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PEROXIDE NUMBER AND ORGANOLEPTIC CHARACTERISTICS OF THREE-SPOT GOURAMI (TRICHOGASTER TRICHOPTERUS) CHIPS IN PACKAGING DURING STORAGE

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ABSTRACT
The application of packaging technology can provide benefits to both producers and consumers. The advantage for manufacturers is that they can extend product storage time, avoid bacterial contamination and improve quality. Three-spot gourami is a type of fish that is well known in the community, especially in South Kalimantan. Three-spot gourami is often found in swamp waters, rice fields and river tributaries. The results of this research are to determine the peroxide and organoleptic characteristics of processed Three-spot gourami (*Trichogaster trichopterus*) chips with a storage period of 40 days.

KEY WORDS
Trichogaster trichopterus, chips, packaging, peroxide.

Three-spot gourami is a type of fish that is well known in the community, especially in South Kalimantan. Swamp catfish are often found in swamp waters, rice fields and river tributaries. Three-spot gourami fishing can be done all year round, with high catches around May, June, July, August and September. The swamp catfish is found in swamp waters, belonging to the anabantidae family with the common name *treespot goramy* because it has two black spots on its body and one eye which has 3 black spots. Generally found in waters with temperatures between 20-28ºC, namely the fresh waters of Malaysia, Burma and Indonesia (Murjani, 2009).

Three-spot gourami chips are a processed food made from the basic ingredients of Three-spot gourami. The characteristic of *crispy* is that it has a crunchy, stiff and tasty outer and inner texture. In this processing, the fish is not coated using additional flour as a dressing for the fish, but is pressure-cooked first so that the fish flesh and bones become soft so that it is easy to consume. Next, the fish is fried until brownish and bitten until it feels crispy. Three-spot gourami has quite high economic value, where the catch of this fish is sold fresh and produced in the form of salted and beksam fish. Research on the processing of three-spot gourami chips was carried out by Rahmawati and Aisyah (2018) and Purnomo et al. (2022).

Every food ingredient has a limited shelf life before it undergoes the rotting process, for example fishery products such as three-spot gourami chips. Efforts to improve and maintain the quality of swamp sepat fish chips can be done through better processing or handling so as to reduce quality deterioration during storage and marketing. Therefore, various methods are used to maintain the durability of three-spot gourami chips. One way to do this is through the application of packaging technology to increase product durability compared to the general packaging used for swamp sepat fish chips.

The application of packaging technology can provide benefits to both producers and consumers. The advantage for manufacturers is that they can extend product storage time, avoid bacterial contamination and improve quality. The benefits for consumers are quality assurance for the products purchased and the safety of the products consumed.

METHODS OF RESEARCH

The tools used in research on swamp sepat fish chips include knives, cutting boards, scales, basins, stoves, pans, autoclaves, spinners, sealers and packaging. Apart from that, the laboratory equipment used for organoleptic testing of three-spot gourami chips includes score sheets, samples, tables and panelist chairs. For the peroxide test, the laboratory equipment used are test tubes, pipettes, stirrers, micropipettes and titration equipment.

Research Procedures (Purnomo *et al.*, 2022):

- Fresh three-spot gourami is cleaned by weeding with the aim of removing dirt such as mucus, scales, blood and fish innards;
- Wash the three-spot gourami with water until clean and drain;
- Prepare an autoclave that has been lined with banana leaves then arrange the fish in layers and alternate between the fish and banana leaves. For cooking, use a pressure cooker for 20 minutes at 121 ^{o}C;
- The fish that has been pressure-cooked is then cooled for 60 minutes;
- After the fish has cooled, the frying process is carried out for 8 minutes at a temperature of 140 ^{o}C The ratio of 1 liter of oil contains ½ kg of fish;
- Next, remove the fish which is cooked to a golden brown color and drain using a spinner for 5 minutes;
- The packaging for three-spot gourami chips uses *polypropylene packaging*;
- Then stored for 40 days with different packaging methods and tested every 10 days.

The design used is the research design used in this research, namely a random factorial design using 2 factors: type of packaging and storage time. Randomized Group Design (RAK) is a design (experiment) where the experimental units in each are relatively homogeneous. This research has 3 treatments with 2 repetitions:

- Treatment O: Unpackaged (Control);
- Treatment A: Regular Packaging (Non-Vacuum);
- Treatment B: Vacuum Packaging (Vacuum).

Parameters are the size of the entire population in the study that must be estimated from those contained in the pilot. The parameters observed were organoleptic tests using hedonic quality (taste, texture, appearance and aroma). This organoleptic test used 10 panelists. Panelists aim to assess product quality and analyze the properties or sensory attributes of the products they test.

RESULTS AND DISCUSSION

Rancidity is a deterioration or change in odor and flavor in fat or fatty foods. Rancidity affects the quality of food products, causing consumers to reject the product and can also endanger health. As a fatty food product, peanuts are susceptible to rancidity during storage. In the presence of oxygen, light, humidity and high temperatures, fatty acid oxidation can occur (Nawar, 1996).

Table 1 – Peroxide Test Results

Sample	Treatment				
	H0	H1	H2	H3	H4
A0	0	3,212	10.3	3.56	0
A1	0	0	6.57	11.2	2.25
A2	0	0	4.59	5.85	1.3

Based on the results of ANOVA calculations on data from observations of different packaging storage times with 15 groups, 2 replications and 3 treatments, the calculated F value

for packaging was 84,516 and F calculated for storage time 862,883. The difference in packaging and storage time obtained an F value of 151.029. From the results of ANOVA calculations and further tests, it can be concluded that differences in packaging and storage time have significantly different effects on three-spot gourami (*Trichogaster tricopterus*) chips.

Appearance criteria are quite important organoleptic parameters assessed by the panelists. This is because if the appearance is good and liked, then the panelists will look at other organoleptic parameters (aroma, texture and taste). Appearance also influences consumer acceptance, although appearance does not determine the absolute level of consumer liking. The uniformity and integrity of a product will certainly attract panelists and is preferred compared to products that are diverse and incomplete (Soekarto, 1985).

Table 2 – Appearance Organoleptic Test Results

Sample	Storage				
	H_0	H_1	H_2	H_3	H_4
A_0	7	1.6	1.6	1	2
A_1	7.3	7.4	2.7	3.7	4.2
A_2	8.6	6.9	6.2	8.6	6

Differences between treatments can be concluded if a sign test is carried out for the organoleptic values of appearance specifications. Based on statistical analysis of sign tests, the appearance values for each treatment were significantly different. This is proven by the value of X^2 table 5% and X^2 table 1% so that H_1 is accepted and H_0 is rejected. So A_O, B_O, and BA three-spot gourami chips using different packaging with 40 days of storage provide a real difference in the appearance of the processed product.

Color is one of the important physical parameters of a food ingredient. Consumers' preferences for food products are also determined by color the food. The color of a food ingredient is influenced by the light absorbed and reflected from the ingredient itself and is also determined by dimensional factors, namely product color, brightness and clarity of product color (Rahayu, 2001).

Table 3 – Color Organoleptic Test Results

Sample	Storage				
	H_0	H_1	H_2	H_3	H_4
A_0	7.6	5.3	3	3.6	3.6
A_1	7.9	8.2	5.5	6.4	6.6
A_2	8	7.7	7.7	8.3	7.3

Differences between treatments can be concluded if a sign test is carried out. So the next step is to carry out a sign test for the organoleptic values of color specifications. Based on statistical analysis of the sign test, the color values in each treatment were significantly different. This is proven by the value of X^2 table 5% and X^2 table 1% so that H_1 is accepted and H_0 is rejected. So A_O, B_O, and BA three-spot gourami chips using different packaging with 40 days of storage provide a real difference in the color of the processed product.

Table 4 – Texture Organoleptic Test Results

Sample	Storage				
	H_0	H_1	H_2	H_3	H_4
A_0	7.3	4.1	4.6	5.6	6.6
A_1	7.9	6.6	4.9	5.8	5.3
A_2	7	7.3	7	7.8	6.2

Texture is one of the properties of a material or product that can be felt by touching the skin or tasting, texture can be felt by applying pressure to the product. Food texture can be

evaluated by mechanical tests (instruments) or by sensory analysis. Sensory analysis uses human senses as an analytical tool (Riyadi et al, 2010).

Differences between treatments can be concluded if a sign test is carried out. So the next step is to carry out a sign test for the organoleptic values of color specifications. Based on statistical analysis of the sign test, the texture values for each treatment were significantly different. This is proven by the value of X^2 table 5% and X^2 table 1% so that H_1 is accepted and H_0 is rejected. So A_O, B_O, and BA three-spot gourami chips using different packaging with 40 days of storage provide a real difference in the texture of the processed product.

Aroma is a complex and interrelated sensation in processed meat products. Meanwhile, according to Kemp et al., (2009), aroma is the smell of a food product. The smell itself is a response when volatile compounds from a food enter the nasal cavity and are felt by the olfactory system. Volatile compounds enter the nose when humans breathe or inhale them, but can also enter from the back of the throat while a person eats.

Table 5 – Aroma Organoleptic Test Results

Sample	Storage				
	H_0	H_1	H_2	H_3	H_4
A_0	7.9	3.7	3	1.8	1.4
A_1	8	7.6	4.9	5.3	5.3
A_2	8.1	7	7.2	7	7.5

Differences between treatments can be concluded if a sign test is carried out. So the next step is to carry out a sign test for the organoleptic values of the aroma specifications. Based on statistical analysis of the sign test, the aroma values for each treatment are significantly different. This is proven by the value of X^2 table 5% and X^2 table 1% so that H_1 is accepted and H_0 is rejected. So A_O, B_O, and BA three-spot gourami fish chips using different packaging with 40 days of storage provide a real difference in the aroma of the processed product.

DISCUSSION OF RESULTS

The peroxide value in each treatment increased during storage and the peroxide value decreased after 30 to 40 days of storage. The oil content in three-spot gourami crispy triggers oxidation in all treatments during 40 days of storage.

In the treatment without packaging, oxidation had occurred and the highest oxidation occurred at 20 days of storage, whereas at 40 days of storage no further oxidation occurred. This condition in the unpackaged treatment occurs because the crispy shoe is in direct contact with room air so that the oxidation process occurs more easily. The lowest oxidation value was in the vacuum packaging treatment.

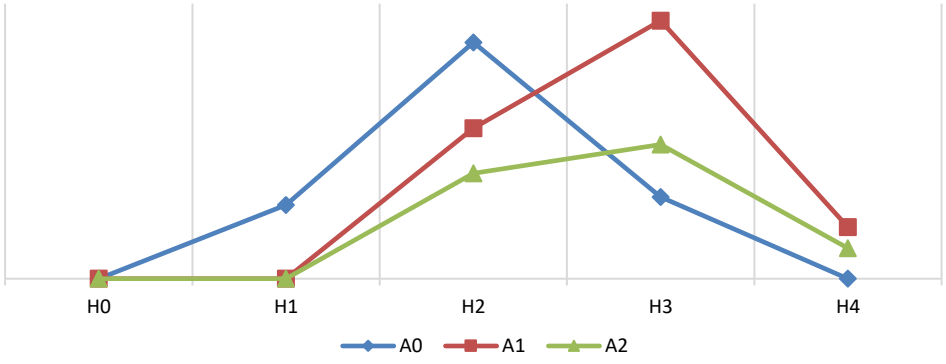

Figure 1 – Peroxide Test Results

Husna and Nurlela (2020), explained that oil in food causes peroxide to form at the oxidation initiation stage, at this stage hydrogen is taken from the oleofin compound to produce free radicals. The presence of light and metal play a role in the process of taking hydrogen. The free radicals formed react with oxygen to form peroxy radicals, which can then take hydrogen from other unsaturated molecules to produce new peroxides and free radicals. Peroxide can speed up the process of developing rancid odors and undesirable odors in food.

A decrease in the appearance value of three-spot gourami crispy occurred in each treatment, especially in the treatment without packaging (H_0). The oxidation process of the fat content of cooking oil greatly influences its appearance value. The growth of mold in the H_0 treatment made the panelists rate it low, namely 1 to 2 after 10 days of storage.

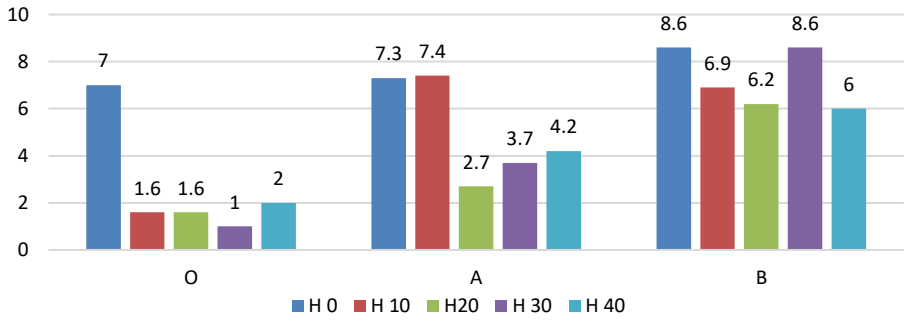

Figure 2 – Appearance Test

Fahmi *et al.* (2015) reported that mold growth in dried fish was caused by an increase in the A_W of the product during storage. This happens because dried fish is in direct contact with room air, causing an increase in the water content because the product has the ability to absorb water content from the air.

A decrease in value also occurred in color organoleptics due to a decrease in quality during 40 days of storage. The growth of foreign objects such as fungi in the H_0 treatment causes a black color on the three-spot gourami crispy. This condition only occurs in the H_0 treatment, but does not occur in the crispy sepat treatment which is packaged either vacuum or non-vacuum.

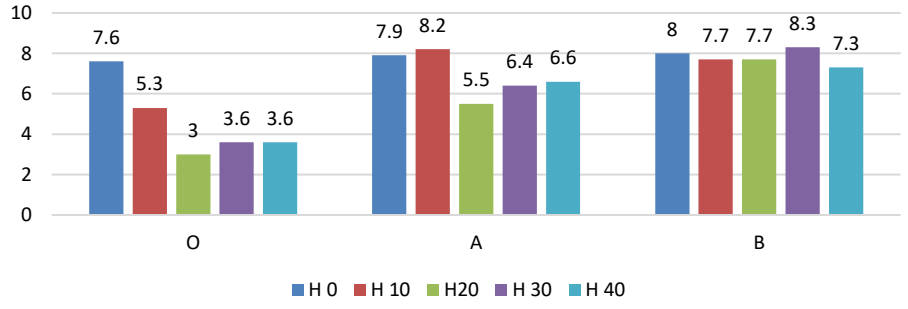

Figure 3 – Color Test

A decrease in texture value occurred in each treatment during 40 days of storage, in line with the increase in peroxide value. Air absorption is likely to occur, causing the crispy biscuits to no longer be dry and crunchy, so the panelists considered that there was a decrease in the texture characteristics to become slightly moist in treatments O (control) and B (non-vacuum packaging).

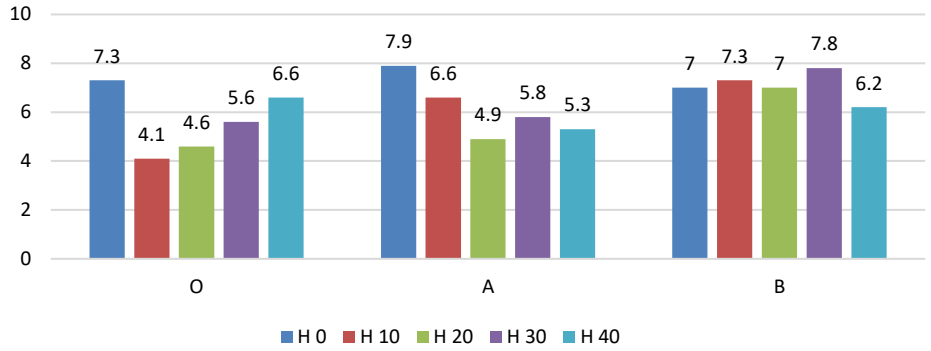

Figure 4 – Texture Test

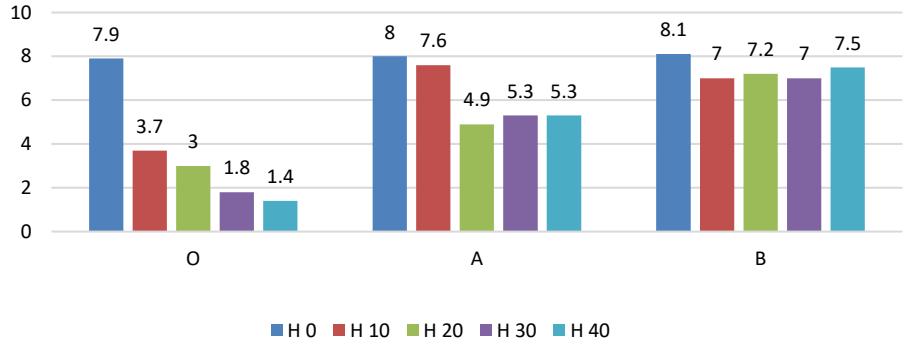

Figure 5 – Scent Test Chart

The crispy astringent aroma became rancid in the H_0 treatment after 10 days of storage but not in the packaging treatment. The high peroxide value in the H_0 treatment produces a rancid odor in the three-spot gourami crispy. Winarno (2004), states that oxidation can be accelerated by the presence of factors such as light, heat, fat peroxides or hydroperoxides, heavy metals such as Cu, Fe, Co, and Mn, porphyrin metals such as hematin, hemoglobin, myoglobin, chlorophyll, and lipoxidase enzymes.

CONCLUSION

Based on the research that has been carried out, it can be concluded that the characteristics of the differences in packaging and storage time for processed three-spot gourami chips (*Trichogaster trichopterus)* in the peroxide test and organoleptic test are stated to be significantly different. The best treatment is in vacuum packaging (B) because it has the lowest peroxide value and the highest value on organoleptic parameters.

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