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Comparison of Adding Ginger (*Zingiber officinale Rosc*) and Green Tea (*Camellia sinensis L*) Extrcat on Organoleptic and Physicochemical Properties of Functional Drinks

Perbandingan Penambahan Ekstrak Jahe (Zingiber officinale Rosc) dan Teh Hijau (Camellia sinensis L) terhadap Sifat Organoleptik dan Fisikokimia Minuman Fungsional

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ABSTRAK

Indonesia merupakan negara agraris dengan hamparan lahan yang luas, keanekaragaman hayati yang melimpah, serta kondisi alam dan iklim yang mendukung. Kondisi iklim di Indonesia yang beriklim tropis sangat mendukung para petani untuk dapat bercocok tanam karena tersedianya sinar matahari sepanjang tahun. Ditambah dengan struktur tanah yang ada, petani bisa menanam segala jenis tanaman seperti jahe dan teh. Penambahan ekstrak bubuk pada minuman fungsional mempengaruhi zat yang terkandung dalam minuman tersebut. Hasil penelitian ini dapat dilihat dari nilai setiap parameter uji. Untuk pengujian dihasilkan formulasi terbaik yaitu pada perlakuan F3 dengan penambahan 0,5 gram ekstrak. Warna 4,76 untuk ekstrak jahe dan 5,15 untuk ekstrak teh hijau, rasa 5,10 untuk ekstrak jahe dan 5,67 untuk ekstrak teh hijau, aroma 4,63 untuk ekstrak jahe, dan 4,78 untuk ekstrak teh hijau. Kadar air ekstrak jahe sebesar 8,25% dan ekstrak teh hijau 8,23%, rendemen ekstrak jahe sebesar 34,31%, dan ekstrak teh hijau sebesar 33,67%. PSA 1930nm untuk ekstrak jahe dan 1915nm untuk ekstrak teh hijau, Kelarutan 92,35% untuk ekstrak jahe dan 93,05 untuk ekstrak teh hijau, waktu larut 161 detik untuk ekstrak jahe dan 156 detik untuk ekstrak teh hijau, higroskopis 12,23% untuk ekstrak jahe dan 11,14% untuk ekstrak teh hijau, aktivitas antioksidan 101,12 untuk ekstrak jahe dan 119,98 untuk ekstrak teh hijau.

Kata kunci: Aktivitas Antioksidan, Minuman Fungsional, Organoleptik, Teh Hijau, Zingiber Officinale Rosc.

ABSTRACT

Indonesia is an agricultural country with a vast expanse of land, abundant biodiversity, and supportive natural and climatic conditions. The climatic conditions in Indonesia with its tropical climate are very supportive for farmers to be able to plant because of the availability of sunlight throughout the year. Coupled with the existing soil structure, farmers can grow all kinds of plants such as ginger and tea. The addition of powder extract to functional drinks affects the substances contained in the drink. The results of this study can be seen from the value of each test parameter. For testing, the best formulation was produced, namely in the F3 treatment, with the addition of 0.5 grams. Color 4.76 for ginger extract and 5.15 for green tea extract, taste 5.10 for ginger extract and 5.67 for green tea extract, aroma 4.63 for ginger extract, and 4.78 for green tea extract. Moisture content is 8.25% for ginger extract and 8.23% for green tea extract, yield is 34.31% for ginger extract, and 33.67% for green tea extract. PSA 1930nm for ginger extract and 1915nm for green tea extract, Solubility 92.35% for ginger extract and 93.05 for green tea extract, dissolving time 161 seconds for ginger extract and 156 seconds for green tea extract, hygroscopic 12.23% for ginger extract and 11.14% for green tea extract, antioxidant activity 101.12 for ginger extract and 119.98 for green tea extract.

Keywords: *Activity Antioxidant, Functional Drinks, Green Tea, Organoleptic, Zingiber officinale Rosc.*

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INTRODUCTION

Indonesia is an agricultural country with a vast expanse of land, abundant biodiversity, and supportive natural and climatic conditions. The climatic conditions in Indonesia with its tropical climate are very supportive for farmers to be able to plant because of the availability of sunlight throughout the year. Coupled with the existing soil structure, farmers can grow all kinds of plants such as ginger and tea.

Ginger is a medicinal plant in the form of clumps of upright pseudo-stem which is not branched and belongs to the Zingiberaceace tribe. Ginger plants can grow well in tropical areas with hot climates and little rainfall. Generally known 3 varieties of ginger, namely: elephant ginger, this type of ginger is usually consumed both at young and old age, ginger sunti / ginger emprit, always harvested after old age. The essential oil content is greater than elephant ginger, so it tastes spicier, besides being high in fiber. Red ginger, its rhizome is red and smaller than white ginger is the same as small ginger, red ginger is always harvested when it is old, and also has an essential mint content making it suitable for medicinal herbs. Ginger is a spice that has been widely known by the public. Apart from being a producer of flavor in various food products. According to (Purnomo *et al*, 2010), ginger contains compounds that are antioxidants.

The use of native Indonesian natural ingredients as antioxidants is needed to improve the quality of public health at a relatively affordable cost. Red ginger is a natural ingredient that can be used as a source of antioxidants (Kikuzaki *et al.*, 1993), showed that non-volatile phenol active compounds such as gingerol, shogaol and zingeron, which are found in ginger, are proven to have antioxidant properties. Gingerol and shogaol are able to act as primary antioxidants against lipid radicals. Gingerol and shogaol have antioxidant activity because they contain a benzene ring and a hydroxyl group (Zakaria, 2000).

The vitamin content in tea can be said to be small because, during the manufacturing process, tea has been oxidized, thus eliminating vitamin C. Likewise, vitamin E is lost a lot during the processing, storage, and manufacture of tea drinks. However, vitamin K is present in sufficient quantities (300-500 IU/g) so that it can contribute to the body's need for these nutrients.

Green tea also contains the main polyphenols in tea leaves, which are very beneficial for health, namely catechins which can reduce the risk of heart disease, kill tumor cells, and inhibit the growth of lung cancer cells, colon cancer, especially skin cancer cells (Brannon, 2007). Catechins can also help smooth the process of digestion of food through the stimulation of peristalsis and the production of digestive juices, as well as facilitate the body's metabolism which can help in the weight loss process.

Functional Drinks are one of the beverage products that are currently being developed. The development of functional drinks can lead the community to choose healthy and quality fresh drinks. Functional drinks must-have characteristics as drinks that provide sensory characteristics, both in terms of color, aroma, and taste, contain certain nutrients and physiological functions in the body. The physiological functions possessed by functional drinks include maintaining body resistance, maintaining physical condition, preventing the aging process, and preventing diseases related to the influence of drinks (Susilo, 2011).

Instant powder drink is food processed in the form of powder, easily dissolves in water, practical in serving and has a long shelf life because of its low water content.

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Instant drinks are produced by drying. The principle is that dehydration in the process generally requires fillers as components of materials that are damaged during drying. (Kumalaningsih, 2005). Instant drinks in the form of powder can be made from fruits, spices, seeds and leaves that can be drunk directly by brewing it with boiled water, both cold and hot (Prasetyo, 2003). One of the instant drinks in the form of powder made from spices is red ginger. Red ginger instant drink products are functional drinks that contain active compounds and can function for health.

METHOD

This type of research is observational research with an experimental research design with three formulations consisting of the addition of red ginger and green tea extract 0.3 grams, 0.4 grams, and 0.5 grams. The three formulations were subjected to organoleptic tests using the hedonic test which included color, taste, and flavor using a Randomized Block Design (RBD). Furthermore, functional drinks of green tea and ginger with the best treatment were dried using a spray dryer and then tested for water content, yield, Psa, solubility, soluble time, hygroscopic, antioxidant activity.

RESULTS AND DISCUSSION

The formulation of red ginger and green tea extracts in functional drinks was carried out using three treatments, namely the addition of 0.3 grams (F1), 0.4 grams (F2), and 0.5 grams (F3).

Organoleptic Test for Color

The results of the statistical test of color preference for the functional drink red ginger extract can be seen in table 1.

Table 1. Comparison ginger and green tea extract to functional drinks on color.

Treatment	Ginger extract	Green tea extract
F1 (0.3 gram extract)	3.96^{b}	4.05^{c}
F2 (0.4 gram extract)	3.90^{b}	4.26^{b}
F3 (0.5 gram extract)	4.76^{a}	5.15^{a}

Based on the results of the organoleptic test on the color of the functional ginger and green tea drinks, the highest value was obtained in F3 (0.5 gram extract) with a value of 4.74 for ginger functional drinks and 5.15 for green tea functional drinks. Meanwhile, the lowest result was in F1 (0.3 grams extract) with a value of 3.96 on ginger fusional drink and 5.15 on green tea functional drink. The addition of ginger extract and green tea extract gave a significantly different effect on the color of functional drinks.

Organoleptic test for taste

The results of the statistical test of color preference for the functional drink red ginger extract can be seen in table 2.

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Table 2. Comparison ginger and green tea extract to functional drinks on taste

Treatment	Ginger extract	Green tea extract
F1 (0.3 gram extract)	4.01[c]	4.04[c]
F2 (0.4 gram extract)	4.26[b]	4.55[b]
F3 (0.5 gram extract)	5,10[a]	5.67[a]

Based on the results of organoleptic tests on the taste of ginger and green tea functional drinks, the highest value was obtained at F3 (0.5-gram extract) with a value of 5.10 in ginger functional drinks and 5.67 in green tea functional drinks. As for the lowest results in F1 (0.3 grams extract) with a value of 4.01 on ginger fusional drinks and 4.04 on green tea functional drinks. The addition of ginger extract and green tea extract gave a significantly different effect on the taste of functional drinks.

Organoleptic test for flavor

The results of the statistical test of color preference for the functional drink red ginger extract can be seen in table 3.

Table 3. Comparison Ginger and Green Tea extract to Functional Drinks on Flavor

Treatment	Ginger Extract	Green Tea Extract
F1 (0.3 gram extract)	4.00[c]	4.15[c]
F2 (0.4 gram extract)	4.16[a]	4.26[b]
F3 (0.5 gram extract)	4.63[b]	4.78[a]

Based on the results of organoleptic tests on the aroma of functional ginger and green tea drinks, the highest value was obtained at F3 (0.5 gram extract) with a value of 4.63 in ginger functional drinks and 4.78 in green tea functional drinks. As for the lowest result in F1 (0.3 grams extract) with a value of 4.00 on ginger fusional drink and 4.15 on green tea functional drink. The addition of ginger extract and green tea extract gave a significantly different effect on the aroma of functional drinks.

Determination of the best formulation

After performing the organoleptic test results on the formulation based on the preference values for color, taste, and aroma. Next, we will determine the best treatment by taking the highest average value.

Table 4. Ranking of functional drinks with ginger and green tea extract

Treatment	Ginger Extract			Green Tea Extract		
	Color	Taste	Flavour	Color	Taste	Flavour
F1 (0.3 gram extract)	3.96	4.01	4.00	4.05	4.04	4.15
F2 (0.4 gram extract)	3.90	4.26	4.16	4.26	4.55	4.25
F3 (0.5 gram extract)	4.76	5.10	4.63	5.15	4.67	4.78

Based on the organoleptic test on the formulation of the functional drink of green tea extract and ginger extract, it was found that F3 got the highest score with an average of 4.83 for a functional drink of ginger extract and 4.87 for a functional drink of green tea extract.

Moisture content

Table 5. The results of the analysis of the water content of the best formulation of functional drinks with green tea extract and ginger

Treatment	Moisture Content (%wb)
Ginger Extract	8.25
Green Tea Extract	8.23

Based on the results of the analysis of the water content in the best formulation of functional drinks with green tea extract and ginger extract, the results obtained were 8.25% water content in ginger extract functional drinks, and 8.23 in green tea extract functional drinks.

Yield

Table 6. Yield analysis results of the best formulations of green tea and ginger extract functional drinks

Treatment	Yield (%)
Ginger Extract	34.31
Green Tea Extract	33.67

Based on the results of the yield analysis on the formulation of functional drinks with green tea extract and ginger extract, the yield was 34.31% for functional drinks with ginger extract, and 28.31% for functional drinks with green tea extract.

Particel size analysis (PSA)

Table 7. PSA analysis results of the best formulations of green tea and ginger extract functional drinks

Treatment	PSA (nm)
Ginger extract	1930
Green tea extract	1915

Based on the results of PSA analysis on the formulation of functional drinks with green tea extract and ginger extract, the PSA results were 1930nm in functional drinks with ginger extract, and 1915nm in functional drinks with green tea extract.

Solubility

Table 8. Results of the analysis of the solubility level of the best formulation of functional drinks with green tea extract and ginger

Treatment	Solubility (%)
Ginger extract	92.35
Green tea extract	93.05

Based on the results of the analysis of the solubility level in the formulation of the functional drink of green tea extract and ginger extract, the results obtained a solubility rate of 92.35% in the functional drink of ginger extract and 93.05 in the functional drink of green tea extract. This means almost all formulations are water-soluble.

Dissolving time

Table 9. Results of the analysis of the dissolving time of the best formulation of functional drinks with green tea extract and ginger

Treatment	Dissolving Time (second)
Ginger Extract	161
Green Tea Extract	156

Based on the results of the analysis of the dissolving time on the formulation of the functional drink of green tea extract and ginger extract, it was found that the dissolving time was 161 seconds for the functional drink with the ginger extract and 156 for the functional drink with the green tea extract. This indicates that the ginger extract formulation took 161 seconds, and the green tea extract formulation took 156 seconds to dissolve in water.

Hygroscopic

Table 10. Results of the hygroscopic level analysis of the best formulations of functional drinks with green tea extract and ginger

Treatment	Hygroscopic (%)
Ginger Extract	12.23
Green Tea Extract	11.14

Based on the results of the analysis of the hygroscopic level in the formulation of the functional drink of green tea extract and ginger extract, it was found that the hygroscopic level was 12.23% for the functional drink with the ginger extract, and 11.14% for the functional drink with the green tea extract.

Antioxidant activity

Table 11. Results of the analysis of the antioxidant activity of the best formulations of functional drinks with green tea extract and ginger

Treatment	Average Antioxidant activity IC_{50} (ppm)
Ginger Extract	101.12
Green Tea Extract	119.98

Based on the results of the analysis of the antioxidant activity in the formulation of functional drinks with green tea extract and ginger extract, it was found that the antioxidant activity results were 101.12 in functional drinks with ginger extract, and 119.98 in functional drinks with green tea extract.

CONCLUSION

The addition of powder extract to functional drinks affects the substances contained in the drink. The results of this study can be seen from the value of each test parameter. For testing, the best formulation was produced, namely in the F3 treatment, with the addition of 0.5 grams.

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