of Chemical Properties of Fish Scale Chips

1. Color AnalysisChromameter (total color difference)

Shows that the ratio of fish scales and the type of flour used has no significant effect on the color value of the chromameter. for more details can be seen in Table 5. The following mean.

Table 5. Average total color content of fish scale chips (total color difference)

Type of flour	Types of fish scales			Rerata B
	A1 (More)	A2 (Nila)	A3 (Gurame)	
B1 (Maizena)	39.50±6.3	40.67±6.4	44.02±6.6	41.40±11
B2 (Tapioca)	36.19±6.0	40.27±6.3	44.83±6.7	40.43±11.0
B3 (Rice)	42.50±6.5	27.96±5.3	33.17±5.8	34.54±10.1
Letter A	39.39±10.8	36.30±10.4	40.67±11.0	

From table 5. It can be seen that the type of fish scales has no significant effect ontotal color difference analysis, but from this average the total color test of fish scale chips with gourami fish scales was higher, based on observations of colorless (transparent) fish scales, only the chromatophore was colored. The color of the chromatophore of gourami scales is brownish yellow or gray (Suwandi, 2010).

The type of flour has no significant effect on the total color difference, but from that average the total color difference between fish scale chips and cornstarch is higher because tcornstarch has a slightly yellowish color that is paler and cloudy (Anggraeniet al., 2014).

2. Texture Analysis

a. Hardness (violence)

The comparison between the type of fish scales and the type of flour used has a significant effect on the hardness test. To find out each treatment, Duncan's multiple range test was carried out with a 5% level of significance. The results of the multiple range test can be seen in Table 6.

Table 6. Results of Duncan's multiple range test (JBD) analysis of fish scale chip hardness (N)

Type of flour	Types of fish scales			Rerata B
	A1 (More)	A2 (Nila)	A3 (Gurame)	
B1 (Maizena)	18.21±6.0	25.79±7.2	20.55±6.4	21.51±11.3
B2 (Tapioca)	22.98±6.8	9.90±4.4	28.78±7.6	20.55±11.1
B3 (Rice)	7.92±4.0	16.44±5.7	18.02±6.0	14.12±9.2
Letter A	16.37±9.9	17.37±10.2	22.45±11.6	

Note: The mean followed by a letter that differs from the column or row indicates a difference based on Duncan's multiple range test at the 5% level of significance.

From Table 6. It can be seen that the type of fish scales has no significant effect on the hardness test, but from this average the hardness test of fish scale chips with carp scales is higher. as big40–90% (Yogaswari, 2010)

The type of flour has no significant effect on the hardness test, but from that average, the hardness test for cornstarch fish scale chips is higher, this is becausecornstarch contains74 – 76% amylopectin and 24 – 26% amylose (Indrawati, 2019).

b. Fracture (Broken Facility)

To find out each treatment, a multiple distance test was performedDuncan with a real level of 5%. The results of the multiple range test can be seen in Table 7.

Table 7. Multiple range test resultsDuncan (JBD) fracture ease analysis of fish scale chips (N)

Type of flour	Types of fish scales			Rerata B
	A1 (More)	A2 (Nila)	A3 (Gurame)	
B1 (Maizena)	2.65±2.3	2.07±2.0	5.62±3.4	$3.44±4.5_c$
B2 (Tapioca)	8.93±4.2	4.70±3.1	5.64±3.4	$6.42±6.2_b$
B3 (Rice)	3.76±2.7	2.38±2.2	4.53±3.0	$3.55±4.6_a$
Letter A	5.11±5.5	3.05±4.3	5.26±5.6	

Note: The mean followed by a letter that differs from the column or row indicates a difference based on Duncan's multiple range test at the 5% level of significance.

Based on Table 7. Shows that the type of fish scales has no significant effect on the ease of fracture test, but from this average the test of the ease of fracture of fish scale chips with carp scales is higher this is because carp carp scales are thicker, wider and the collagen in fish scales big carp40–90% (Yogaswari, 2010).

The type of flour has a significant effect on the hardness test, because but from this average the test for the ease of breaking fish scale chips with tapioca flour is higher this is because tapioca flour contains 17% amylose and 83% amylopectinwith a granule size of 3-3.5μ (Jayanti, 2017).

c. Chewiness (Masticatory Force)

The type of fish scales and the type of flour used did not have a significant effect nor did the interaction between the two have a significant effect on chewing power. For more details, this can be seen in Table 8. The following averages.

Table 8. Average chewing power of fish siisk chips (N)

Type of flour	Types of fish scales			Rerata B
	A1 (More)	A2 (Nila)	A3 (Gurame)	
B1 (Maizena)	12.79±3.6	14.39±3.8	5.78±2.4	32.97±5.7
B2 (Tapioca)	13.67±3.7	11.67±3.4	11.99±3.5	37.33±6.1
B3 (Rice)	16.12±4.0	9.32±3.1	12.70±3.6	38.15±6.2
Letter A	42.59±6.5	35.39±5.9	30.48±5.5	

Based on Table 8. Shows that the type of fish scales has no significant effect on the chewing power test, but from this average the test of the ease of breaking fish scale chips with carp scales is higher this is becauseGoldfish scalesrelatively large and classified into the type of cycloid scales (circle). The dorsal (dorsal) fin is elongated with hard fingers at the back and the end (third and fourth fins) is serrated (Hamid, 2017).

The type of flour has no significant effect on the chewing power test, but from this average the chewing power test of fish scale chips with rice flour is higher, this is because rice flourthe content of amylose in wheat flour is 28% and amylopectin is 72% (Bagus et al., 2015).

d. Cohesiveness (Compactness)

The type of fish scales and the type of flour had no significant effect. Of the two factors there is no interaction between the two. for more details can be seen in table 9 the following mean.

Table 9. Average compactness of fish scale chips (N)

Type of Flour	Types of fish scales			Rerata B
	A1 (More)	A2 (Nila)	A3 (Gurame)	
B1 (Maizena)	0.56±0.7	0.49±0.7	0.77±0.9	1.82±1.4
B2 (Tapioca)	0.57±0.8	0.28±0.5	0.79±0.9	1.64±1.3
B3 (Rice)	0.73±0.9	0.75±0.9	1.78±1.3	3.26±1.8
Letter A	1.86±1.4	1.52±1.2	3.34±1.8	

Based on Table 9. Shows that the type of fish scales has no significant effect on the cohesiveness test, but from this average the test of the ease of breaking fish scale chips with carp carp scales is higher this is becauseGouramy scales Gouramy scales are a type of stenoid scales with characteristicsthe presence of small serrations on the posterior part called stenii (Pramonoet al., 2022).

The type of flour has no significant effect on the cohesiveness test, but from this average the cohesiveness test of fish scale chips with rice flour is higher, this is because rice flourthe content of amylose in wheat flour is 28% and amylopectin is 72% (Goodet al., 2015).

C. Organoleptic Test of Fish Scales Favorite

1. Color Likeness Test

Multiple range test resultsduncan color preference test is in Table 10

Table 10. Results of Duncan's multiple range test (JBD) on fish scale color preference

Type of flour	Types of fish scales			Rerata B
	A1 (More)	A2 (Nila)	A3 (Gurame)	
B1 (Maizena)	4.45±3.0	4.57±3.0	4.65±3.0	$4.55±5.2_c$
B2 (Tapioca)	4.65±3.0	4.63±3.0	4.67±3.1	$4.65±5.3_b$
B3 (Rice)	4.45±3.0	4.55±3.0	4.73±3.1	$4.57±5.2_a$
Letter A	$4.51±5.2_x$	$4.58±5.2_{and}$	$4.68±5.3_{With}$	

The mean followed by a letter that differs from the column or row indicates a difference based on the multiple range test Duncan at a real level of 5%.

Based on Table 10. Shows that the type of fish scales has a very significant effect on the color preference test, but from this average the total color test of fish scale chips with gouramy scales is higher, based on observations of colorless (transparent) fish scales, only the chromatophore is colored . The color of the chromatophore of gourami scales is brownish yellow or gray (Suwandi, 2010).

The type of flour has a very significant effect on the color preference test, because tcornstarch has a slightly yellowish color that is paler and cloudy (Anggraeniet al., 2014).

2. Scent Favorability Test

Multiple range test resultsduncan Aroma favorite test is in Table 11.

Table 11. Results of Duncan's multiple range test (JBD) preference for the aroma of fish scale chips

Type of flour	Types of fish scales			Rerata B
	A1 (More)	A2 (Nila)	A3 (Gurame)	
B1 (Maizena)	4.50±3.0	4.62±3.0	4.78±3.1	4.63±5.3
B2 (Tapioca)	4.50±3.0	4.55±3.0	4.65±3.0	4.56±5.2
B3 (Rice)	4.58±3.0	4.60±3.0	4.75±3.1	4.64±5.3
Letter A	$4.52±5.2_x$	$4.59±5.2_{and}$	$4.72±5.3_{With}$	

The mean followed by a letter that differs from the column or row indicates a difference based on the multiple range testDuncan at a real level of 5%.

Based on Table 11. Shows that the type of fish scales has a significant effect on the aroma preference test, because the panelists quite like the strong smell of fish scale chips. More and more spices are used in the

ingredients so that the fishy smell from fish scales does not smell (Kamalet al., 2019).

The type of flour has no significant effect on the preference test for the aroma of fish scale chips, but from this average the preference test for the aroma of fish scale chips with rice flour is higher, this is because rice flourthe aromaneutral (Indriyani, 2013).

3. Taste Favorability Test

The results of the multiple range test of taste preferences are in Table 12.

Table 12. Results of Duncan's multiple range test (JBD) preference for the taste of fish scale chips

Type of flour	Types of fish scales			Rerata B
	A1 (More)	A2 (Nila)	A3 (Gurame)	
B1 (Maizena)	4.68±3.1	4.72±3.1	4.83±3.1	4.74±5.3$_c$
B2 (Tapioca)	4.73±3.1	4.70±3.1	4.82±3.1	4.75±5.3$_b$
B3 (Rice)	4.55±3.0	4.68±3.1	4.85±3.1	4.69±5.3$_a$
Letter A	4.65±5.3$_x$	4.70±5.3$_{and}$	4.83±5.4$_{With}$	

ormation: The mean followed by a letter that differs from the column or row indicates a difference based on the multiple range testDuncan at a real level of 5%.

Based on Table 10. Shows that the type of fish scales has a significant effect on the taste preference test, because the chips taste delicious and can be accepted by all groups (Indriyani, 2013).

The type of flour has a significant effect on the taste preference test, because the taste of the flour which is quite sharp causes the panelists to feel neutral towards the taste produced (Kusuma, 2018).

4. Texture Likeness Test

The type of fish scales, the type of flour, and the interaction between the two did not significantly affect the preference for the texture of the fish scale chips. The average texture preference test for dry noodles can be seen more clearly in table 13.

Table 13. The average preference for the texture of fish scale chips

Type of flour	Types of fish scales			Rerata B
	A1 (More)	A2 (Nila)	A3 (Gurame)	
B1 (Maizena)	4.68±3.1	4.70±3.1	4.75±3.1	4.71±5.3
B2 (Tapioca)	4.68±3.1	4.73±3.1	4.73±3.1	4.71±5.3
B3 (Rice)	4.63±3.0	4.63±3.0	4.70±3.1	4.65±5.3
Letter A	4.66±5.3	4.68±5.3	4.72±5.3	

From the results of table 13, the types of fish scales did not have a significant effect on the preference test for the texture of fish scale chips, but from this average, the preference test for the aroma of fish scale chips and carp fish scales was higher, this was becausecarp scales have more tex[illegible]ehard (Kusuma, 2018)

The type of flour has no significant effect on the hardness test, but from that average, the hardness test for cornstarch fish scale chips is higher, this is becausecornstarch contains74 – 76% amylopectin and 24 – 26% amylose (Indrawati, 2019).

5. Average Overall Organoleptic Test

The overall preference for organoleptic tests obtained the average of the color, taste and aroma parameters to get the highest sample which is in Table 42.

Table 42. Mean Organoleptic Test Likelihood of Fish Scales Overall

Treatment	Color	Feel	Aroma	Texture	Rerata	Information
A1	4.41	4.65	4.52	4.66	4,56	Kinda like it
A2	4.58	4.70	4.59	4.68	4,63	Kinda like it
A3	4.68	4.83	4.72	4.72	4,73	Kinda like it
B1	4.55	4.74	4.63	4.71	4,65	Kinda like it
B2	4.65	4.75	4.56	4.71	4.66	Kinda like it
B3	4.57	4.69	4.64	4.65	4,63	Kinda like it

In Table 42 the mean of the overall preference organoleptic test shows that the difference in the level of preference of all panelists is not too great because the majority have the same rating, namely rather like it. This is due to the similarity in color, aroma, and texture of the samples.

The overall preference mean of the organoleptic test showed that the difference in the level of preference for all panelists was not too great because the majority had the same assessment, namely neutral. This is due to the similarity of both color and aroma in the samples. The overall results showed that the fish scale chips that the panelists liked the most were coded A3 (gouramy fish scales) with an average of 5 (rather liked) and B2 (cornstarch) with the highest average of 5 (rather liked). This is because the carp scales are larger and do not smell too fishy and can increase the panelists' preferences.

IV. KESIMPULAN

Based on the research results obtained, the following conclusions are generated:

1. Variations in the type of fish scales have a significant effect on organoleptic (color and taste), organoleptic (aromatic) significant effect. However, it did not significantly

affect the water content, ash content, fat content, protein content, total difference in color, texture (hardness, fracture, chewiness, andcohesiveness), and organoleptic (texture).

2. Variations in flour types have a significant effect on organoleptic (color), have a significant effect on texture (fracture) organoleptic (taste). However, it did not significantly affect the moisture content, ash content, fat content, protein content, color, texture (hardness, chewiness, andcohesiveness), organoleptic (aroma, and texture).
3. Based on the highest level of organoleptic preference, the most preferred fish scale chip product was in treatment A3B2 with the type of carp scales (A3) and the type of cornstarch (B2) with the highest average of 5 (rather like).

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