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The Effect of Various Types of Natural Sweeteners in Agar with Rice Bran Addition on Organoleptic and Physicochemical Characteristics

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***Abstract*— This research was conducted in two stages, namely the first stage, looking for the best concentration of natural sweetener with organoleptic. Second stage analyzed the physicochemical characteristics using the best concentration of first stage. This research was carried out using a Completely Randomized Design, with various natural sweeteners consisting 6 levels, namely: stevia sweetener (0.05%, 0.75%, 0.10%), sorghum sugar (10%, 15%, 20%), corn sugar (10%, 15%, 20%), coconut sugar (14%, 15%, 16%), palm sugar (7.5%, 10%, 12.5%), and honey (15%, 25%, 35%) and 3 replications so that 18 experimental units. The addition of various types of natural sweeteners significantly affected the hedonic test (taste and overall acceptance), water content, pH, total dissolved solids, total sugar, and color but did not significantly affect the hedonic quality test (texture), hedonic test (texture and color), crude fiber content, syneresis and gel hardness.**

***Keywords*— Agar, Natural Sweeteners, Rice Bran**

I. INTRODUCTION

Functional food is processed food that has one or more food components which, based on scientific studies, have certain physiological functions outside their basic functions, are proven to be harmless, and beneficial to health (BPOM, 2005). The commodity that gets attention as functional food is rice bran. Rice bran is one of the byproducts of the rice milling process. Rice bran has a fiber content in the form of cellulose of 8.7-11.4% and hemicellulose of 9.6-12.8% (Azzmi, 2012).

Utilization of rice bran as processed food has not been done much. Therefore, making processed food from rice bran needs to be done, one that can be made is agar products. The addition of rice bran can increase fiber content in agar and can make agar products enriched with secondary metabolites in the form of saponins, alkaloids, tannins, and flavonoids (Moko et al., 2014), but rice bran has a bitter taste aftertaste. Bitter taste is caused by the presence of saponin in rice bran (Kusumastuti and Ayustaningwarno, 2013).

So far, the use of cane sugar in making agar products is not good for health because cane sugar has a glycemic index of 75, while the limit of glycemic sugar levels that are good for health is 40 (Yanto et al., 2015). Therefore, it is necessary to add natural sweeteners with a low glycemic index but can cover the aftertaste produced from bran.

Research into making sweet pineapple jelly drink with the addition of stevia sugar with two factors. Concentration of carrageenan consisting of three levels of 0.075%; 0.085% and 0.095% and stevia sugar concentration consisting of three levels of 0.05%; 0.075% and 0.1%. The best results are carrageenan concentration of 0.085% and stevia sugar concentration of 0.075% which is the combination that produces pineapple jelly drinks that are most favored by panelists (Cyntia, 2018).

The sugar content of sorghum mainly comes from fructose and cellobiose so that sweeteners made from sorghum can be consumed by diabetics without causing side effects, but the starch content of the sorghum sap is relatively high so that it inhibits the crystallization process of sorghum sap into crystalline sugar (Irawan and Sutrisna , 2011).

Corn sugar is glucose taken from corn. Sweet corn has a relatively high sweet taste but low fat content, so it is suitable to be processed into sugar for diabetics. The sweet taste of corn sugar is around 5-6% which is more than ordinary corn flavor with sugar content of 2-3% (Sirajuddin, 2010).

Research on making jelly drinks with the addition of coconut sugar with a concentration of 14%; 15%; 16%. From the research it was concluded that jelly drinks using liquid coconut sugar and coconut sugar with concentrations of 15% and 16% are generally preferred by panelists, but jelly drinks that use coconut sugar with a

concentration of 14% are less favored by panelists (Yanto et al. 2015).

Research on nata de seaweed (*Eucheuma cottonii*) with a difference in seaweed concentration of 1%; 2%; 3% and palm sugar concentration 7.5%; 10%; 12.5%. Based on the pair differentiation test that has been done, the results show that there are no differences in appearance, aroma and taste between nata de seaweed and nata de coco commercial (Syukroni et al. 2013).

Research on making tomato velva (*Lycopersicum esculentum* Mill) with honey sweetener with a concentration of 15%; 25% and 35%, shows that the sweetness intensity test of tomato velva with 15% honey concentration has a lower sweetness level than 25% sucrose, while tomato velva with 25% honey concentration and 35% has a higher sweetness level than sucrose 25 % (Sapriyanti et al. 2014).

The research aims to determine the best concentration of various types of natural sweeteners and determine the effect of various types of natural sweeteners on agar with the addition of bran to organoleptic and physicochemical properties.

II. Material and Methods

A. *Material*

The materials used are rice bran from the rice mill of Tunas Harapan Farmer Group, Muaro Jambi Regency, agar powder, water, vanilla, sweetener stevia, sorghum sugar, corn sugar, coconut sugar, palm sugar, and honey. Materials for chemical analysis are standard buffer pH 4 and pH 7, aquadest, HCl 25%, NaOH, phenolphthalein, phenol 5% solution, sulfuric acid, H_2SO_4 0.3 N and Whatman filter paper No. 41.

B. *Methods*

Stage I. Preparation of agar with the addition of bran (Mithania, 2017 with modification) for organoleptic testing.

Rice bran for 10 minutes is roasted at a temperature of 80-90ºC, sieved using a 100-mesh sieve. 325 mL of water is heated. After that, natural sweeteners are added according to their treatment and concentration which can be seen in **Table 1**, commercial agar powder as much as 3.5 g, vanilla 0.5 g, and roasted rice bran as much as 15 g. All ingredients are stirred until boiling. The agar is poured into a plastic cup and allowed to stand until it hardens. After that the organoleptic test was carried out to get the best concentration of each treatment.

Table 1
Types and Concentrations of Natural Sweeteners

Types of Natural Sweeteners	Consentration (%)
Stevia sweetener	0,05; 0,075; 0,10
Sorghum sugar	10; 15; 20
Corn sugar	10; 15; 20
Coconut sugar	14; 15; 16
Palm sugar	7,5; 10; 12,5
Honey	15; 25; 35

Stage II. Making agar with the addition of bran (Mithania, 2017 with modification) for analysis. Preparation of agar is the same as stage I, but at this stage it uses the best concentration of each type of natural sweetener. The best concentration can be seen in table 2.

Table 2
The Best Concentrations of Natural Sweeteners

Types of Natural Sweeteners	Concentration (%)
Stevia sweetener	0,10
Sorghum sugar	20
Corn sugar	20
Coconut sugar	16
Palm sugar	12,5
Honey	35

Table 3
Hedonic Quality Test Score and Hedonic Test Score

Skor	Parameter				
	Texture (Hedonic Quality)	Texture	Color	taste	Overall acceptance
7	-	Really like	Really like	Really like	Really like
6	-	Like	Like	Like	Like
5	Very easily Break	Rather like	Rather like	Rather like	Rather like
4	Easy to break	Neutral	Neutral	Neutral	Neutral
3	Somewhat easily broken	Somewhat like	Somewhat like	Somewhat like	Somewhat like
2	Not easily Broken	Dislikes	Dislikes	Dislikes	Dislikes
1	Very easy to break	Very dislike	Very dislike	Very dislike	Very dislike

C. *Parameter Analysis*

Organoleptic Test

Organoleptic test was carried out in the first stage of research to get the best concentration of each treatment. The panelists used were 30 trained panelists who were from Agricultural Product Technology students, Faculty of Agricultural Technology, Jambi University. Panelists were asked to provide an assessment of the hedonic quality test (texture) in the range of 1-5 scale and the hedonic test (texture, color, taste and overall acceptance) in the range of scale 1-7 which can be seen in Table 3.

Water content

The aluminum dish is roasted for 15 minutes and cooled in a desiccator for 10 minutes, then

weighed. The sample was weighed as much as 2 g in a cup. The cup and contents are 105 ° C for 6 hours. The cup is transferred to the desiccator and then dried and weighed. The cup and its contents are dried again until a constant weight is obtained. Moisture content is calculated by the equation:

$$Water\ content\ (\%\ b/b) = W - \frac{(W_1 - W_2)}{W}\ x\ 100\%$$

Information:
W = weight of sample before drying (g)
W1 = sample weight and dry cup (g)
W2 = empty cup weight (g)

Acidity (pH)

The pH meter is calibrated using a buffer solution of pH 4 and pH 7. The electrodes are rinsed with distilled water and dried. The crushed sample of 5 g was put into a 25 ml beaker and the aquadest was added until it reached 25 ml. The pH meter electrode is dipped into the sample. The number displayed on the screen shows the agar pH value.

Total Dissolved Solids

The refractometer prism is rinsed with water and wiped with a soft cloth. The 5 g sample was crushed and then put into a 25 ml beaker and added water until it reached 25 ml. The sample is dropped onto a refractometer prism. The number shown shows the TPT value in Brix units.

Crude Fiber Content

A sample of 1 g was put into a 300 ml beaker, adding 50 ml of $H_2SO_4$0.3 N to boil for 30 minutes. Add 50 ml of 1.5 N NaOH and boil again for 30 minutes. The liquid in the beaker is filtered with filter paper. Subsequently washed in succession with 50 ml of hot water, 50 ml of H_2SO_4 0.3 N and 25 ml of acetone. The residue along with the filter paper is roasted at 105^{o}C until the weight is constant then weighed. After that it is put in the furnace at 105^{o}C for 3-4 hours. Fiber content can be calculated by the equation:

$$Crude\ fiber\ content\ (\%) = \frac{a - b - c}{w}\ x\ 100\%$$

Note:
a = Weight of residue in filter paper dried (g)
b = Weight of residue that has been planted (g)
c = Weight of empty filter paper (g)
w = sample weight (g)

Total Sugar

a. Making a Standard Curve

Standard curves were made using standard glucose solutions of 0, 10, 20, 30, 40 and 50 µl glucose, each pipette as much as 1 ml was inserted into a test tube. 5% phenol solution was added then stirred. Then quickly added concentrated H_2SO_4 solution. Leave for 10 minutes then stir. Placed in a water bath for 15 minutes. The absorbance was measured at 490 nm.

b. Sample Determination

1 ml of diluted sample is then put into a test tube. 5% phenol solution was added then stirred. Then added concentrated H_2SO_4, left for 10 minutes then stirred. Placed in a water bath for 15 minutes. The absorbance was measured at 490 nm.

Syneresis

Agar is put into a plastic cup weighing 40 g for each treatment. The water separated from the agar was separated, then weighed on the 0th, 7th, and 14th days in storage. The level of syneresis is calculated by the formula:

$$Syneresis\ = \frac{W_1 - W_2}{W_1} x\ 100\%$$

Note:
W1 = The initial weight of the gel
W2 = The final weight of the gel

Color Analysis with Color Reader

Samples are put in a uniform transparent plastic cup, the device is turned on by pressing the Power Switch and Lab button, then the cup is affixed to the optical head and press the measuring button, the results obtained include L * (lightness), a * (redness) and b * (yellowness). The color descriptions are presented in Table 4 as follows:

Table 4
Color Descriptions Based on L *, a *, and b * values

Score	Color Description
L	0 (black) - 100 (white)
+ a (positive)	0-100 for red
-a (negative)	0 - (- 80) for green
+b (positive)	0-70 for yellow
-b (negative)	0 - (- 70) for blue

Furthermore, ^{o}Hue is calculated from the values a * and b * with the equation: ^{o}Hue = tan-1 (b / a), to find out the color division based on oHue can be seen in Table 5.

Table 5
Color distribution of ^{o}Hue (Hutching, 1999)

^{o}Hue [arc tan (b/a)]	Color Description
18-54	*Red (R)*
54-90	*Yellow Red (YR)*
90-126	*Yellow (Y)*
126-162	*Yellow Green (YG)*
162-198	*Green (G)*
198-234	*Blue Green (BG)*
234-270	*Blue (B)*
270-306	*Blue Purple (BP)*
306-342	*Purple (P)*
342-18	*Red Purple (RP)*

Gel Hardness with Texture Analyzer

Hardness of gel on agar products using the Brookfield LFRA Texture Analyzer. The type of probe that will be used for gelatin is TA 35 mm. The LFRA Texture Analyzer is set with the provision of a cylinder speed probe of 0.2 cm / s; trigger 10 g; and 20 mm distance. The sample is placed on the foundation to be pressed. The probe is mounted in place and the "start" button is pressed to start the testing process. Peak load and final load values appear on the screen.

III. RESULTS AND DISCUSSION

A. Organoleptic Test

Texture Hedonic Quality Test

The results of the analysis of variance showed that all-natural sweeteners used on the agar texture did not have a significant effect. The average value of hedonic texture quality test can be seen in Table 6.

The average value of the panelist hedonic quality test on the texture ranges from 2.73 to 3.20 (rather easily wrecked). The nature of gel is influenced by the concentration of agar powder, temperature, acidity and sugar content. The higher sugar content causes the gel to become hard with low texture cohesivity (Imeson, 2010).

Texture Hedonic Test

The results of the analysis of variance showed that all-natural sweeteners used on the agar texture did not have a significant effect. The average value of the texture hedonic test can be seen in Table 6. Based on the results of the texture hedonic test has a preference value between 4.80 (somewhat like) to 5.67 (like).

The higher the concentration of sugar used the more the panelists' preference for texture increases. This is because sugar as a hydrophilic hygroscopic substance will absorb a lot of water (Manullang, 1997), so that the addition of sugar affects the thickness or osmolality and strength of the gel that is formed (BeMiller and Whistler, 1996 in Ramadan, 2011).

Color Hedonic Test

The results of the analysis of variance showed that all-natural sweeteners used on agar did not have a significant effect. The average value of the color hedonic test can be seen in Table 6. Based on the results of the color hedonic test has a preference value between 4.43 (neutral) to 5.27 (somewhat like).

The color formed on agar is caused by the presence of pigments in each type of natural sweetener used. The higher the concentration of sugar given will increase the formation of pigments as a result of non-enzymatic browning reactions without nitrogen compounds (deMan, 1997 in Ramadan, 2011).

Taste Hedonic Test

The results of the various analyzes showed that sweetener stevia, sorghum sugar, coconut sugar, and palm sugar did not significantly affect the taste of agar, whereas corn sugar and honey had a very significant effect. The average value of the hedonic taste test can be seen in Table 6.

Based on the hedonic test results, the taste has a preference value of 2.97 (somewhat dislike) to 5,53 (likes). Panelists' preference for gelatin taste increases with the addition of sugar concentrations.

The 35% honey treatment showed the panelists' acceptance of the highest agar taste. That is because that honey contains fructose. Fructose is the sweetest sugar type compound (1.12 times sweeter than sucrose) (Sudarmadji, 1982), with the sweet taste covering the aftertaste in the form of bitter taste from bran, so the product is accepted by panelists.

Hedonic Test of Overall Acceptance

The results of the analysis of variance showed that all types of natural sweeteners did not significantly affect the overall acceptance of agar except honey treatment which had a very significant effect. The average value of the overall acceptance hedonic test can be seen in Table 6. The lowest level of overall acceptance in the stevia sweetener treatment is 0.075% (neutral) and the highest in the treatment of honey is 35% (somewhat like).

B. Water content

The results of the analysis of variance showed that all-natural sweeteners used on agar water levels had a very significant effect. The average value of water content can be seen in Table 7. The highest average water content is in the stevia sweetener treatment of 0.10% (92.3542%) and the lowest in the honey treatment of 35% (70.5892%).

The addition of sugar with high concentrations makes the water content decreases, because sugar is a hygroscopic compound that is able to bind free water into bound water that is difficult to evaporate during cooking (Yulistiani et al., 2013).

The main content of stevia leaves are steviol derivatives, especially stevioside (4-15%), rebaudioside A (24%) and C (1-2%) and dulcocide A (0.4-0.7%) (Raini and Isnawati, 2011) . In addition, stevia is a sweetener without calories so there is no sucrose content. Therefore, in the treatment of stevia sweetener has a very high water content of 92.3542% due to the absence of sucrose content that can bind to free water which causes the water to become volatile during cooking so that the resulting water content becomes high.

Table 6. Hedonic Quality Test Score and Hedonic Test

Types of Natural Sweeteners	Concentration (%)	Parameter				
		Texture (Hedonic Quality)	Texture	Color	Taste	Overall acceptance
Stevia sweetener	0,05	3,10	4,80	4,70	2,97	3,97
	0,075	3,07	4,97	4,57	3,17	3,70
	0,10	3,17	5,10	4,50	3,47	3,97
Sorghum sugar	10	2,87	5,13	4,43	3,57	4,13
	15	2,77	5,33	4,73	3,87	4,17
	20	2,73	5,27	4,60	4,03	4,43
Corn sugar	10	2,80	5,30	4,50	3,47[a]	4,20
	15	2,73	5,50	4,60	4,23[b]	4,47
	20	2,83	5,43	4,60	4,53[b]	4,70
Coconut sugar	14	2,93	5,23	5,03	4,43	4,87
	15	3,00	5,33	5,23	4,77	4,87
	16	3,10	5,33	5,17	4,63	5,00
Palm sugar	7,50	3,17	4,97	4,93	3,73	4,27
	10	3,10	5,00	5,10	4,23	4,67
	12,50	3,00	5,33	5,17	4,50	4,83
Honey	15	3,10	5,27	4,87	4,27[a]	4,50[a]
	25	3,03	5,40	4,83	4,93[b]	4,90[ab]
	35	3,20	5,67	5,27	5,53[c]	5,43[b]

Note: Numbers followed by the same lowercase letters in the same column show no significant difference at the 5% level according to the DNMRT test.
Texture value (hedonic quality test): 1 = Very easy to break, 2 = Not easily broken, 3 = Somewhat easily broken, 4 = Easy to break, 5 = Very easy to break.
Value of texture, color, taste and overall acceptance (hedonic test): 1 = Very dislike, 2 = Dislike, 3 = Somewhat dislike, 4 = neutral, 5 = somewhat like, 6 = like, 7 = really like

C. Acidity (pH)

The results of the analysis of the variance showed that all-natural sweeteners used on agar pH had a very significant effect. The average value of pH can be seen in Table 7. Increasing the pH in line with the increase in the amount of sucrose added due to the addition of sugar, H + ions derived from organic acids also undergo dilution, so that H + ions that form acid will be reduced and the pH of the material will increasing (Pertiwi and Wahono, 2014). But this is not suitable for stevia sweetener, because stevia sweetener contains glycoside which has a sweet taste but does not produce calories and has a pH of 5-6 (Buchori, 2007) so that the use of even a small amount of the resulting pH value is already high.

D. Total Dissolved Solids

The results of the analysis of variance showed that all- natural sweeteners used on the total dissolved solids of agar had a very significant effect. The average total dissolved solids can be seen in Table 7. The total dissolved solids tend to increase with increasing sugar concentration. This is consistent with Buckle (1987) in Yulistiani (2013), stating the higher addition of sucrose results in higher total dissolved solids.

The lowest average value of total dissolved solids in the stevia sweetener treatment was 0.10%, which was 1.61%. The main content of stevia leaves are steviol derivatives, especially stevioside (4-15%), rebaudioside A (24%) and C (1-2%) and dulcocide A (0.4-0.7%), besides stevia as a sweetener without calories and without the addition of chemicals (Raini and Isnawati, 2011) make the measured component of total dissolved solids very small because there is no sucrose content in stevia sweeteners so the resulting value is also very small compared to other natural sweetener treatments.

E. Crude Fiber Content

The results of the analysis of variance showed that all-natural sweeteners used on agar fiber levels did not have a significant effect. This can be caused because the natural sweetener used does not contain high fiber. The average value of crude fiber content can be seen in Table 7.

Stevia sweetener comes from stevia leaf extract. In Widodo et al research. (2015) stated that the crude fiber content of stevia leaf extract was 1,304%. The levels of crude fiber from stevia leaf extract makes high levels of crude fiber agar for the stevia sweetener treatment.

F. Total Sugar

The results of the various analyzes showed that all the natural sweeteners used on the total sugar agar were very significant. The average value of total sugar can be seen in Table 7.

In the 0.10% stevia sweetener treatment has a total sugar value of 0.74% this is assumed because the stevia sweetener used contains 97% steviol glycosides so that in the stevia sweetener treatment there is still a sugar content. The total value of sugar increases with increasing concentration of the treatment used. This was also explained by Pratama et al., (2011) in a research on syrup making that sugar concentration affected the total value of sugar

produced. The more concentration of sugar added will increase the total sugar available, because the solubility of sugar is a sugar solution consisting of mostly sucrose and some non-sucrose components, so that by adding sugar from the outside it will automatically increase its sucrose part.

Table 7
Average values of water content, pH, total dissolved solids, crude fiber content, total sugar

Types of Natural Sweeteners	Water content (%)	pH	TDS (^{o}Brix)	Crude fiber content (%)	Total Sugar (%)
Stevia sweetener	92,3542 ± 0,7961^{d}	5,60 ± 0,07^{c}	1,61 ± 0,10^{a}	1,304 ± 0,569	0,74 ± 0,08^{a}
Sorghum sugar	71,8920 ± 1,6508^{a}	4,61 ± 0,02^{a}	21,50 ± 1,44^{d}	0,978 ± 0,020	5,81 ± 1,01^{bc}
Corn sugar	75,6811 ± 1,3499^{b}	5,70 ± 0,07^{c}	21,28 ± 1,21^{d}	0,971 ± 0,016	7,00 ± 1,21^{c}
Coconut sugar	76,5283 ± 1,0515^{bc}	4,82 ± 0,34^{ab}	17,67 ± 0,50^{c}	0,971 ± 0,016	3,88 ± 1,06^{b}
Palm sugar	79,0544 ± 1,9895^{c}	4,69 ± 0,06^{a}	15,17 ± 0,88^{b}	0,987 ± 0,022	3,86 ± 0,98^{b}
Honey	70,5892 ± 2,2236^{a}	4,99 ± 0,05^{b}	25,61 ± 2,38^{e}	0,955 ± 0,006	6,88 ± 1,53^{c}

Note: Numbers followed by the same lowercase letters in the same column show no significant difference at the 5% level according to the DNMRT test

G. Syneresis

The results of the analysis of variance showed that all-natural sweeteners used for agar syneresis had no real effect. The average value of syneresis on the 7th and 14th day can be seen in Table 8.

The syneresis of agar increases with increasing storage time because during storage the aggregation between the double helix polymer chains continues to occur. Aggregation is caused by the movement of the polymer chain in the gel system.

The heating process with a temperature higher than the temperature of the formation of the gel will cause the polymer so that the solution becomes a random coil (random) because the kinetic energy generated by heat prevents the polymer from forming a helix structure (Sadar, 2004). The polymer chains that meet each other cause the formation of hydrogen bonds between the polymer chains so that the structure of the network is denser and the space to trap water is smaller. As a result, water that was originally trapped in the space between the polymer chains is released from the gel system (Therkelsen, 2003).

H. Color Analysis

The results of the analysis of variance showed that the addition of natural sweeteners had a very significant influence on the respective values of L *, a * and b *. The average values of L *, a * and b * can be seen in Table 9.

The L * value indicates that all treatments are directed towards black (dark). The resulting a * value is positive (+) which indicates that all treatments are directed towards red. The resulting b * value is positive (+) which indicates that all-natural sweetener treatments are pointing towards the yellow.

Based on Table 9, the addition of various natural sweeteners to agar has the same color as indicated by the color description, namely Yellow Red (YR). The color produced in agar products comes from natural bran and sweeteners used, because these ingredients contain pigments that affect the color of the final product. The higher the concentration of sugar given will increase the formation of pigments as a result of non-enzymatic browning reactions without nitrogen compounds (deMan, 1997 in Ramadan, 2011).

I. Gel Hardness

Based on the results of the analysis of the variety showed that all-natural sweeteners used in gel agar hardness had no real effect. The average value of gel hardness can be seen in Table 8.

The highest average gel hardness value in the 16% coconut sugar treatment is 645.9 gF and the lowest average gel hardness value in the 20% corn sugar treatment is 539.9 gF. In research (Mithania, 2017), it is stated that the gel hardness of gelatin with the addition of red yeast rice and rice bran has a value of 964.25 gF, while the hardness of gel without treatment has a value of 2535.5 gF. The average value of gel hardness in this study was lower than the average value of gel hardness in previous studies which indicated that the agar product had a softer texture. The amount of water contained in food affects the texture and level of gel hardness, the more water levels increase the easier it is to undergo syneresis so that the gel hardness will decrease (Murdinah, 2010).

Table 8
Average Value of Syneresis and Gel Hardness

Types of Natural Sweeteners	Syneresis on Day 7	Syneresis on Day 14	Gel Hardness
Stevia sweetener	0,4448 ± 0,1658	0,8309 ± 0,1586	577,1 ± 8,4
Sorghum sugar	0,3990 ± 0,0972	0,8932 ± 0,0141	557,8 ± 76,2
Corn sugar	0,3329 ± 0,1319	0,5978 ± 0,1533	539,9 ± 79,9
Coconut sugar	0,2907 ± 0,1085	0,7522 ± 0,1312	645,9 ± 81,9
Palm sugar	0,1624 ± 0,0150	0,8291 ± 0,2857	614,9 ± 5,9
Honey	0,4259 ± 0,1154	0,8345 ± 0,0945	558,7 ± 74,3

Table 9
Average Values of L *, a *, b *, ^{o}Hue and Color Descriptions

Types of Natural Sweeteners	L*	a*	b*	^{o}Hue	Deskripsi Warna*
Stevia sweetener	$35,38^{e}$	$5,32^{c}$	$22,83^{c}$	75,88	*Yellow Red* (YR)
Sorghum sugar	$33,33^{c}$	$4,82^{ab}$	$22,03^{ab}$	77,66	*Yellow Red* (YR)
Corn sugar	$33,66^{c}$	$4,92^{b}$	$22,10^{b}$	77,45	*Yellow Red* (YR)
Coconut sugar	$32,68^{b}$	$5,59^{d}$	$22,99^{c}$	76,34	*Yellow Red* (YR)
Palm sugar	$32,06^{a}$	$5,40^{c}$	$21,85^{a}$	76,12	*Yellow Red* (YR)
Honey	$33,53^{cd}$	$4,69^{a}$	$21,81^{a}$	77,86	*Yellow Red* (YR)

Note: Numbers followed by the same lowercase letters in the same column show no significant difference at the 5% level according to the DNMRT test.

IV. CONCLUSION

Based on the results of research that has been done, it can be concluded as follows:

1. The best concentration of organoleptic properties in making agar with the addition of bran is stevia 0.10% sweetener, 20% sorghum sugar, 20% corn sugar, 16% coconut sugar, 12.5% palm sugar and 35% honey.
2. The addition of various types of natural sweeteners to the making of agar with the addition of bran has a significant effect on taste and overall acceptance but has no significant effect on texture and color.
3. The addition of various types of natural sweeteners in the making of agar with the addition of rice bran significantly affected the water content, pH, total dissolved solids, total sugar, and color analysis, but did not significantly affect the levels of crude fiber, syneresis and gel hardness.
4. The best treatment for making agar with the addition of bran is honey 35% with a value of liking the texture and taste, as well as the value of rather liking the color and overall acceptance, water content of 70.5892%; pH 4.99; TPT 25.61 0Brix; crude fiber content of 0.955%; total sugar 6.88%; 7th day syneresis 0.4259%; syneresis of the 14th day 0.8345%; yellow red color description; and gel hardness of 558.7 gF.

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