Effect of additional balance of temulawak extract (*Curcuma xanthorrhiza* Roxb) on organoleptic characteristics and antioxidant content, of clove (*Eugenia aromaticum*), and Cinnamon (*Cinanomum burmanni*) extracts as functional drinks

Hari Hariadi[1,*] Diang Sagita[1] Asri[1] Hidayat[1] Laila Rahmawati[1] R Cecep E A[1] Saepurahman[1]

[1] *National Research and Innovation Agency*
**Corresponding author. Email : raden_harie@yahoo.com*

ABSTRACT

Temulawak has tremendous potential for its benefits to be developed, in fact, the temulawak plant has advantages equivalent to Korean ginseng so that many people consider temulawak as "Indonesian ginseng". Besides being used as traditional medicine, ginger can be used as a drink, Health drinks are anything that can quench thirst and thirst and also have a beneficial effect on health, This research aims to determine the effect of temulawak enhancers on clove and cinnamon funsional drinks. The reseach was conducted using the Randomized Block Design (RAK) method with 3 treatments (F1 = 9.25 mg / 100grams, F2 = 8.75 mg / 100grams, F3 = 7.75 mg / 100grams) and 3 repetitions. The result on the hedonic test did not have a significantly different effect on the but had a significantly different influence on the content of antioxidants and flavonoids. Based on the results of the hedonic test analysis, antioxidant activity and flavonoid content, it was found that the addition of temulawak 9.25 to the funsional drink with the best treatment, for the hedonic test the value of favorability towards color was 3.38, liking for flavor was 3.50, favorability for flavor, 4.03, favorability for texture 3.10 which indicated that the panelists liked functional drinks with the addition of temulawak as much as 9.25mg / 100grams, the analysis of the highest antioxidant activity was 93, 30 and flavonoid content of 2.59mg/100gr.

Keywords: *Temulawak Extract, Organoleptic Test, Antioxidants, Functional Drinks*

1. INTRODUCTION

Spices have long been known by the public, especially the Indonesian people, as plants that have many benefits. In ancient times, when there was no known medicine as it is today, people used spices for the prevention and treatment of various diseases. Along with the times, which were followed by advances in pharmaceutical and drug technology, many people turned away from spices. This is because medicines are more practical and cure diseases faster than spices which are more therapeutic because they must be consumed regularly. Temulawak is a medicinal plant with pseudo-trunk and has perfectly formed rhizome roots and strong branches and dark green in color. The parent rhizome can have 3-4 rhizomes with reddish brown or dark yellow skin color, while the color of the rhizome flesh is dark orange or yellow. Temulawak has tremendous potential for its benefits to be developed, in fact, the temulawak plant has advantages equivalent to Korean ginseng so that many people consider temulawak as "Indonesian ginseng". Besides being used as traditional medicine, ginger can be

A. D. Saputro et al. (Eds.): ICOSEAT 2022, ABSR 26, pp. 231–236, 2023.
https://doi.org/10.2991/978-94-6463-086-2_30

used as a drink. The efficacy of temulawak drink is its ability to increase stamina by the immunomodulatory activity of curcumin in temulawak, which can increase the body's resistance to disease [1].

Cloves (*Syzygium Aromaticum* or *Eugenia Aromatucum*), cloves in English, are scented dried flower stalks of the Myrtaceace tree family. Cloves contain a number of active substances that kill bacteria. Cloves contain essential oils, kariofilien z-at as well as oleic acid and wax. Clove essential oil has an anesthetic and antibacterial function. It is said to be antibacterial because it is able to inhibit and kill bacteria [2]. Dried clove flowers contain essential oils, fixed oil (fat), resin, tannin, protein, cellulose, pentosan and minerals. Carbohydrates are present in the amount of two-thirds of the weight of flowers. Another component that is the most abundant is essential oils, the amount of which varies depending on many factors including the type of plant, where it grows and how it is processed [3].

Cinnamon is a plant native to AsiaSelatan, Southeast Asia and mainland China, Indonesia is included in it, The main result of cinnamon is the bark of the trunk and branches, while the by-products are twigs and leaves. Cinnamon bark extract with a fairly high trans-sinamaldehyde content (68.65 %) is a source of antioxidant compounds with its ability to capture free radicals or radical scavenger. A study showed that essential oil and cinnamon oleoresin type C. burmanniis have antioxidant activity [4].

Health drinks are anything that can quench thirst and thirst and also have a beneficial effect on health [5]. In general, the manufacture of functional drinks usually only consists of ginger, tamarind and turmeric. However, in this study, the addition of other spices used as raw materials, namely cardamom, lemongrass, cloves and cinnamon. The combination of 7 kinds of spices in a ready-to-drink package can be an alternative consumption of practical and nutritious drinks. Functional drink is a functional food. As functional food, functional drinks must of course fulfill two main functions, namely providing nutritional intake and sensory satisfaction such as good taste and good texture. The process of processing herbal plants into functional drinks requires knowledge of the content of active compounds and formulation techniques [6].

One of the added values that exist in the balance of the ginger and cinnamon functional drink extracts is as a source of antioxidants. Based on the source, antioxidants are divided into endogenous antioxidants, namely enzymes with antioxidant properties, such as: Superoxide Dismutase (SOD), catalase (Cat), and glutathione peroxidase (Gpx), as well as exogenous antioxidants, which are obtained from outside the body/food. Antioxidants are needed to prevent oxidative stress. Oxidative stress is a condition of an imbalance between the amount of free radicals present and the amount of antioxidants in the body [7].

2. METHOD

This research was conducted at the FTIP Laboratory of Padjadjaran University and STIKES Immanuel. The reseach was conducted using the Randomized Block Design (RAK) method with 3 treatments (F1 = 9.25 mg / 100grams, F2 = 8.75 mg / 100grams, F3 = 7.75 mg / 100grams) and 3 repetitions. The ingredients used in this study were aquadest, cinnamon, cloves and temulawak.

The tool used in this study is aquadest, the first langlah in this study is the manufacture of clove extract, cinnamon extract, and temulawak extract which is made using the ultrasound method with a temperature of 50 °C - 60 °C for 120 minutes Method, then the resulting extract is deposited for 24 hours to separate between the ecstasy and the residue that is still stored, after the deposition of clove extract, Cinnamon and temulawak are then dried using a spray dryer, after each extract has formed a powder and then made a formulation that is in accordance with the treatment.

Organoleptic properties with preference or hedonic test on color, taste, texture, and flavor of purple sweet potato extract yogurt were carried out by filling out the hedonic test form by 30 panelists of STIK Immanuel Bandung students. processing hedonic scoring test data with assessment criteria (scores: 1 = very dislike, 2 = dislike, 3 = slightly like, 4 = like, 5 = very like), anthocyanin levels using the pH-Differential-Lambert Beer method (Giusti and Wrolstad, 2001), and flavonoids content using spektrofotometri UV – Vis.

3. RESULTS AND DISCUSSION

3.1. Hedonic Test

The data on the hedonic test results of clove and cinnamon functional drinks with the addition of different ginger extracts, namely F1 = 9.25 mg/ 100gram, F2 = 8.75 mg/ 100gram, F3 = 7.75 mg/ 100gram are as follows:

Table 1. Hedonic test of addition of temulawak balance to the characteristics of functional drinks.

	F1 (9,25 mg/ 100gr)	F2 (8,75 mg/ 100gr)	F3 (7,75 mg/ 100gr)
Color	3,83±0,75[a]	3,73±0,69[a]	3,43±0,82[a]
Flavor	3,50±0,90[a]	3.00±0,79[a]	2,73±0,74[a]
Taste	4,03±0,81[a]	3,70±0,60[a]	3,17±0,75[a]
Texture	3,10±0,71[a]	3,00±0,59[a]	3,13±0,43[a]

The purpose of sensory analysis is to determine the response or impression obtained by the human senses towards an optimization caused by a product [8]. Color plays the most role in food acceptance [9]. based on table 1. The addition of the balance of temulawak extract did not have a significantly different effect on organoleptic properties in terms of color, aroma, taste, and viscosity. The results of the hedonic test of clove and cinnamon functional drinks on color showed that the highest average was in F1 with a result of 3.83, while the lowest average value was found in F3 with a result of 3.43. These results are in accordance with research by [10].

The weakness of curcumin in temulawak, the color is influenced by pH, so to get a stable color a buffer solution is needed. This is due to the ketoenol structure of curcumin. Curcumin in acidic media will be yellow-red in color while in alkaline media it will be brownish-red. Cinnamon has an effect on karema color if ginger is mixed with alkaline-containing ingredients, the color of curcumin changes to brown and red [10]. The results of the hedonic test of functional drink color were highest in the F1 treatment with the addition of 9.25 grams of liquid ginger extract and the lowest was in the F3 treatment with the addition of 7.75 grams of liquid ginger extract.

Flavor is a flavor that indicates a pleasant or pleasant smell. Flavor is a parameter that is difficult to measure, so it usually gives rise to different opinions in assessing the quality of flavor. This is because everyone has a different smell, although everyone can distinguish the flavor, but everyone has a different level of preference [11]. The results of the hedonic test of clove and cinnamon functional drinks on aroma showed that the highest average was in F1 with a result of 3.50, while the lowest average value was found in F3 with a result of 2.73.

Taste is a sensory response to nerve stimulation such as sweet, bitter, sour to the sense of taste and others. Taste is the most dominant factor in a product. Although some of the other parameters look good, if the taste is not liked by consumers, the product is rejected. There are four basic tastes recognized by humans, namely salty, sour, sweet and bitter [12]. The results of the hedonic test of clove and cinnamon functional drinks on taste showed that the highest average was in F1 of 4.03, while the lowest average value was in F3 of 3.17.

Viscosity is the degree of viscosity of a food product. Viscosity is influenced by the amount of concentration of the thickener added. Viscosity is the friction caused by a moving fluid, or a solid object moving in a fluid. The texture of a beverage product includes the viscosity/viscosity used for homogeneous Newtonian fluids, non-Newtonian liquids or heterogeneous liquids, solid products, and semi-solid products [13]. The results of the hedonic test of clove and cinnamon functional drinks on viscosity showed that the highest average was in F3 of 3.13, while the lowest average value was found in F2 of 3.00.

3.2. Antioxidant activity

Table 2. Statistical test results of antioxidant activity.

Treatment	Antioxidant activity
F1 (9,25g ekstrak temulawak)	93,30 ± 0,900[a]
F2 (8,75g ekstrak temulawak)	72,51 ± 0,809[b]
F3 (7,75g ekstrak temulawak)	57,54 ± 0,712[c]

Antioxidants are needed to prevent oxidative stress, which plays an important role in the etiology of various degenerative diseases [7]. A powerful antioxidant that reduces oxidative stress and improves endothelial function through the production of nitric oxide which has a vasodilator effect[14]. Based on table 2, the average antioxidant test produced is between 57.54 - 93.30 ppm, which means it is strong and shows a difference. The highest antioxidant was at F1 of 93.30 ppm with the addition of 9.25 grams of temulawak extract, which means strong according to IC50. While the lowest antioxidant activity at F3 was 57.54 ppm with the addition of ginger extract at 7.75 grams. This is in line with research [15], that the higher the levels of curcuminoids in the extract, the higher the antioxidant capacity. The active components responsible for being antioxidants in temulawak rhizomes are curcumin, demethoxycurcumin and bisdemethoxycurcumin [16].

Temulawak (*Curcuma xhantorriza*) also contains the active substances curcuminoid and ukanon types A, B, C and D which function to optimize the immune system. This is in line with research conducted that the addition of

temulawak extract to clove and cinnamon drinks contains strong antioxidants and can increase body immunity. Based on the results of statistical analysis of the three formulations of adding ginger extract to the manufacture of clove and cinnamon functional drinks, obtained a significant value of $p < (0.05)$, it can be concluded that there are significant differences in antioxidants for both F1, F2 and F3. This can be seen from the test results that the three formulas have different results. Among the three formulations, the formulation that has a strong antioxidant is F1 with the addition of 9.25 grams of temulawak extract.

3.3. Flavonoid

Table 3. Statistical test results of flavonoid content.

Treatment	Flavonoid Content
F1 (9,25g ekstrak temulawak)	$2,59 \pm 0,900^{a}$
F2 (8,75g ekstrak temulawak)	$1,65 \pm 0,809^{b}$
F3 (7,75g ekstrak temulawak)	$1,14 \pm 0,712^{c}$

Flavonoids are secondary metabolites of polyphenols, found widely in plants and food and have various bioactive effects including anti-viral, anti-inflamsmatory [17]. Based on Table 3, it is known that the flavonoid which has the highest value in the F1 formula is 2.59 mg with the addition of ginger extract of 9.25 grams. Flavonoids for plants function to protect themselves from disease and the surrounding environment, while the function of flavonoids for the human body is to prevent cardiovascular disease, because flavonoids are phenolic compounds that have antioxidant properties that play a role in preventing cell damage by reactive free radicals [18]. Based on the statistical results of the three formulations of adding ginger extract to the manufacture of clove and cinnamon functional drinks, a significant value of $p < (0.05)$ was obtained, so there was a significant difference in flavonoid levels. If it is seen from the Duncan test results that F2 and F3 are not significantly different, but F1 and F2 are significantly different as well as F1 and F3 are significantly different. Based on the Duncan test results, the best formula is F1.

4. CONCLUSION

The addition of temulawak extract to the functional drinks of clove and cinnamon extracts did not have a significantly different effect on the hedonic test but had a significantly different influence on the content of antioxidants and flavonoids. Based on the results of the hedonic test analysis, antioxidant activity and flavonoid content, it was found that the addition of temulawak 9.25 to the funsional drink with the best treatment, for the hedonic test the value of favorability towards color was 3.38, liking for flavor was 3.50, favorability for flavor, 4.03, favorability for texture 3.10 which indicated that the panelists liked functional drinks with the addition of temulawak as much as 9.25mg / 100grams, the analysis of the highest antioxidant activity was 93, 30 and flavonoid content of 2.59mg/100gr.

REFERENCES

[1] Moehady, Serbuk Temulawak Sebagai Bahan Baku Minuman. Jurnal Teknik Kimia. 1(2). 58, 2015.

[2] Saraswati D., Kiu H., Kadir S, Ekstrak Bawang Merah Dan Ekstrak Bawang Putih Sebagai Pengusir Nyamuk Culex Sp Yang Ramah Lingkungan. jurnal. Fakultas IlmuIlmu Kesehatan Dan Keolahragaan Gorontalo 2014.

[3] Purseglove, J.W, E B. Brown, C. L green and S. R. J. Robbins. 1981. Spices. Vol I. Longman, London and New York P. 229 – 285, 1981.

[4] Prasetyaningrum, Utami R., dan Anandita R.B.K, Aktivitas Antioksidan, Total Fenol, dan Antibakteri Minyak Atsiri dan Oleoresin Kayu Manis (Cinnamomum burmannii). Jurnal Teknosains PanganVol 1 No 1: 24-31, 2012.

[5] Winarti, S., Minuman Kesehatan. Trubus Agrisarana, Surabaya, 2006.

[6] Widyantari Sauca, FORMULASI MINUMAN FUNGSIONAL TERHADAP AKTIVITAS ANTIOKSIDAN. Vol.2 Health Journal Vol.2 22-29. 2013

[7]. Asri Wedhasari, Peran antioksidan bagi kesehatan, Jurnal Biotek Medisiana Indonesia, vol. 3, no. 2, hh. 59-68, 2014.

[8] Setyaningsih, D., A. Apriyantono dan M. P. Sari, Analisis Sensoris untuk Industri Pangan dan Agro. Perpustakaan Nasional: Katalog dalam Terbitan (KDT). Bogor 2010.

[9] Winarno 2002 Winarno. Kimia Pangan dan Gizi, PT. Gramedia Pustaka Utama. Jakarta. 2002.

[10] Koswara, S, Pewarna alami : Produksi dan Penggunaannya. eBookPangan.com, 2009.

[11] Manik., Sawitri dan Tri, Susilorini. 2009. Produk Olahan Susu. Penebar Swadaya. Jakarta. 2009.

[12] Soekarto, S, Penilaian Organoleptik untuk Industri Pangan dan Hasil Pertanian. Bharata Karya Aksara. Jakarta, 2009.

[13] Meilgard, M., Civille, GV and Carr, B. T, Sensory Evaluation Techniques Fourth Edition. CRC Press. United State of America, 2006.

[14] Briawan, D., Anemia: Masalah Gizi pada Remaja Wanita. In: Anemia: Masalah Gizi pada Remaja Wanita. Jakarta: EGC, pp. 23-25, 2013.

[15] Rosidi, A., Khomsan, A., Setiawan, B., Riyadi, H., & Briawan, D, POTENSI TEMULAWAK (Curcuma xanthorrhiza Roxb) SEBAGAI ANTIOKSIDAN, 2014.

[16] Masuda 1992, Masuda T, Isobe J, Jitoe A, Naktani, Nobuji, Antioxidative curcuminoids from rhizomes of Curcuma xanthorrhiza. Phytochemistry. 31(10): 36453647, 1992.

[17] Wang, Qinghu., Jinmei, J., Nayintai, D., Narenchaoketu, H., Jingjing, H., Baiyinmuqier, B, AntiInûammatory Effects, Nuclear Magnetic Resonance Identiûcation and High Performance Liquid Chromatography Isolation of The Total Flavonoids From Artemisia Frigida. Journal Of Food and Drug Analysis. 24: 385-391, 2016.

[18] Minanti Arna Ekawati, I Wayan Suirta, Sri Rahayu Santi, SOLASI DAN IDENTIFIKASI SENYAWA FLAVONOID PADA DAUN SEMBUKAN (Paederia foetida L) SERTA UJI AKTIVITASNYA SEBAGAI ANTIOKSIDAN JURNAL KIMIA 11 (1), JANUARI 2017: 43-48 , 2017.