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QUALITY OF CRISPY SEASONED FLOUR WITH TUMANG SAGO SUBSTITUTION (*Mexroxylon sago* Rottb) AS A SUBSTITUTE FOR WHEAT FLOUR AND ITS APPLICATION IN BROILERS

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ABSTRACT

The utilization of local resources such as tumang sago flour is needed to be conducted to increase diversification of local food with superior quality. This study aims to determine the physicochemical and functional quality of crispy seasoned flour using tumang sago substitution. In addition, the sensory quality of the chicken crispy is also checked using those spiced flour. Tumang sago flour was obtained by drying the sago under the sun until it was dry and then sifted using a 100 mesh sieve. This study used a total of 5 treatments with 5 times. Four treatments were applied namely control (without substitution of sago tumang flour); 10%; 20%; 30% and 40% of sago tumang flour. Observations were made on the crispy seasoning flour, among others: Water Content (SNI-01-02891-1992); Crude Fiber Content (Sudarmadji *et al*. (1997); Water Holding Capacity (Subagio, 2006); Oil Holding Capacity (Subagio, 2006); Color (L, a and b) (Digital Colorimeter), while the sensory test chicken crispy (color, aroma, crunch, taste and acceptability). Data on physicochemical quality and color using a digital colorimeter were analyzed using a completely randomized design with a unidirectional pattern, while the quality of crispy chicken accessories was analyzed by Kruskall Wallis' Non-Parametric analysis. If there is a real effect, then Duncan's test is continued. The results showed that the quality of seasoning flour is moisture content (12.518-15.208%), crude fiber content (0.396-2.138%), WHC (64.606-89.855%), OHC (96.373-115.498%), L (87.677-93.330), a (2.153-2.697), b (5.630 – 7.743), while the sensory quality of crispy chicken is color (1.57-4.29), aroma (2.00-4.14), crispy (3.57-3.86), taste (2.86-3.86) and receptivity (2.57-4.00). The addition of Tumang sago flour in different percentages had a significant effect ($P<0.05$) on water content, crude fiber content, WHC, OHC, color (digital colorimeter), color sensory parameters, scent and acceptance of crispy chicken. In conclusion, the best treatment in this study was seasoned flour with the addition of 10% sago flour.

Key words: Seasoning flour; substitution, tumang sago flour; crispy chicken sensory

INTRODUCTION

Crispy chicken is broiler chicken that is coated with seasoning flour with a certain formula. Seasoned flour is a mixture of flour and spices with a certain formula that can be applied to chicken, shrimp, squid, fish and other food ingredients. The use of spice flour which is very practical in cooking makes this spice flour very popular and this crispy product is very popular among all people. The development of fast food restaurants serving crispy chicken is very fast in line with the development of fried chicken seasoning flour products.

Crispy chicken is a piece of chicken meat coated with flour that has been mixed with spices so that the chicken becomes more delicious with a mixture of spices mixed with flour and is also crunchy (crispy). Currently, seasoned flour has been modified so that it not only offers taste, but also the uses of each of these spice flours (Sejati, 2010). The highest percentage of raw materials as flour used for seasoning flour is wheat flour, but Indonesia must import wheat from other countries to meet domestic needs. An alternative to overcome this problem is the use of local raw materials to replace flour in food products with local carbohydrate sources that can be used as a substitute for wheat.

Many researches on the manufacture of seasoned flour have been carried out, including: fried chicken seasoning flour based on modified cassava flour (Rahman *et al*., 2017); characterization of mocaf-based seasoning flour (modified cassava lour) with the addition of cornstarch and rice flour (Anwar, 2016); product development of fried chicken seasoning flour from sweet potato flour modified (Rahman and Maulana, 2017)Based on the results of the Sejati research (2010), the results of the application of seasoned flour using 100% wheat flour on chicken were not as desired, the chicken became mushy and not crispy after it cooled down. In addition, the seasoning on the crispy chicken lacks taste, even though pepper, garlic powder and coriander have been added. Therefore, it is necessary to formulate by mixing wheat flour with other flours. Therefore, it is very likely to take advantage of local resources in the manufacture of seasoned flour with wheat flour substitutes, one of them is sago tumang.Tumang sago flour *(Mexroxylon sago* Rottb) is a locally processed food ingredient that can be an alternative as a flour ingredient in seasoned flour. Sago flour has a water content of about 10.44%, a starch content of 53.73%, amylose content of 2.27%, and an amylopectin content of 52.425 (Sudirman *et al*., 2018). High levels of amylopectin will cause rapid gelatinization if stirred sago flour is added to hot water. How is the quality of Tumang sago flour when used as a substitute for wheat flour in crispy seasoned flour, it must be studied to get crispy flour that is liked by the public.

MATERIALS AND METHODS

Tools and Materials

The tools used in the research process include basins, sieves, spoons, digital scales, stoves, pans, stopwatches, porcelain dish, oven, desiccator, erlenmeyer, autoclave, vortex, as well as tools used in sensory testing. Raw materials used in wheat flour, Tumang Sago flour, broiler chicken, garlic powder, pepper powder,

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salt, baking soda, flavoring, seasoning, paprika powder, cooking oil, gas, aquades, H_2SO_4 0.325 N, NaOH 0.313 N, Whatman No 41, cooking oil, as well as for sensory testing.

Stages of Research

This experimental study used a total of 5 treatments with 5 times. The treatment used without the addition of tumang sago flour as a control (A1), substitution of Tumang Sago flour as much as 10% (A2), 20% (A3), 30% (A4) and 40% (A5) with 5 replications. The formula for Spiced Sago Crispy Flour can be seen in the Table 1. The research procedures were as follows. The first stage was the preparation of seasoned flour. The seasoned flour was made by weighing all the raw and additional materials as shown in Table 1.

The materials were then mixed in a basin and stirring until well-blended. The second stage was the application of seasoned flour on broilers. The seasoned flour consisted of dry and wet seasoned flour.

Table 1. Crispy Seasoned Flour Formulation

Ingredient (gram)	Control (A1)	A2	A3	A4	A4
Flour	1000	900	800	700	600
Tumang Sago Flour	0	100	200	300	400
Garlic powder	20	20	20	20	20
Pepper powder	5	5	5	5	5
Salt	10	10	10	10	10
Baking soda	5	5	5	5	5
Flavoring	60	60	60	60	60
Seasoning	2,5	2,5	2,5	2,5	2,5
Paprika Powder	10	10	10	10	10

Dry seasoned flour is the flour that has been made in the previous stage, while the wet seasoned flour is the flour consisting of 200 g flour and 750 ml of water (1). The chicken meats were first cleaned of unwanted tissue and then cut into the same size. They were then washed again until clean and set aside, (2). Dip in dry flour until all parts were covered with dry seasoning flour, then transfered to wet flour that has been prepared in advance. After all parts of the chicken meats were coated with wet flour, they were then drained and transferred to dry seasoned flour, (3). The frying process was carried out by using cooking oil, for 6 minutes, draining the oil after the meat was cooked until no oil drips.

Observations were made on the crispy seasoning flour, among others: Water Content (SNI-01-02891-1992); Crude Fiber Content (Sudarmadji *et al*. (1997); Water Holding Capacity (Subagio, 2006); Oil Holding Capacity (Subagio, 2006); Color (L, a and b) (Digital Colorimeter), while the sensory test on the application sample Crispy seasoning flour in broilers is color, aroma, crunch, taste and acceptability.

Water Content (SNI-01-02891-1992)

Approximately 2 gram of the samples were put into a porcelain cup and the weight was known, dried in an oven (105° C) for 1 hour then put in a desiccator, after reaching an equilibrium temperature and then weighed. Drying and weighing were repeated until a constant weight was obtained. The rest of the sample was calculated as the weight of solids and the weight lost as the water content.

Crude Fiber Content (Sudarmadji *et al*., 1997)

Approximately 2 g of samples were put into a 300 ml Erlenmeyer then added 100 ml of 0.325 N H2SO4. Hydrolyzed was performed by using autoclave for 15

minutes at 105ºC. After cooling the sample, 50 ml of 0.313 N NaOH was added, then hydrolyzed again for 15 minutes. The sample was filtered through Whatman filter paper No.41, which has been dried and calculated its weight. The filter paper was washed successively with heat and then 25 ml of 0.325 N H2SO4. Then with hot water with the last with 25 ml of 95% ethanol. The filter paper was dried in an oven at 105ºC for one hour until the weight was constant.

$$= \frac{\text{The weight of filter paper and sample – the initial weight of filter paper}}{\text{The initial weight of sample}} \text{ x100\%}$$

Water Holding Capacity (Subagio, 2006);

Weighing the bottle (a gram). One gram of the spice flour sample was put into the bottle (b gram). Aquadest as much as 7x the weight of the sample was added. Homogenization was performed using vortex and centrifuged at 2000 rpm for 5 minutes. The supernatant was removed slowly and the precipitate was weighed (c gram). The water holding capacity was calculated using the following formula.

$$\text{WHC} = \frac{(c-a)-(b-a)}{(b-a)} \text{ x } 100\%$$

Note:
a = centrifuge bottle weight (g)
b = sample weight + bottle (g)
c = sediment weight + bottle (g)

Oil Holding Capacity (Subagio, 2006);

Weighing the bottle (a gram). One gram of the spice flour sample was put into the bottle (b gram). Aquadest as much as 7x the weight of the sample was added. Homogenization was performed using vortex and centrifuged at 2000 rpm for 5 minutes. The supernatant was removed slowly and the precipitate was weighed (c gram).

$$\text{OHC} = \frac{(c-a)-(b-a)}{(b-a)} \text{ x } 100\%$$

Note:
a = centrifuge bottle weight (g)
b = sample weight + bottle (g)
c = sediment weight + bottle (g)

Color (L, a and b) (Digital Colorimeter)

Before used, the color reader was calibrated with a standard using a white paper. Then, the sample was placed in a cup and determines the five points to be measured to determine the L, a, and b values of the sample.

Sensory Test Chicken Crispy.

The sensory test on the application sample Crispy seasoning flour in broilers is color, aroma, crunch, taste and acceptability. The numerical rating scale was 1 – 5. The sensory test was carried out by 7 trained panelists. Data on physicochemical quality and color using a digital colorimeter were analyzed using a completely randomized design with a unidirectional pattern, while the quality of crispy chicken accessories was analyzed by Kruskall Wallis' Non-Parametric analysis. If there is a real effect, then Duncan's test is continued.

RESULTS AND DISSCUSION

Chemical and Functional Quality

Chemical and Functional Test Results of Crispy Seasoning Flour can be seen in the Table 2. In Table 2. Above, it can be seen that the results of the moisture content test of crispy spice flour had a significant effect ($P < 0.05$).

The results also showed that treatments A1 and A5 were significantly different ($p<0.05$) with other treatments, while treatments A2, A3 and A4 had no difference. This is due to the addition of sago flour with different amounts causing

differences in the moisture content of seasoning flour. The moisture content of Tumang Sago Flour based on the test results is 13.37% while the moisture content of Wheat Flour is around 14.33% (Alfisah, 2020).

Table 2. Result of Chemical and Functional Test

Parameter	A1	A2	A3	A4	A5
Moisture Content (%)*	15.208±0.204[a]	12.531±0.037[b]	12.518±0.059[b]	12.6883±0.141[b]	13.037± 0.240[c]
Crude Fiber Content (%)*	0.396±0.008[a]	1.622±0.044[b]	1.145±0.039[c]	2.138±0.038[d]	0.290±0.001[e]
Water Holding Capacity (WHC) (%)*	64.606±0.178[a]	89.252±2.855[c]	89.855±2.172[c]	67.523±2.304[a]	78.745±1.017[b]
Oil Holding Capacity (OHC) (%)*	96.373±0.353[a]	107.726±0.664[b]	115.498±3.078[c]	97.112±0.549[a]	108.312±2.305[b]

Note: different superscripts on the same line show significant differences (P<0.05)

Crude fiber content showed that all treatments were different (P<0.05) from one another. This difference is due to the addition of different sago flour. Rosida (2019) stated that Tumang sago flour with a moisture content of 14.8% has a crude fiber content of around 1.7%. Furthermore, it is explained that the chemical composition of Tumang Sago varies greatly and the most influential factor is the processing process.

The quality of WHC showed that the 40% substitution of Tumang sago was different (P<0.05), while the WHC quality of the crispy seasoned flour without substitution was the same as that of the 30% Tumang sago substitution as well as the 20% Tumang sago substitution which was equal to 30%. In Table 1 it can be seen that the more sago flour the lower the WHC value. The results of this study are the same as those of Anwar *et al*., (2016) based on Mocaf (Modified Cassava Flour) with the addition of cornstarch and rice flour. They found that the less cornstarch and the more rice flour, the higher the WHC value. The increase in the WHC value of seasoned flour was due to the less protein composition in the spice flour formulation with the increase in the addition of sago flour. Water absorption is influenced by protein quality and polar amino acid content in flour protein (Hastuti, 2014).

The OHC quality of crispy seasoned flour showed that the 30% substitution of Tumang sago flour was different (P<0.05) with other treatments. The treatment without substituted Tumang Sago had the same OHC quality as the seasoning flour substituted with 30% Tumang Sago. The same thing happened to the substitution treatment of 10% and 40% of Tumang Sago flour. The results of research by Anwar *et al*. (2016) give the results that it is seen that the lower the use of flour rice, the lower the OHC value of the seasoning flour.

Color Quality

Color analysis with the Hunter system uses a Hunter colorimeter with parameters L, a, dan b. The maximum value for L is 100 reflecting perfect diffuser reflection (white). The minimum value for the L parameter is zero indicating black. The positive a parameter value is red and the negative is green. The positive b parameter values are yellow and negative ones are blue.

Table 3. Result of Color Test with Digital Colorimeter

Parameter	A1	A2	A3	A4	A5
Color					
L*	93.330±0,386[a]	90.483±0,294[b]	88.683±0,18[c]	89.437±0,447[d]	87.677±0,095[e]
a*	2.617±0.191[a]	2.697± 0,125[a]	2.153±0,114[b]	2.970± 0.035[c]	2.477±0.099[a]
b*	5.630±0.115 [a]	6.977±0.046[b]	7.030± 0.700[b]	7.560±0.288[c]	7.743±0.060[c]

Note: different superscripts on the same line show significant differences (P<0.05)

The color quality of L showed that all treatments were different (P<0.05) from one another. The quality of color an obtained by substitution treatment of 20% and 30% was significantly different (P<0.05) with other treatments.

The quality of color b showed that without the addition of tumang sago flour was significantly different (P <0.05) with other treatments, while the 10% substitution treatment was the same as the quality of color b with the 20% substitution treatment of tumang sago flour. The same thing with the substitution treatment of 30% with 40%. This color difference is due to the addition of different percentages of Tumang Sago flour. The color of the flour used is grayish white.

Crispy Chicken Sensory Quality

Sensory evaluation was conducted by 7 (seven) best-selling panelists. The panelists are Small and Medium-sized Enterprises (SMEs) and sellers of crispy chicken. The results of the Crispy Chicken Sensory Test can be seen in the Table 4.

Table 4. Result of Crispy Chicken Sensory Test

Parameter	A1	A2	A3	A4	A5
Color*	4.29 ±0.76[a]	4.29±0.76 [a]	3.43±0.79[b]	2.57±0.53[c]	1.57±0.79[d]
Aroma*	4.14±0.69[a]	4.00±0.58 [a]	3.57±0.53[a]	3.29±0.76[a]	2.00±1.15[b]
Crispy	3.71±0.95	3.86±1.07	4.14±0.37	3.86±0.69	3.57±0.96
Taste	3.86±0.38	3.86±0.69	3.86±0.69	3.71±0.76	2.86±1.35
acceptability*	3.86±0.38[a]	4.00±0.58[a]	3.86±1.08[a]	3.29±0.95[b]	2.57±1.13[b]

Note: different superscripts on the same line show significant differences (P<0.05)

The results of the Kruskal Wallis Non-Parametric Analysis showed that the treatment had a significant effect (P<0.05) on the color, aroma and acceptability parameters, while the crispy and taste parameters had no significant effect. The results of the Duncan test of color parameters showed that treatment A1 had the same color properties as A2, while the two treatments were different from A3. A4 and A5. The treatments of A3. A4 and A5 were different (P<0.05) from each other. The color rating score used 1). Dark brown/black. 2). Dark brown. 3). Chocolate. 4). Light brown and 5). Light brown/golden brown. The results of the aroma assessment obtained were at a score of 4.29 - 1.57 which means light brown - slightly dark brown. This is probably due to the addition of sago flour which is gray in color which causes the higher the addition of Tumang sago flour. the color of the crispy chicken tends to be slightly darker brown.

Aroma test showed that treatment A5 was different (P<0.05) with other treatments. This may be due to the addition of Tumang Sago Flour with a different presentation. The results of the aroma sensory parameter test in Table 4 show that treatments A1, A2 and A3 have a crispy chicken aroma that tends to be delicious, treatment A4 is slightly tasty and treatment A5 tends to be unpleasant. This means that the panelists do not like the smell of crispy chicken which uses seasoned flour with Tumang Sago substitution as much as 30% and 40%. The results of the analysis

showed that there was no difference between treatments on the parameters of crispy and taste. The panelists considered that the crispy chicken samples in this study were crispy with a slightly good and tasty taste. For the acceptability test, the results showed that the treatment of A1 was the same as A2 and A3 but different ($P<0.05$) with A4 and A5 and the treatment of A4 was the same as consumer acceptance with A5. Panelists like treatment A1. A2 and A3 but rather like treatment A4 and A5.

During the organoleptic test, direct interviews were also conducted with the panelists. There are several panelists who already know that sago flour can be used as a raw material for making crispy chicken seasoning flour but have never tried it and some don't know it. The panelists also said that the addition of Tumang Sago flour to the seasoning flour gave the chicken a unique taste of crispy.

CONCLUSION

The conclusion of this research is that the substitution treatment for Tumang Sago flour is 0%; 10%; 20%; 30% and 40% produce the same level of crunch and taste. The best quality of crispy chicken is found in chicken that is given seasoning flour with 10% substituted for sago flour.

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REFERENCES

Alfisah, L. N. (2020). *Pengendalian Mutu Kadar Air Produk Cakra Kembar Emas Di PT ISM TBK Divisi Bogasari*. Supervisor Jaminan Mutu Pangan.

Anwar, M. A., Windrati, W. S., & Diniyah, N. (2016). Karakterisasi tepung bumbu berbasis mocaf (Modified Cassava Flour) dengan Penambahan Maizena Dan Tepung Beras. *Jurnal Agroteknologi*, *10*(2), 167–179.

Badan Standardisasi Nasional. (1992). *Cara Uji Makanan dan Minuman*. BPS.

Eliasson, A., & Gudmundsson, M. (2006). *Starch: Physicochemical and Functional Aspects. Dalam: Carbohydrates in Food* (A. Eliasson (ed.)). CRC Press.

Hastuti, F. (2014). *Produksi Tepung Fungsional Termodifikasi (TFT) Koro Kratok (Phaseolus lunatus L.) Kajian pH dan Waktu*. Universitas Jember.

Moraru, C. I., & Kokini, J. L. (2003). *Nucleation and Expansion during Ex trusion and Microwave Heating of Cereal Foods.* Comprehensive reviews in food Science and Food Safety.

Rahman, T., & Maulana, C. (2017). Pengembangan Produk Tepung Bumbu Ayam Goreng Dari Tepung Ubi Jalar Termodifikasi. *Prosiding SNaPP2017 Sains Dan Teknologi*, 309–315.

Rahman, T,, Erwan, R. C., Herminiati, A., Turmala, E., & Maulana, C. (2017). Formulasi dan evaluasi sensori tepung bumbu ayam goreng berbasis tepung singkong termodifikasi. *JURNAL PANGAN*, *26*(2), 153–166.

Rosida, D. F. (2019). *Inonasi Teknologi Pengolahan Sagu* (1st ed.). CV. Mitra Sumber Rejeki.

Sejati, M. K. (2010). *Formulasi Dan Pendugaan Umur Simpan Tepung Bumbu Ayam Goreng Berbahan Baku Modified Cassava Flour (Mocaf)*. IPB University.

Subagio, A. (2006). *Ubi Kayu: Subtitusi Berbagai Tepung-Tepungan*. Food Review.

Sudarmadji, S. B., Haryono, & Suhardi. (1997). *Prosedur Analisa untuk Bahan Makanan dan Pertanian*. Liberty.

Sudirman, N. A., Sukinah., & Yanto, S. 2018. Pengaruh pengeringan menggunakan *Room Dryer* terhadap kualitas tepung sagu. JurnalPendidikan Teknologi Pertanian, *19*(20), 104-112