JURNAL BIOLOGI

El-Hayah

Journal Homepage: http://ejournal.uin-malang.ac.id/index.php/bio/index
e-ISSN: 2460-7207, p-ISSN: 2086-0064

Formulation of Full Instant Functional Drinking Making With Coffee Addition

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DOI: 10.18860/elha.v7i3.10152

Article Info

Article history:
Received 06 March 2019
Received in revised form
02 June 2019
Accepted 03 July 2019

Keywords:
Antioxidant
Caffein
Complete Random Design

Abstract

Galangal (Alpinia officinarum) is a type of rhizome plant such as ginger. Utilization of galangal which is still well known by the public is a spice in cooking and as a traditional herbal medicine that has not yet attracted people's interest. Further processing needs to be done to attract the public so that they can benefit from galangal. The study was designed using a Randomized Block Design (RCBD) using 2 factors. Comparison of coffee and galangal are 9: 1, 7: 3, 5: 5, and factor 2 for 50 grams of sugar, 100 grams, and 150 grams. The research results obtained by the panelists the most important formulation is the ratio of galangal and coffee 7: 3 with the approval of 150 grams of coconut sugar. The results of the antioxidant activity test obtained data about instant galangal functional drinks having antioxidant content of IC50 8.10 mg/ml have not been approved as functional drinks. The results of the caffeine content test showed that instant galangal functional drinks had caffeine levels of 2.63 ± 0.04%.

1. INTRODUCTION

Galangal is one of the rhizomes that are widely found in Indonesia. In Indonesia, there are several types of galangal and their uses are different, such as white galangal often used as a spice in cooking, while for red galangal is often used as traditional medicine [1]. Galangal which has the Latin name Alpinia officinarum is a type of rhizome plant that has a lot of fiber that is good for the body and has a 1% essential oil content consisting of 48% methyl cinnamate, 30% eugenol, 20% cineol and the rest camphor, sesquiterpenes, apinen, galangin, and others [2]. From the content contained in galangal, this rhizome is useful as an antimicrobial, antifungal, antioxidant, antitumor and anticancer, vasodilator, and anti-tuberculosis.

Making instant galangal functional drinks with the addition of coffee can make it easier

for consumers to benefit from galangal. The functional drink is a type of drink that has physiological benefits or effects for the body, such as reducing blood pressure, improving body condition, can reduce the risk of disease, and even cure certain diseases [3]. Trends in functional drinks are a trend among the general public because they are believed to have health benefits. This research wants to develop an instant ginger functional drink with the addition of coffee, to find out the antioxidant content in it.

2. MATERIALS and METHODS

The main ingredients used in the manufacture of instant functional drinks with the addition of coffee are Bajawa Arabica coffee in Flores, East Nusa Tenggara, red galangal, ginger, lemongrass, pandanus leaves, cinnamon, cloves, tween 80, maltodextrin and mineral water. Additional ingredients used are coconut sugar. Other materials used for testing the characteristics are aquades, tissue paper, solid lead acetate, chloroform solution, filter paper, DPPH solution, ethanol, methanol, running water, calcium carbonate, dilute ammonia, cobalt, nitrate, and other materials needed.

Making of Galangal Coffee Juice

Galangal is selected which is still fresh then washed using water and separated from the skin. Additional ingredients are also cleaned, such as ginger, lemongrass, cinnamon, cloves, and pandan leaves. Put in a container and add water, then boil until boiling and stirring occasionally. After boiling, add coffee grounds and stir until blended. Refrigerate and let stand for 1 night. Filter the galangal coffee liquid with a filter cloth to separate it from the pulp

Formulation of Galangal Instant with Coffee Addition as Functional Drinks and Crystallization Process

Galangal coffee juice is prepared for the process of instantiation. The instantiation process used is the Foam Mat Drying method. The addition of tween 80 and maltodextrin aims to make foam or scum in the ingredients. After adding, stir using a mixer for about 20 minutes until it is foamy. The process of crystallization using a cabinet dryer temperature of 70-100 oC for ± 8 hours and a blender by adding coconut ant sugar according to factors with the formulation. Instant coffee powder drink obtained with the addition of galangal extract following the formulation.

Organoleptic Test of Functional Drinks: Galangal Instant with Coffee Addition

Organoleptic testing is done by the hedonic method, this is used to assess whether instant galangal functional drinks with the addition of the coffee that has been made as desired. Hendonic test is a test that requires panelists to response what was tested personally their likes and dislikes and their levels [4]. In organoleptic testing, this study used 30 panelists. Parameters tested in organoleptic testing include color, taste, aroma, texture, and overall. The preferred level of hedonic test assessment in the form of scale is 1-5, where the number 1: very dislike, 2: dislike, 3: somewhat like, 4: like, 5: very like.

Antioxidant Activity Testing of Functional Drinks: Galangal Instant with Caffee Addition

Antioxidant activity testing is done by the DPPH method, where this method is fast, simple, and does not require high costs in determining the ability of antioxidants using free radicals 2,2-diphenyl-1-picrylhydrazil (DPPH). The testing step is initiated by taking different extract concentrations and making the volume to 100 µL with methanol. Then add 5 mL of 0.1 mM DPPH methanol solution and incubate for 20 minutes at 27oC. After that measure the absorbance of the solution at 517 nm. A mixture of methanol, DPPH, and standards (BHT, BHA, quercetin, and α-tocopherol) will serve as a positive control. The reduction of purple from DPPH solution to pale yellow will give a percentage of inhibition. Calculate the percentage inhibition from the

absorbance of the sample and the negative control using the following equation:

% penghambatan = [(OD kontrol - OD sampel) / kontrol OD] x 100

After obtaining the percentage value of IC50 inhibitors (50% inhibitory concentration) from the inhibitory concentration and presentation charts [5].

Caffeine Level Determination Of Functional Drinks: Galangal Instant with Caffee Addition

Caffeine levels were tested using UV-Vis spectrophotometry. The test begins with making a solution from a sample with a predetermined concentration and determines the wavelength for the caffeine standard of 250-300 nm. Calibrate the solution with a predetermined concentration and measure the absorbance.

Caffeine is extracted from 1 gram of sample into 150 mL of hot distilled water. Filter to take the filtrate and feed into a separating funnel and add 1.5 gr of CaCO3. Then extract four times with the addition of 25 mL of chloroform solution.

The extract was evaporated using a rotary evaporator and then diluted 10 times. Then the absorbance solution is measured using UV-Vis Spectrophotometry at the specified wavelength [6].

Analysis of Data

Data analysis was performed from organoleptic test results by the Hedonic Scale Scoring method and the effectiveness index test using the De Garmo method. Then, the data from the Hedonic Scale Scoring processed using the Friedman test to find out which products the panelists like from the parameters of color, taste, aroma, texture, and overall. Then the selection of the best treatment using the De Garmo method is determined from the level of importance by the panelists.

3. RESULTS and DISCUSSION

Organoleptic Properties of Instant Galangal with Coffee Addition

The Colors

The results of the organoleptic test of the average color parameter preference level of the color attributes in the ratio of galangal and coffee with the addition of coconut sugar are between 3.00 - 3.93. Then the Friedman test was performed to obtain a significant value data of 0,000, which means that the ratio of galangal and coffee ratios as well as the addition of coconut sugar to the production of instant galangal functional drinks have a significant effect on consumers' color preferences.

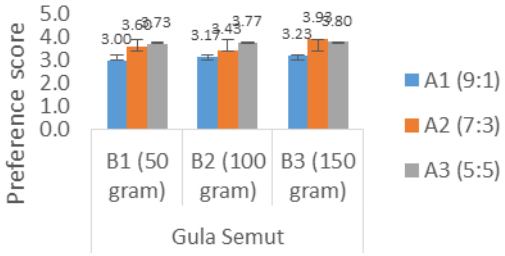

Figure 1. Color Preference Levels of Galangal Instant with Caffee Addition as Functional Drinks

The Taste

The results of the organoleptic test showed that the average taste parameter in the taste attribute in the ratio of galangal and coffee with the addition of coconut sugar between 2.80-3.66. Then the Friedman test was performed to obtain significance value data of 0,000, which means that the ratio of galangal and coffee ratios as well as the addition of coconut sugar to the manufacture of instant galangal functional drinks have a significant effect on consumers' taste preferences.

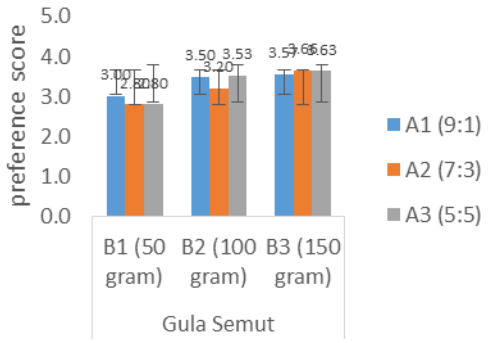

Figure 2. The Taste Preference Levels of Galangal Instant with Caffee Addition as Functional Drinks

The Flavor

The results of the organoleptic test of the flavor parameters mean the level of preference on the flavor artibute in the ratio of galangal and coffee with the addition of coconut sugar between 2.63 - 3.66. Then the Friedman test was performed to obtain significant value data of 0,000, which means that the ratio of galangal and coffee ratios as well as the addition of coconut sugar to the manufacture of instant galangal functional drinks have a significant effect on the consumer's flavor preference.

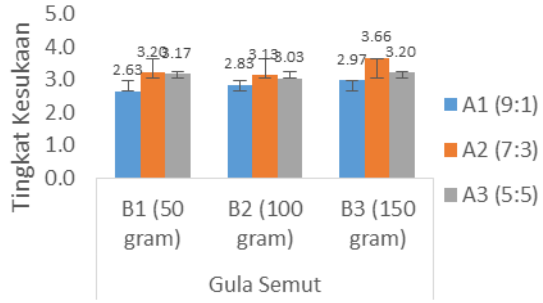

Figure 3. The Flavour Preference Levels of Galangal Instant with Caffee Addition as Functional Drinks

The Texture

The results of the organoleptic test of texture parameters mean the level of preference for texture parameters in the ratio of galangal and coffee with the addition of coconut sugar were between 2.90 - 3.46. Then the Friedman test was performed to obtain significant value data of 0.034, which means that the ratio of galangal and coffee ratios as well as the addition of coconut sugar to production of instant galangal functional drinks have a significant effect on the preferences of consumers' textures on these drinks.

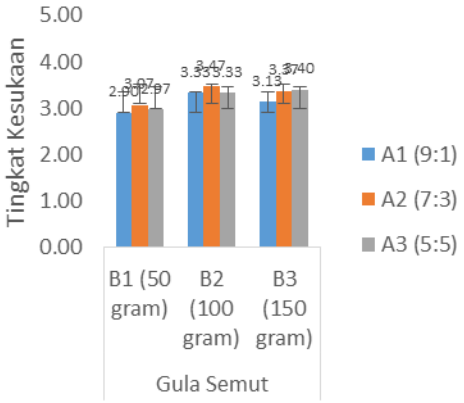

Figure 4. The Texture Preference Levels of Galangal Instant with Caffee Addition as Functional Drinks

Overall

The results of the overall parameter organoleptic test were assessed from the four attributes are color, taste, aroma, and texture. Obtained data that shows the average preference for instant galangal functional drinks with the addition of coffee had a overall score were between of 2.90 - 3.53, it showed that the functional drink was preferred by consumer.

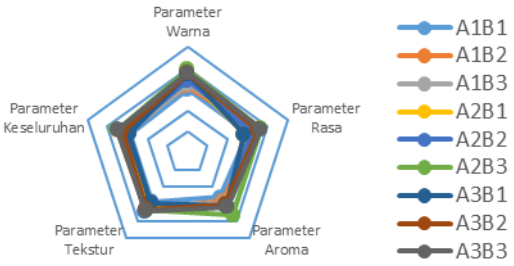

Figure 5. The Overall Preference atributes Levels of Galangal Instant with Caffee Addition as Functional Drinks.

Water Content of Functional Drinks: Galangal Instant with Coffee Addition

The results of the calculation of water content can be seen in **Figure 6** which shows the highest water content obtained in the formulation of the ratio of galangal ratio and coffee 9: 1 and the addition of 50 grams of sugar that is 4.98%. The lowest water content is obtained in the ratio formulation of galangal and coffee ratio 7: 3 and the addition of sugar as much as 150 grams is 2.59. According to research conducted by Erni et al (2018) **[7],** stated that the water content produced by the sample is influenced by the addition of coconut sugar in the study affecting the water content in the product. The more sugar added the lower the water content produced.

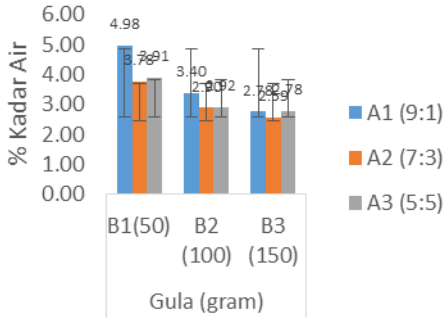

Figure 6. Water content for Each Treatment

The Functional Drinks Rendemen of Galangal Instant with Caffee Addition

The results of the calculation of yield can be seen in **Figure 7.** which shows the highest yield obtained in the ratio formulation of galangal and coffee ratio is 9: 1 and the addition of sugar as much as 150 grams. The lowest yield obtained in the ratio formulation of galangal and coffee ratio is 9: 1 and the addition of sugar as much as 50 grams. According to research conducted by Erni et al (2018) **[7],** states that the yield produced by a sample is influenced by the length of time of drying and the temperature used in the drying process. The longer the drying process is carried out the lower the yield produced. The same is true of the use of temperature in the drying process, where the higher the dryer temperature causes the water content of the material to decrease. Along with the evaporation of water content, the yield produced is also reduced.

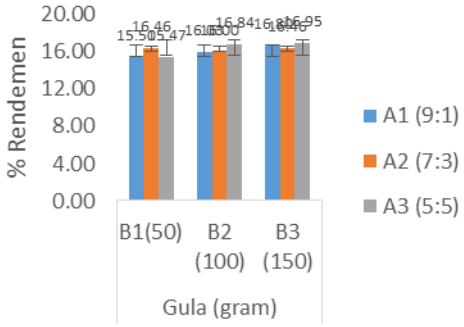

Figure 7. Rendement content for Each Treatment

The Selection of The Best Process

The selection of the best treatment is obtained by using the effectiveness index test or the De Garmo test. The results of the selection of the best treatments performed can be seen in Table 1. shows that the combination of treatments that has the highest value for organoleptic parameters of instant galangal functional drinks with the addition of coffee from nine treatments namely the ratio of galangal and coffee 7: 3, where the addition of coconut palm sugar is 150 gram which has a value of 3,823.

Table 1. The best treatment of Galangal Instan Fucntional Drinks: *the best treatment

Parameter		color	taste	flavor	Texture	Total
Bobot Parameter		**0,18**	**0,39**	**0,28**	**0,15**	**1,00**
A1B1	**NE**	0,00	0,23	0,00	0,00	0,23
	NP	0,00	0,09	0,00	0,00	
A1B2	**NE**	0,18	0,81	0,20	0,77	1,95
	NP	0,03	0,32	0,05	0,12	
Parameter		**color**	**taste**	**flavor**	**Texture**	**Total**
Bobot Parameter		**0,18**	**0,39**	**0,28**	**0,15**	**1,00**
A1B3	**NE**	0,25	0,89	0,32	0,41	1,88
	NP	0,05	0,34	0,09	0,06	
A2B1	**NE**	0,64	0,00	0,55	0,29	1,49
	NP	0,12	0,00	0,15	0,05	
A2B2	**NE**	0,46	0,47	0,49	1,00	2,42
	NP	0,09	0,18	0,14	0,15	
A2B3	**NE**	1,00	1,00	1,00	0,82	3,82*
	NP	0,18	0,39	0,28	0,13	
A3B1	**NE**	0,79	0,00	0,52	0,12	1,42
	NP	0,14	0,00	0,14	0,02	
A3B2	**NE**	0,82	0,85	0,39	0,77	2,83
	NP	0,15	0,33	0,11	0,12	
A3B3	**NE**	0,86	0,97	0,55	0,88	3,26
	NP	0,16	0,38	0,15	0,14	

Antioxidant Activity of Functional Drinks: Galangal Instant with Caffee Addition.

The results of testing the antioxidant activity content of instant galangal functional drinks with the addition of coffee have an IC50 value of 8.10 mg / ml. Values obtained from testing using free radicals 1,1-diphenyl-2-picrylhidrazil (DPPH). A compound that has a very strong antioxidant if it has an IC50 value of less than 0.05 mg / ml, strong if the IC50 value is around 0.05-0.10 mg / ml, while if it has an IC50 value of around 0.10-0.15 mg / ml, and weak if the IC50 value is more than 0.15 mg / ml. In this study, the IC50 value obtained was 8.10 mg / ml or 8100 ppm, it showed that 50% of DPPH free radicals could be inhibited at a concentration of 8100 ppm.

Protein Content of Functional Drinks: Galangal Instant with Caffee Addition

Test results measuring caffeine content in instant galangal functional drinks with the addition of coffee obtained caffeine content of 2.63 ± 0.04%. The results obtained in caffeine testing were carried out by gravimetric methods using chloroform reagents. The caffeine content in coffee is influenced by drying and roasting coffee. In raw coffee, the caffeine content is higher compared to ground coffee or mixed coffee, this is because the water content and caffeine in raw coffee are still in the form of bonds with other compounds in the form of organic compounds that will affect secondary metabolites **[8].**

4. CONCLUSION

The best formulation chosen based on the organoleptic test of 30 respondents is instant galangal functional drinks with the addition of coffee with rasio of galangal and coffee 7: 3 and the addition of ant sugar as much as 150 grams. The best formulation that has been selected is tested for IC50 antioxidant content and caffeine content. The results of antioxidant testing and caffeine levels, obtained antioxidant content of IC50 8.10 mg/ml, this result is strong category. The results of testing caffeine levels in instant galangal functional drinks were 2.63 ± 0.04%

5. REFERENCES

1. Bermawie, N., Susi, P., dan Meliawati, M.L.W. 2012. Karakter Morfologi, Hasil, dan Mutu Enam Genotip Lengkuas pada Tiga Agroekologi. Bul. Littro, 23 (2): 125-135

2. Savitri, A. 2016. Tanaman Ajaib! Basmi Penyakit dengan TOGA (Tanaman Obat Keluarga). Bibit Publisher. Jakarta

3. Siro, L., Kapolna, E., Kapolna, B., and Logasi, A. 2009. Functional Foods Product Development, Marketing, and consumer Aceptance a Review, Appetite. International Journal of Herbal Medicine. 51(05). 456-467

4. Wahyuningtias, D, Trias, S. P, dan Raden, N. R. Uji Kesukaan Hasil Jadi Kue Brwonies Menggunakan Tepung Terigu dan Tepung Gandum Utuh. Jurnal Binus Busines Review. 5(1): 57-65

5. Thangaraj, P. 2016. Pharmacological Assays Of Plant-Based Natural Product. Springer International Publishing. Switzerland

6. Hasani, N. F, dan Imelda, F. 2018. Analisis Kadar Kafein Kopi Arabica Pada Variasi Temperatur Sangrai Secara Spektrofotometri Ultraviolet. Analytical and Environmental Chemistry. 3(2): 148-162

7. Erni, dkk. 2018. Pengaruh Suhu Dan Lama Pengeringan Terhadap Sifat Kimiadanorganoleptik Tepung Umbi Talas (Colocasia esculenta). Jurnal Pendidikan Teknologi Pertanian. 4(01): 95-105

8. Fahmi, A.A., Ida, A.R.A.A., dan Iwayan, S. 2016. Analisis Kandungan Kafein pada Kopi Didesa Sesaot Narmada Menggunakan Spektrofotometri UV-Vis. Jurnal Kimia. 10(01):110-114