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Determination of Antioxidant Activity and Organoleptic Score of Kencur (*Kaempferia galanga*) Fortified Bread

Giovany Angelita Siregar[1], Marvel Reuben Suwitono[2,*], Titin Sulastri[3]
[1,2,3]Faculty of Science, Universitas Advent Indonesia.
*Corresponding author's: rsuwitono@unai.edu

Abstract

Kencur (*Kaempferia galanga*), or aromatic ginger, is usually used as a spice, especially in the Southeast Asia region. In Indonesia, the use of Kencur is climbing in the form of drinks and food, which is believed to promote health. Its active chemical constituent, particularly ethyl p-methoxycinnamate, plays an important role as an antioxidant for inflammation and as a traditional medicine to cure metabolic disorders, urinary tract infections, cardiovascular disorders, skin diseases, and many more. This research aims to study kencur fortified bread to enhance the antioxidant content of plain bread, along with its organoleptic test. Dried powdered kencur is macerated in 96% ethanol solvent and concentrated by a vacuum rotary evaporator. DPPH (2,2-diphenyl-1-picrilhydrazil) method is applied to measure antioxidant activity in kencur extract using Rigol U3000 UV/Vis spectrophotometer. The results showed that plain bread has IC 50 288.56 ppm (very weak), 4% kencur bread has IC50 163.10 ppm (weak), 6% kencur bread has IC50 39.86 ppm (very strong), and 8% kencur bread has IC50 36.41 ppm (very strong). The organoleptic test for volunteers is conducted in several categories, including flavor, taste, and texture. The result showed that 6% kencur bread is preferred for flavor and taste, and 4% kencur bread is preferred for the texture of the bread. The research concludes that kencur fortified bread can still be preferred, which is enhanced for its antioxidant content.

Keywords: kencur, antioxidant activity, DPPH, organoleptic

INTRODUCTION

Free radicals are highly reactive molecules because they have unpaired electrons in their outermost orbitals. These free radicals will generally have a chained response like a domino effect that, at the point when it occurs in the body, can cause lasting and continuous damage. Several factors such as stress, radiation, cigarette smoke, and pollution cause the number of free radicals to increase so that the protection system in the body is inadequate (Wahdaningsih et al., 2011). In ordinary amounts, free radicals are beneficial for health, among others, fighting irritation, killing bacteria, and controlling the smooth muscle tone of blood vessels and organs in the body. However, if excessive, free radicals can cause oxidative stress that results in the development of several diseases and also accelerates aging (Yuslianti, 2018).

Free radicals in the body can easily attack healthy cells, and while not in optimal condition, they will get sick, and some diseases can arise, such as cancer, liver, and Alzheimer's. In the body, it naturally has a fortification to prevent attacks of various diseases called antioxidants (Hernani

& Rahardjo, 2006). Antioxidants have the ability to inhibit damage due to the oxidation process of free radicals. Therefore, the body needs antioxidants in order to help the body be protected from free radical attacks (Sayuti & Yenrina, 2015). Antioxidant substances can be found in spices such as kencur. In general, kencur (Kaempferia galanga L.) is used as an herbal ingredient as well as a cooking spice. Kencur has active chemicals such as ethyl cinnamate, ethyl p-methoxycinnamate, p-methoxystiren, karen, borneol, and paraffin (Assaat, 2011). In addition, according to the results of research, Hasanah et al. (2011) showed the content of phytochemicals contained in ethanol extract kencur rhizome, among others flavonoid compounds, polyphenols, tannins, lyons, and sesquiterpenes. The benefits of kencur include antibacterial, antifungal, analgesic, anti-inflammatory, antioxidant, antiviral, antihypertensive, anticarcinogenic, antinociceptive, antituberculosis, and larvicide. Rhizome kencur also has essential oils that can be used as an ingredient in perfumes, medicines, and for inhalant aromatherapy and massage to reduce anxiety, stress, and depression (Kumar, 2014).

Processed kencur as a cooking spice is common among the public, but processed kencur into a practical product and can be enjoyed easily is still very rarely found. Fortification of kencur in bread is expected to increase the nutritional value of bread and also as a medium to increase antioxidant intake for the wider community. Based on the description above, the research is attended to conduct "Antioxidant Activity of Kencur Flour Fortified Bread (Kaempferia galanga L.) As well as the Organoleptic Test."

Test the antioxidant activity in bread extracts fortified kencur flour using the DPPH method (2,2-diphenyl-2-picrylhydrazyl), where these compounds are free radicals that, when interacted with compounds that can neutralize it, will cause the fading color of the free radical compound. Thus, it can indicate the value of inhibition concentration (IC50). The IC50 value is a concentration of antioxidants that can inhibit 50% of free radicals (Cahyanto, 2018). Then organoleptic tests are assessed by filling out a questionnaire on bread fortified kencur flour by volunteers that can show the level of volunteer fondness for kencur bread. And according to Handarsari et al. (2010), organoleptic tests are also carried out with the aim of knowing the quality of food. Taste stimuli that include aroma, taste, and texture are factors that affect the acceptance of food.

MATERIALS AND METHODS

The tools used include drip pipettes, measuring cups, beakers, filter paper, spatula, Erlenmeyer tubes, test tubes, test tube racks, rotator shakers, funnels, vial bottles, vacuum rotary evaporators, UV-Vis spectrophotometers, micropipettes, pens, and labels.

The ingredients used in the study were extracted simplicia of kencur bread, 96% ethanol solvent, and DPPH (2,2-diphenyl-2-picrylhydrazyl).

Preparation of Turmeric Powder and Bread

The preparation of simplicia begins by sorting the kencur, then washed with running water until clean, then lined, then peeled the skin and cut thinly equally. Furthermore, the kencur is dried

using a dryer oven, and after drying, the kencur is mashed using a blender, sizzled, and then the powder is stored in a sealed container and protected from direct sunlight.

The process then continued by making a bread formula that is plain bread and kencur-fortified bread by ratios (4%, 6%, 8%). The formula of the kencur bread is margarine, butter, sugar, egg, salt, milk, yeast, water, high protein flour, and kencur powder. The ingredients are then mixed to form one dough, after which the dough is covered with a cloth at 37 °C for 45 minutes until it expands and will be baked using an electric oven at 120 °C for 15 minutes. Bread is set aside to cool at room temperature and will then be packed with plastic (Sulastri et al., 2019).

Making Simplicia Extract of Kencur Bread

Kencur bread is put into the Erlenmeyer for 100 grams each and soaked with 500 ml of 96% ethanol solvent, then Erlenmeyer is shaken using a rotator shaker for 3×24 hours. The solution will be left for 24 hours, then filtered using filter paper and funnel, and then stored in a closed container and protected from sunlight.

After obtaining the results, the extract is then compressed by evaporation (evaporation) using a rotary evaporator vacuum at a temperature of 50 °C. The obtained viscous extract is put into a petri dish and stored in a place protected from sunlight.

Determination of DPPH Solution Stability, Linearity Test, and Kencur Antioxidant Activity Test

At certain concentrations, the DPPH solution is estimated for the use of pseudo-spectrophotometer absorbance. Then, the concentration is determined using conditions from linearity testing and determines accuracy. DPPH solution is observed its absorbance, which depends on the change in time at a frequency of 517 nm. The results of absorbance data are then observed and presented in a graphical structure (Molyneux, 2004).

The concentration of DPPH solution used in testing antioxidant activity is 40 ug/ml. Furthermore, 7 different concentrations of extract, namely 12.5, 25, 50, 100, 200, 400, 800 ppm with ethanol solvents. The way that is done in testing antioxidant activity is to mix 3 ml of DPPH solution with 2 ml of extract solution and vortexed for 3 seconds. After that, the solution is checked for retention at 517 nm with a spectrophotometer. The absorbance information obtained is converted into antioxidant activity by utilizing the formula, then statistical analysis is carried out.

Organoleptic Test

Tests are done to measure the level of preference for a product. Each panelist is asked to evaluate a product and the parameters used, i.e., (1) smell, (2) taste, (3) texture, and (4) sweetness of kencur bread (Suryono et al., 2018). The five hedonistic scale points are represented as 5 = very likes, 4 = likes, 3 = likes enough 2 = dislikes, and 1 = very dislikes.

RESULTS AND DISCUSSION

Kencur Extract Results (Kaempferia galanga L.)

Table 1 shows that the highest yield of kencur bread extract is bread 4% with a weight of 0.147%, then bread 6% with a weight of 0.144%, and bread 8% with a weight of 0.139%.

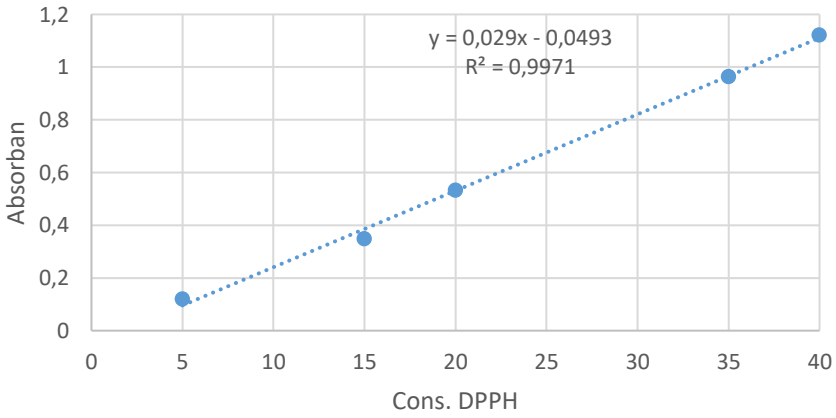
Table 1: Yield of Kencur Bread Extract 4%, 6%, and 8%

Simplisia	Yield (%)	Extract Color
Kencur Bread 4%	14.7	Golden Yellow
Kencur Bread 6%	14.4	Golden Yellow
Kencur Bread 8%	13.9	Golden Yellow

Antioxidant Activity Calibration Curve

The linearity relationship between the concentration and absorbance of the DPPH solution can be seen through the calibration curve shown in Figure 1. From the curve obtained the equation y = 0.029x + 0.0493 and the linearity value is 0.9971.

Figure 1: Linearity calibration curves of DPPH Spectrum



Antioxidant Activity Test

The results of processed free radical concentration data on test samples of plain bread and kencur bread with various concentrations are shown in Table 2.

Table 2: Free Radical Concentration Sample Tests Plain Bread Extract and Kencur Bread

Simplicia	IC_{50} (ppm)	Antioxidant Power Category
Plain Bread	288,5852	Weak
Kencur Bread 4%	163,1039	Weak

Kencur Bread 6%	39,8642	Very Strong
Kencur Bread 8%	36,4127	Very Strong

Organoleptic Tests

Organoleptic test data on fortified kencur bread showed differences in concentration and rating category in bread shown in Table 3. It is found that for the category of the aroma of kencur bread, 6% is preferred with an average value of 3.8, for the taste of kencur bread, 6% is preferred with an average value of 3.85, for the texture of kencur bread, 4% is preferred with an average value of 4.1 and for the sweet taste of kencur bread 6% preferably with an average value of 3.5.

Table 3: Influence of The Level of Fondness for Flavour, Kencur Taste, Texture and Sweetness on Bread (Hedonic Test, n=20)

Parameters	Kencur bread 4%	Kencur bread 6%	Kencur bread 8%
Flavour	3.55 ± 1.16^{a}	3.60 ± 1.11^{a}	3.80 ± 0.98^{a}
Kencur Taste	3.15 ± 1.15^{a}	$3.50 \pm 1.02^{a.b}$	3.85 ± 0.91^{b}
Texture	4.10 ± 0.77^{b}	$4.00 \pm 0.77^{a.b}$	3.75 ± 0.89^{a}
Sweet	3.50 ± 1.02^{a}	3.35 ± 1.28^{a}	3.05 ± 1.20^{a}

Note:

1. Scale 5 (Very Like), 4 (Likes), 3 (Just Like), 2 (Dislike), 1 (Very Dislike)

2. The use of the letters a, ab, b after the numbers on the bread category parameters indicates a class (subset) based on the Duncan test results.

3. The difference in letters in one group of characters indicates a real difference ($P<\alpha$)

CONCLUSION

Based on the analysis of the results of research that has been done, the researcher obtained the following conclusions:

1. Highest yield found in 4% kencur bread extract

2. Antioxidant activity of 6% and 8% kencur bread extract is classified as very strong, while the antioxidant activity of bread extract 4% is classified as weak.

3. The favorite test for the category of aroma / fragrant, kencur taste, and sweetness found that 6% of the preferred kencur bread, while for the preferred 4% bread texture category.

4. Increased concentration of kencur bread extract affects the strength of antioxidant activity

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It is hoped that with this writing, research can be refined to increase the effectiveness and also the useful value of Kencur Flour Fortified Bread so that it can develop and be accepted in the community.

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