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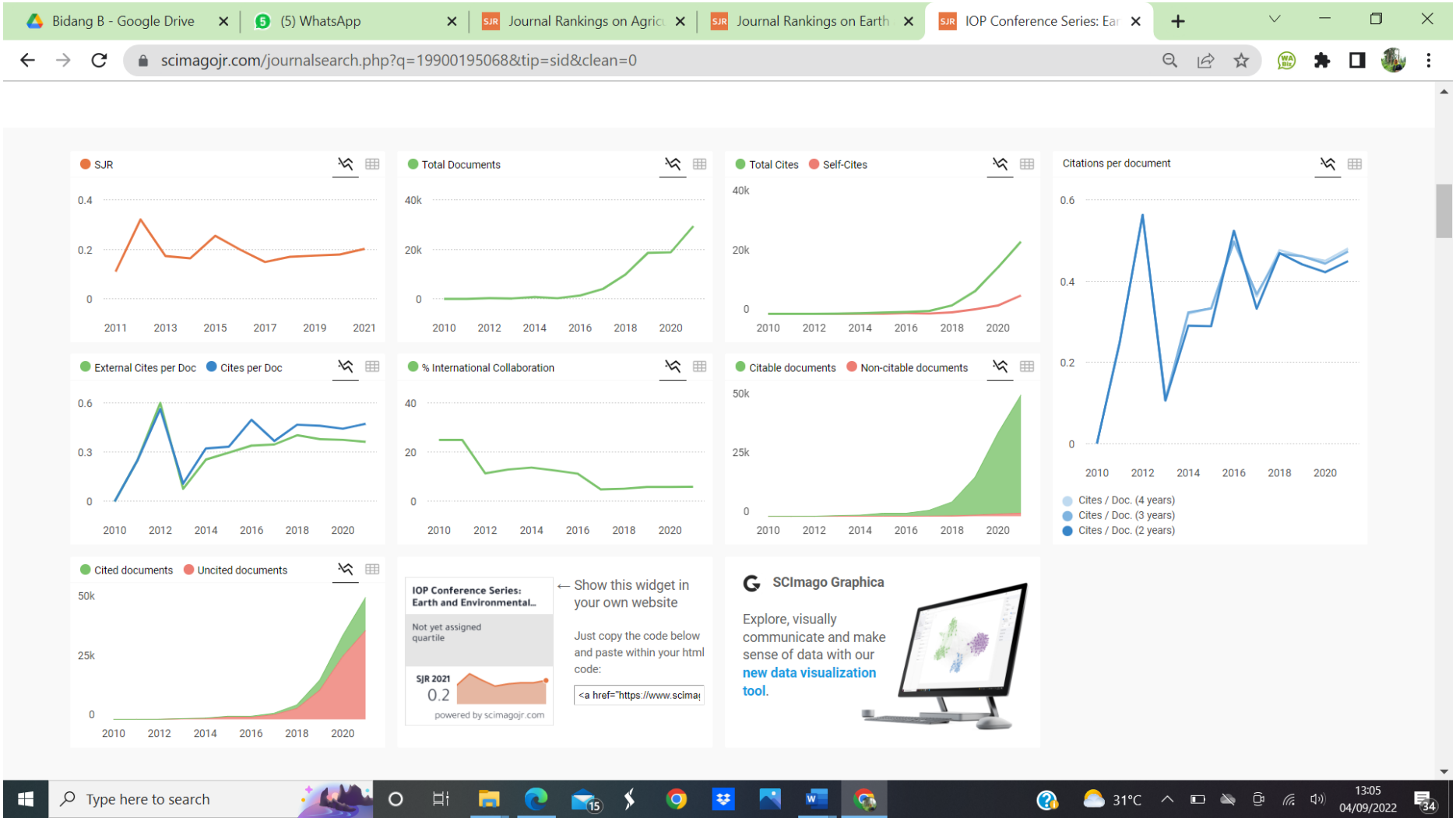
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Physicochemical Analysis of Gouramy Fish Sausage with Kecombrang Edible Coating Addition

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Abstract. Gouramy fish sausage is one of the processed fish meat products that perishable food both physics and chemical caused by microbiology activity. The edible coating is added kecombrang concentration can inhibit physicochemical destruction of gouramy fish sausage during storage. kecombrang plants proved to have antioxidant and antimicrobial compounds that serve to inhibit the destruction of food. The aim of this research is 1. To know the effect of the kecombrang plants concentrates type on the edible coating on the quality of gouramy sausage during storage; 2. To know the effect of concentration of kecombrang concentrate type to the quality of gouramy sausage during storage; 3. To know the effect of interaction between type of kecombrang extract and concentration of kecombrang extract on the quality of gouramy sausage during storage. The research uses a completely randomized design (CRD) with two factors and four variables. The results showed that the concentration of flower concentration added to the edible coating gave good result to gouramy sausage when viewed from the variable of formol value, the treatment of stem rods gave a good result from the hardness variables, the intensity of the color and the pH. It best concentration is given to edible coatings for application in gouramy fish sausage as a preservative is a 4% concentration of concentrated addition of starch in terms of the value of 36.77 flower formol; fruit 45,18; stem 37,47; leaf 47.98 and pH value of 6.93 flowers; fruit 6.90; stem 6.95; leaf 6.91. Edible coating of flower kecombrang with 4% concentration give the best result to gouramy sausage quality that is hardness 1,5 kg/cm^2; color 24,7; pH 6.93 and formol value 36.77%.

1. INTODUCTION

Processing of gouramy is generally still limited and consumed as side dishes. Processing of gouramy into sausage products is one step in food diversification and utilization of gouramy as local fish. Gourami has the advantage to be produced because the price of gouramy is higher than other freshwater fish, so it is economically relatively more profitable. Market demand for gourami is quite high and still not

fulfilled, so that market opportunities are still wide open and can increase the economic value of local products [1].

Sausage is one of the perishable food products because of its high water and protein content, and good environmental conditions for decay microbial growth. According to [2], fish sausages that have been added with food additives (seasonings) have a shelf life of up to 42 days in low temperatures with twice pasteurization and low preservatives.

The role of using edible coatings on food products is widely developed, such as sausage. Edible coating is expected to maintain the quality of food products because it is a barrier to water vapor and the exchange of O2 gas with CO2 [3]. Research on Edible coatings on food has been carried out and proven to be able to extend shelf life and improve product quality. [4] states that edible coating is an environmentally friendly technology that can be applied to various products to control steam transfer, gas transfer and oxidation processes. Another advantage of using edible coating is that some active ingredients can be added to the polymer matrix so as to improve the safety, nutrition and sensory attributes of food products.

Kecombrang is one of the native Indonesian spices that is widely used as an additive to food products. The commonly used parts of this plant are flowers, leaves and stems. Several studies have shown that kecombrang flowers and leaves have antibacterial activity against gram-positive and gram-negative bacteria. [5]; [6]; conducted a study of antioxidant and antibacterial tests of kecombrang leaf extract (Etlingera elatior) as a natural preservative against Escherichia coli and Staphylococcus aureus. From the results of his research, the kecombrang leaf water extract has several compounds which are assumed to be related to the antibacterial ability of the extract, namely the phenolic group, the alcohol group, the monoterpenes and aromatic groups.

Each part of the kecombrang plant contains bioactive substances included in, such as saponins, phenols and polyphenols which can preserve food products [7]. Almost all parts of the kecombrang plant have an active ingredient of polyphenols as antimicrobial substances. In addition, kecombrang plants also contain several phytochemical compounds such as alkaloids, saponins, tannins, phenolics, flavonoids, triterpenoids, steroids, and glycosides which play an active role as antioxidants. [8] explained that bioactive compounds in kecombrang were applied to snake fruit using the CMC-based edible coating method - kecombrang able to extend shelf life to 2-4 days.

The purpose of this study was to: (1) determine the effect of the type of kecombrang concentrate on the quality of gourami sausages during storage; (2)

knowing the effect of the concentration of addition of kecombrang plant concentrate on the quality of gouramy sausages during storage; (3) knowing the interaction effect of the type of kecombrang plant concentrate treatment and the concentration of addition of kecombrang concentrate on the quality of gouramy sausages during storage.

2. RESEARCH METHODOLOGY

Material and experimental design

The materials used in this study were flowers, fruit, stems and leaves of kecombrang obtained from Banyumas and gourami from the wage market, Purwokerto, Whatman No. filter paper. 41, aquades, Carboxymethyl cellulose (CMC), glycerin, buffer 7 solution, physiological sodium chloride (NaCl) salt, Polyethylene (PE) plastic, 96% technical ethanol, potassium oxalate, Indicator Phenolphtalein (PP), 37% formaldehyde, markers, labels, 500 mesh monyl cloth, aluminum foil, and tissue.

The study was conducted using an experimental method with Completely Randomized Design (CRD). The factors studied were the type of kecombrang plant concentrate (B): flower (B1), fruit (B2), stem (B3), leaf (B4), and concentration of addition of thick concentrate (K): 1% (K1), 2% (K2), 3% (K3), 4% K4). The study consisted of 16 combinations of treatments with 2 replications, and added 3 controls for each replication to obtain 38 experimental units. The samples used as controls are sausages without edible coating, edible sausage coating without the addition of kecombrang concentrate, and commercial sausages with synthetic sodium nitrate preservatives "Chicken Sausage brand X".

Gurami fish sausage

The gouramy fillet is washed with running clean water. Then 100 grams of gouramy fillets are ground using a chopper. After being finely added 22% tapioca flour, 23% flour, 8% ice water and 3% cooking oil (b / b) from the total fillets of gouramy meat. The mixing of the material uses the chopper until it is smooth for ± 3 minutes. Filling in the emulsion sleeve is done carefully so its free from air bubbles. After the sleeve is filled with solid dough weighing ± 25 g / sleeve and ± 7 cm long, and tied with a rope. Cooking fish sausages by steaming at 100°C for 20 minutes. Once cooked, the sausage is cooled at room temperature for ± 30 minutes [9].

Concentrated kecombrang plants

Concentration obtained from extraction of stem powder and kecombrang leaves carried out by maceration method, kecombrang powder was extracted with technical

ethanol 96% (1: 8 b / v) while flower powder, fruit and kecombrang leaves were extracted with technical ethanol 96% (1: 4 b / v). The residue is extracted again with technical ethanol 96% (1: 8 b / v) and (1: 4 b / v). The extraction process is macerated at 37 ° C with a rotation speed of 150 rpm for 2-4 hours at each level. After that filtering is done using whatman disc paper No. 1 to obtain the filtrate (extract). The extract is separated from the solvent by evaporation in the evaporator. The solvent is evaporated at a maximum temperature of 50 ° C and the remaining solvent is removed with nitrogen gas. The concentrate obtained was used as a sample to be added to the manufacture of edible coating which was then analyzed [6]; [10]; [11].

***Edible coating* concentrate of kecombrang**

0.5% CMC stabilizer and 1% glycerol added with 100 ml distilled water homogenized by using a hand blender for ± 1 minute. Then the solution is heated in a beaker glass above the magnetic stirrer hot plate until the temperature reaches 70ºC. Furthermore, edible coating was added to the kecombrang concentrate according to the treatment and homogenized using a hand blender ± 2 minutes [12].

Physicochemical analysis

The physical analysis tested was the level of hardness of gouramy sausages using a penetrometer [13], color intensity using a color reader [14], pH of carp using sausage pH meters [15] . While the chemical analysis tested was the level of protein degradation by calculating the formal value of gouramy sausages [16].

Data analysis

The data were analyzed using variance analysis (F test) at the level of 5% then if Duncan's Multiple Range Test at the level of 5% significantly followed it.

3. RESULT AND DISCUSSION

The results of the analysis of the various effects of kecombrang edible coating, plant parts (B), concentrations of kecombrang concentrates (K) and their interaction (BXK) on the quality of gourami sausages during storage are presented in Table 1.

Table 1. The results of the analysis of the variance of the types of concentrated concentrations of adding kecombrang concentrates and their interaction with the quality of gouramy sausages during storage.

No	Variable	Treatment		
		B	K	BXK
1	Hardness	*	*	*
2	Color intensity	*	tn	tn
3	pH	tn	tn	tn
4	Total Phormol	*	tn	tn

Description: B (part of kecombrang plant), K (concentration of kecombrang concentrate), BXK (interaction between part of kecombrang plant and concentration of kecombrang concentrate), *: significant effect; tn: no significant effect

Physicochemical Variable

Hardness

Texture plays an important role as a quality indicator on sausage products. Hardness texture acts as an indicator of acceptance of a food product. The average hardness value of gouramy sausages during storage is shown in Figure 1.

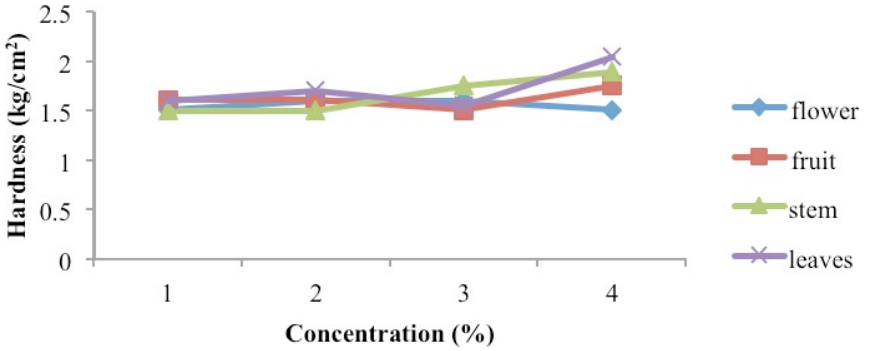

Figure 1. Average hardness value of gouramy sausages during storage with the interaction of type of kecombrang plant concentrate and concentration of addition of kecombrang.

Figure 1 shows that all treatments of the kecombrang concentration experienced an increase in hardness with the higher concentration of addition of kecombrang concentrate. The treatment of increasing the concentration of kecombrang flowers decreased the average value of hardness at a concentration of 4%. While the treatment of fruits and leaves of kecombrang decreased the value of hardness at a concentration of 3% and increased again at a concentration of 4%. The treatment of

the type of stem concentrate continues to increase with the higher concentration of the addition of the concentration of kecombrang stem.

The results showed that during storage of hardness texture figures on gouramy sausages increased, this was due to the content of gouramy sausages, namely proteins and carbohydrates that bind water during the sausage making process. During cooking sausages at high temperatures, protein and carbohydrates bind water, at certain temperatures carbohydrates will experience gelatinization. At low temperature storage, carbohydrates that have undergone gelatinization will be retrogradated, namely the process of re-crystallization of starch that has undergone gelatinization. This is in accordance with [17] which carried out retrogradation at 4 □ for vermicelli making which affected its characteristics. At low temperatures kinetic energy is not high enough to counteract the tendency of amylose molecules to unite, so that amylose molecules will bind again and bind to amylopectin branches at the edges of the granule and form swollen starch grains into a kind of microcrystalline webs and settles [18].

Color intensity

The average color intensity of gouramy sausages that are applied by thick coating tends to increase during storage. Color intensity is one indicator that can be seen from the appearance of a food product. However, to see more clearly the number of color intensities can use a tool that is a color reader to see the right color intensity. The following is the average value of gourami sausage color intensity during storage at ± 4 □ interaction type of kecombrang concentrate with the concentration of addition of kecombrang concentrate (Figure 2).

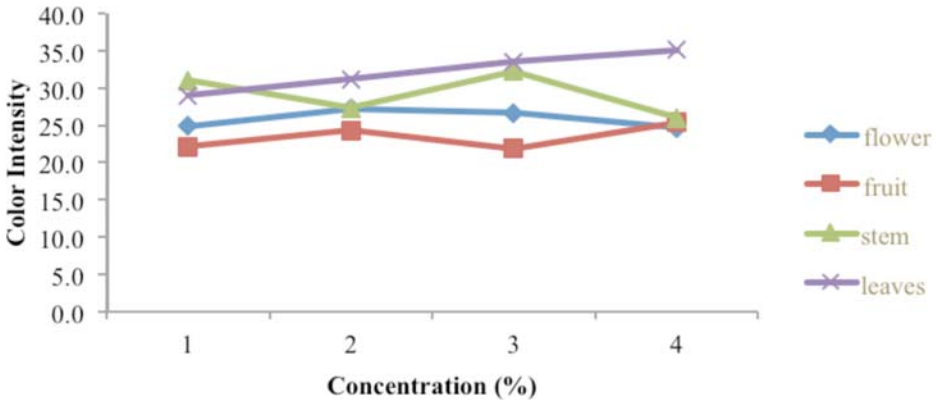

Figure 2. The average value of the color intensity of gouramy sausages interacts with the type of concentrate and the concentration of adding concentrated concentrates during storage.

The results showed that the average value of gourami sausage color intensity changes were not significant, because the color intensity was also influenced by the protein content that caused the maillard reaction and caused the color of the sausage to become darker. So that the addition of concentration during storage is not closely related to the intensity of the kecombrang color. however, compared to other types of concentrate treatment, the treatment of the type of leaf concentrate has a high average value compared to other treatments.

Figure 2 also shows that the type of kecombrang fruit concentrate treatment has the smallest number compared to other types of concentrate treatment. The type of fruit concentrate tends to increase the color intensity number by increasing the concentration of the addition of kecombrang flower concentrate. The treatment of the addition of the type of kecombrang leaf concentrate also increased the color intensity with the higher concentration of addition of the kecombrang leaf concentrate. The highest average color intensity was found in the type of kecombrang leaf concentrate treatment, this was allegedly because the color of the kecombrang leaf concentrate was concentrated and the edible coating produced was also dark green.

While the treatment of the type of flower concentrate has decreased with the higher concentration of addition of kecombrang flower concentrate. The treatment of addition of kecombrang stem concentrate has changed with the combination of the concentration treatment of the addition of kecombrang stems, at a concentration of 4% the number of color intensity is smaller than the other concentration levels. The highest average intensity of color intensity during the storage combination of the type of kecombrang treatment with the concentration of concentrate addition is a concentration of 4% (B4K4) concentration 35.1, while the lowest value is obtained from a combination of types of fruit concentrate treatment with a concentration of 3%, 21.9.

pH

The pH value is one of the important factors in every manufacture of processed fish products. The pH value is strongly influenced by the ingredients used in the manufacture of these products, especially fish meat which is used as the main ingredient. The pH value is very influential on the product characteristics produced such as shelf life, texture and product color [19].

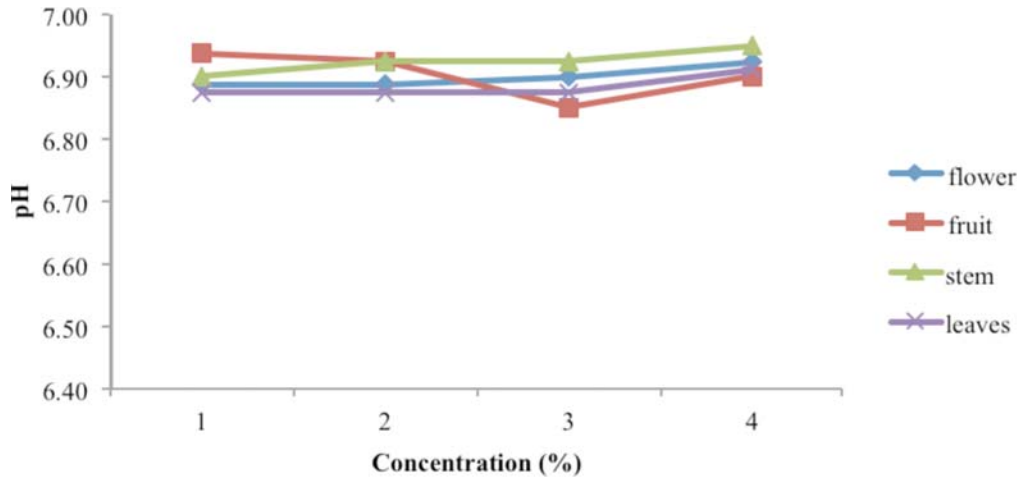

Figure 3. The average pH value of the interaction type of concentrate and the concentration of adding concentrated concentrates during storage.

The results showed a decrease in the pH value of gouramy sausages during storage. During storage there are many activities in food products, one of which is the activity of microorganisms that can damage the sausage component. One microbial activity is the hydrolysis of proteins that produce proteolytic enzymes into acidic organic acids [7]. Microorganisms also move to degrade carbohydrates into simpler compounds that are acidic which can reduce the pH of carp sausages. The longer the microbial storage will be more, one of these microbes can degrade carbohydrates. These microbes can convert carbohydrates into lactic acid, acetic acid, propianic acid, butyric acid, hydrogen and carbon dioxide. So that the pH value of the product goes down or gets more acidic [20].

Figure 3 shows that the type of kecombrang fruit concentration treatment has decreased pH value with the higher concentration of kecombrang fruit concentrate. [20] stated that the decrease in pH value with the higher concentration of kecombrang as a preservative because more H + ions are released by organic acids. In the treatment of the types of concentrates of flowers, stems and leaves of kecombrang tend to be stable with the higher concentration of addition of kecombrang concentrate. this is likely because the kecombrang edible coating has undergone pH neutralization, so the pH value tends to be more stable even though the concentration added is higher. The treatment of the fruit concentrate type still decreases the pH value probably because the taste is more acidic than the other kecombrang plants.

Phormol Value

Determination of the quality of food products can be done by chemical analysis, one of which is formal analysis. Formol analysis is one of the analyzes to find out protein damage in food products. The value of formol can determine the rate or speed of hydrolysis of proteins into simple compounds. The average formol value of the combination treatment of kecombrang plant concentrates with the concentration of adding concentrated kecombrang during storage can be seen in Figure 4.

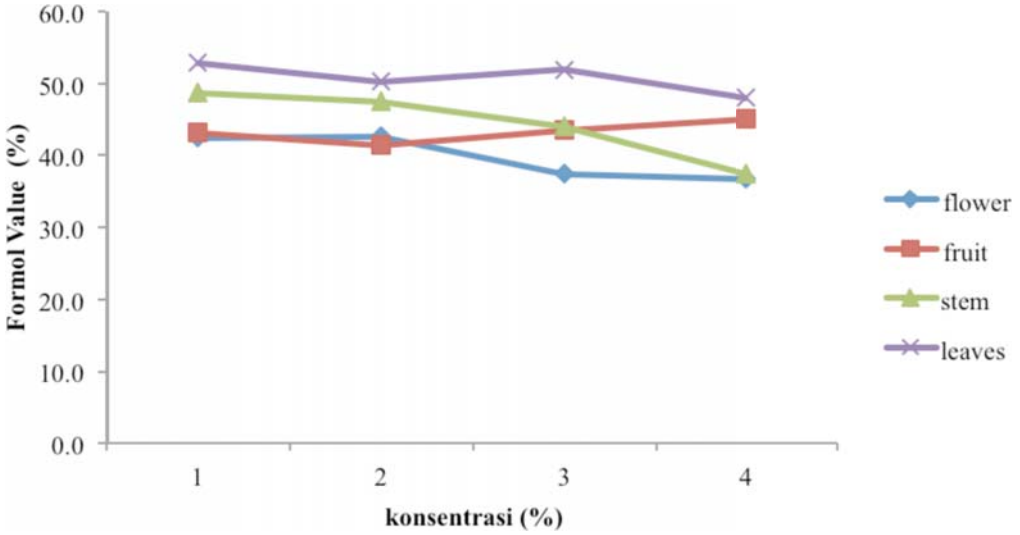

Figure 4. The average formol value of interaction between the type of kecombrang concentrate and the concentration of additive kecombrang during storage.

Figure 4 shows that the treatment of types of concentrates of flowers, stems and leaves of kecombrang decreased the value of formol with the higher concentration of addition of concentrates of flowers, stems and leaves of kecombrang. [21], states that increasing the concentration of kecombrang as a preservative can inhibit microbial activity so that it can reduce the value of formol. While the treatment of the type of kecombrang fruit concentrate tends to increase the value of formol with the higher concentration of addition of kecombrang fruit concentrate. This is presumably because the active ingredient in flowers, stems and leaves is more active in inhibiting the hydrolysis of proteins by microbes. Kecombrang fresh flowers produce fewer components of antimicrobial compounds than kecombrang powder [22]. According to

[23], kecombrang flowers have many active ingredients that can be used as antioxidants and antimiroba, namely alkaloids, flavonoids, polyphenols, terpenoids, steroids, saponins, and essential oils [24].

Based on the results of the research, the average value of gouramy sausage formol has increased during storage. This is presumably because the longer the storage of microbial growth activity increases, so that many proteins are degraded during storage. The content of the active ingredient kecombrang in edible coating increasingly according to its activity as an antimicrobial with longer storage, so it is not able to inhibit the metabolic activity of microbes [20]. Not only on the flowers, but also kecombrang leaves can minimize damage to gouramy products and their processed products especially on microbial growth [25] [26]. According to [27], real decay is the decomposition of proteins that break down proteins into peptones, then polypeptides into peptides are broken down again into amino acids and continue into carbonyl compounds, carboxylic acids, NH3, H2S, indole and foul-smelling skatol.

4. CONCLUSION

The type of kecombrang flower concentrate added to edible coating gives good results for gouramy sausages from the formol value variable, the kecombrang stem treatment gives good results in terms of the variables of hardness, color intensity and pH. The best concentration given to edible coatings for application to gouramy sausages as preservatives is a concentration of 4%, the addition of kecombrang concentrate in terms of the formol value of 36.77%; fruit 45.18%; stem 37.47%; 47.98% leaves and pH value of 6.93; fruit 6.90; stem 6.95; leaf 6.91. Kecombrang flower edible coating with a concentration of 4% gave the best results on the quality of gouramy sausages based on the effectiveness index of 1.5 kg / cm2 hardness; color 24.7; pH 6.93 and formol value 36.77%.

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