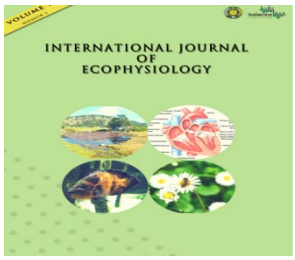
International Journal of Ecophysiology



Organoleptic evaluation and chemical tests of various formulations of kencur drink (*Kaemfelia galanga* L.): efforts to find the best formulation to increase body immunity

Syafruddin Ilyas*[1], Salomo Hutahaean[1]

[1]*Department of Biology, Fakulty of MIPA, Universitas Sumatera Utara, Jln. Bioteknologi No.1, Kampus USU, Padang Bulan, Medan 20155.*

Abstract. *Kencur drink is one of the traditional drinks that has been known to be popular and has become an icon for daily healthy drinks. Kencur drink is very useful in preventing and treating diarrhea in Indonesia, can prevent colds and flu. Kencur can also prevent cancer, stop vomiting, prevent and treat fungi, lower cholesterol and improve appetite. Therefore, various ways are done so that this kencur drink remains a healthy daily drink, such as giving a mixture of other ingredients, one of which is the provision of stevia leaf extract. There is also the addition of lemon, brown sugar, and others. Methods in the study with the addition of stevia extract were increased from groups one to six. While other compositions remain such as kencur, lemon and brown sugar. From the results of the study it was obtained that the addition of stevia leaf extract was the highest most preferred and contained vitamin C which was more abundant with other groups. It was concluded that giving stevia leaf extract as much as 24.24% became a favorite drink and had the highest vitamin C content.*

Keywords: *kencur, formulation, organoleptic*

Received [5 December 2022] | Revised [20 January 2023] | Accepted [22 February 2023]

1. Introduction

Kaempferia galanga L. belongs to the rhizome medicinal plants of the Family Zingiberaceae, with the local name kecur. Kencur is an herbal drink that has become a culture in Southeast Asian countries, namely. China, Malaysia, Thailand, India, and Indonesia. In Indonesia, especially in the Sibayak Forest of North Sumatra, 11 species of Zingiberaceae have been found, namely Globba nawawii Ibrahim & K. Larsen, Globba paniculata Valeton, Globba patens Miq, Globba pendula Roxb., Etlingera alatior (Jack), R.M. Sm., Etlingera littoralis

*Corresponding author at: Biology Study Program, Faculty of Mathematics and Natural Sciences, Universitas Sumatera Utara, Medan, Indonesia

E-mail address: *syafruddin6@usu.ac.id*

DOI: 10.32734/ijoep.v5i1.12387
Journal Homepage: http://ijoep.usu.ac.id

(J.Konig) Giseke, Amomum ochreum Ridl., Curcuma sp., Hedychium coronarium Koenig., Hornstedtia tomentosa (Blume) bakh.f., and Zingiber multibracteata Holtt [1]. All types of Zingiberaceae found belong to the 7 Genus. The most common species found are from the genus Globba, as many as 4 species [2].

Various kinds of uses of K. galanga such as for medicine and culinary. So it is useful for health, food variety, and also for documented nutritional purposes. Some people use kencur for cooking spices, medicine as in other Indian [3], Chinese[4], and Southeast Asian cuisines, especially Indonesia[5]. Most people use K. galanga for pickles with its health value. However, scientific studies on its practical use with a determined nutritional status and safety have not been conducted.

The expansion of the benefits of new health products using the combined concept of "whole foods" and selective plant bioactives, has been a very exciting field of research. 'Beras Kencur' is known to many as a Javanese drink made from K. galanga tubers [4]. In China, kencur is included in Traditional Chinese Medicine (TCM), and is used to treat cholera, constipation, bruises, and stomach pain. In Thailand, it is used to treat menstrual disorders and dyspepsia. In some places, rhizomes are used to treat several diseases, such as amoebiasis, fever, headache, bruises, dandruff, rheumatism, abdominal pain, toothache, cold, and chest pain. In Bangladesh, essential oils from rhizomes or leaves are used for perfumes in vinegar, hair washes, cosmetic powders, as flavoring for food or beverages. In Indonesia and Malaysia, it is used for traditional herbal ingredients, known as 'Makjun' and Jamu, often consumed for health.

In addition to its traditional use in several countries, studies have been carried out in experimental studies such as research on *K. galanga* as a cytotoxic, antioxidant, anti-inflammatory, sedative, vasorelactan, anti-angiogenic, antinociceptive, and wound healing activity. The pharmacological activity of the rhizome of *K. galanga* is mainly due to the presence of secondary metabolites of a different nature. Ethyl-p-methoxycinnamate (EPMC) is a key compound of *K. galanga* rhizoma has been reported as a bioactive secondary metabolite of *K. galanga* rhizome (KGR).

In this study, the use of K. galanga-based herbal medicine was carried out by changing the composition of Stevia sugar sources. Therefore, various tests will be used as measuring parameters so that it can be determined which Stevia composition is better and preferred.In this study, the use of K. galanga-based herbal medicine was carried out by changing the composition of Stevia sugar sources. Therefore, various tests will be used as measuring parameters so that it can be determined which Stevia composition is better and preferred.

2. Materials and Methods

The study used kencur (Kaemferia galanga L.), sugar, lemon, and stevia (Stevia rebaudiana). Some of the chemical materials used in the study include gallic acid, quercetin, AlCl3, Na2CO3, methanol p.a, folinciocalteau, and potassium acetate.

The tools used are: 80 mesh siever, analytical balance, spectrophotometer, grinder, condenser, aerator, pan, stirrer, pipette, measuring flask, 3 neck flask, laboratory glassware, and stove.

Material Preparation

The prepared kencur is washed thoroughly and with a blender mashed so that when given water it looks like porridge. The dried stevia is mashed with a grinder and then sifted with an 80 mesh sieve until a homogeneous powder is formed.

Extract from Stevia

In the flask with 'triple neck' that already has aquades, stevia powder with a composition of 1: 1 (b / v) is inserted. Then heated 100oC-30 minutes for extraction. After heating is complete, it is then put into a baker's glass and cover with aluminum foil. After that put in the refrigerator for 24 hours. Paper is often used to filter the extract formed so that it separates stevia leaf extract. The distillation process is carried out at a temperature of 100oC until the solvent does not drip anymore. This result can be used or stored in the refrigerator.

Compounding Kencur Drink

The source of the drink is kencur extract, lemon juice, brown sugar, and stevia extract, mixed in a pan. Heated 100oC the result of the mixture, stir thickly and become a dry powder. Repetition of these steps is performed for the various compositions listed in Table 1.

Table 1. The composition of the formulation of kencur drinkTable 1. The composition of the formulation of kencur drink

Groups	Kencur (mL)	Lemon (mL)	Brown sugar (g)	Stevia (mL) (%)
K1	60	3	12	4 (5,06)
K2	60	3	12	8 (9,64)
K3	60	3	12	12 (13,79)
K4	60	3	12	16 (17,58)
K5	60	3	12	20 (21,05)
K6	60	3	12	24 (24,24)

Vitamin C Test

In the existing Erlenmeyer aquades 9 ml samples are put 1 ml and dilute again by entering 15 ml aquades and amylum 1%. Perform titration with 0.01 N iodine solution until it turns blue. Ten mL of sodium thiosulfate was fed to Erlenmeyer. Then put 5 ml of 6 N HCl solution, KI-10% 2 ml, 2 ml of 1 amylum solution, and finally titrated using 0.01 N iodine solution until blue color appears.

Total Sugar content measurement

Measurement of sugar content by spretrophotometric method. One mL sample is dissolved in 10 mL aquades. The sample solution formed is taken 10 µ (0.01 mL) and piptted into a test tube. Then, it is inserted with a 1000 µ/1 mL glucose color reagent micropipette. Then incubated 10 minutes, 37oC. The last is placed in a spectrophotometer with a lamda of 546 nm.

Organoleptic Measurement

Organoleptic measurement uses a hedonic test consisting of flavour, steeping color and taste. There are 6 numerical scales namely (1) strongly dislike, (2) dislike, (3) neutral, (4) like, (5) strongly like. The measurements were carried out at the same time with 25 panelists.

3. Result and Discussion

Vitamin C Test

Determination of vitamin C (ascorbic acid) is carried out by iodimetry titration (direct titration). It is based on the property that vitamin C can react with I2. From the results of Table 2, it shows that the highest sample vitamin C levels were 1.40±0.25 in the K6 group. While the K1 group had the lowest vitamin C levels of 1.13±0.25. From Table 2, vitamin C levels from sample K1 to sample K6 showed an increase although the increase did not differ markedly ($p>0.05$). This is because the source of vitamin C in drinks comes from lemon and stavia. For Stevia is given more in the higher group. As stated by Simarmata et al, [6], that stevia extract contains high vitamin C, which is 11.66 mg of ascorbic acid / 10 ml.

Table 2. Vitamin C Content

Group	Average±SD
K1	1,13±0,02
K2	1,23±0,09
K3	1,28±0,06
K4	1,34±0,09
K5	1,37±0,26
K6	1,40±0,25

Total Sugar Content

Drinks derived from kencur must have a sweet taste derived from sugar. Sugar content can be obtained from brown sugar / arena sugar or stevia sugar. The combination of the two can determine the sweetness of the kencur drink that is being made. In Table 3 the highest high sugar content is due to the addition of high sucrose levels in the formulation.

Table 3. Total sugar content (g/mL)

Groups	Average ± SD
K1	4,575±0,051
K2	4,686±0,045
K3	4,803±0,066
K4	4,901±0,021
K5	4,962±0,028
K6	5,168±0,033

Table 3 shows that the highest total sugar content was 5.168 g/mL in group 6 (K6). While the K1 sample had the lowest total sugar content of 4.211. From sample 0 to sample 6 showed an increase in total sugar levels although there was no significant difference between treatment groups ($p>0.05$). The sugar content makes the drink taste sweet which is sourced from red gura (palm sugar). Palm sugar contains high enough glucose that can cleanse the kidneys thus avoiding kidney disease [7]. Stevia sugar Stevia is a natural sweetener other than sugar cane sweetener with a sweetness level of 200 – 300 times that of cane sucrose sugar. [5]

Organoleptic test

Flavour Assessmen

In flavour testing for organoleptic tests requires panelists who are sensitive to flavour tests. Panelists' sensitivity is very necessary to perform organoleptic tests. From Table 4, it can be seen that panelists favored scents in groups 1, 2, and 3 with an average of 3.09. While the panelists least liked the flavour in sample 6 with an average of 2.80. The flavour that appears is certainly related to the composition formed in these groups.

Table 4. Organoleptic test on flavour assessment

Group	Average±SD
K1	3.17±0.75
K2	3.13±0.73
K3	3.07±0.64
K4	2.87±0.63
K5	2.73±0.64
K6	2.80±0.76

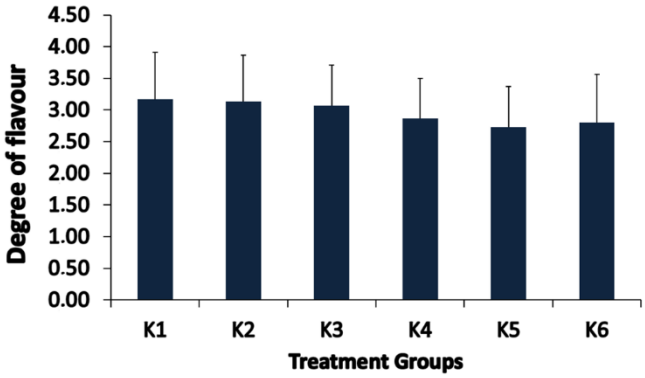


Figure 1. Flavour Assessment

Flavour is important in the assessment of a processed food product because it can provide a quick assessment of the product's acceptance to consumers. Flavour is a special attraction in many ways in determining the good taste of a processed food product. Panelists' disinterest in K6 can be overcome by adding lemon from what has been given. Lemon can play a role in relieving unpleasant flavours. Similar to lemon, it has been known to use vinegar, lime (*Citrus aurantifolia*) and star fruit (*averrhoa bilimbi*) to reduce the fishy smell of kite fish petis (*Decapterus* spp.) [9]

Degree of color

Based on Table 5, it can be seen that the panelists' preference for color with the addition of stevia extract by 4 to 24 mL there was a significant difference between other groups. From the picture above, it shows that panelists like colors in groups K1 (3.40±0.62) and K2 (3.33±0.61). and dislike colors in groups K3 (3.20±0.61) to K6 (2.87±0.68). This is because the color of kencur in this spice mixture is darkened by other colors, such as the color of dry leaves from stevia extract along with the addition of stevia extract. It is noticeable that the color of the spice mixture given a little stevia leaf extract (K1 = 4 mL) produces a lighter green color due to the lack of influence of stevia leaf extract. As for the color in the herbal mixture formula, it has a tendency to be solid green. The higher the concentration of stevia extract, the more concentrated and darker the resulting green color [5].

Based on Table 5, it can be seen that the panelists' preference for color with the addition of stevia extract by 4 to 24 mL there was a significant difference between other groups. From the picture above, it shows that panelists like colors in groups K1 (3.40±0.62) and K2 (3.33±0.61). and dislike colors in groups K3 (3.20±0.61) to K6 (2.87±0.68). This is because the color of kencur in this spice mixture is darkened by other colors, such as the color of dry leaves from stevia extract along with the addition of stevia extract. It is noticeable that the color of the

spice mixture given a little stevia leaf extract (K1 = 4 mL) produces a lighter green color due to the lack of influence of stevia leaf extract. As for the color in the herbal mixture formula, it has a tendency to be solid green.

Table 5. Organoleptic test of the degree of color

Group	Average ± SD
K1	3.40±0.62
K2	3.33±0.61
K3	3.20±0.61
K4	3.17±0.83
K5	2.93±0.69
K6	2.87±0.68

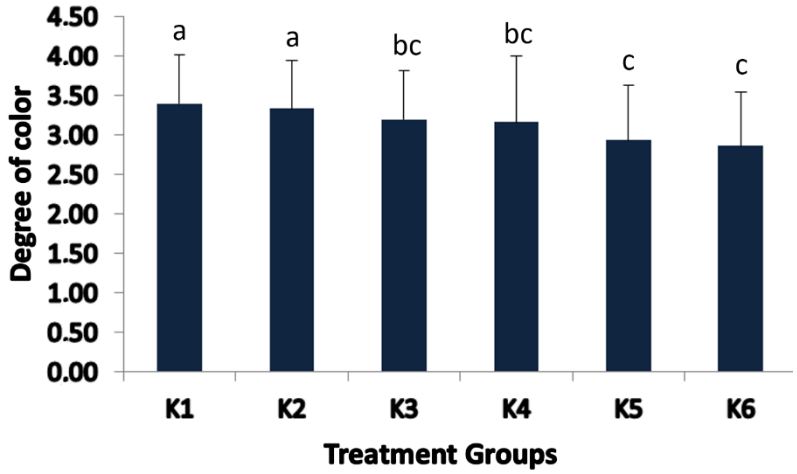


Figure 1. Flavour Assessment

Degree of favorite

Based on the results of organoleptic tests (Table 6, Figure 3) on the taste of herbal mixtures (herbs) it was obtained that group six (K6) added stevia leaf extract 24 mL. The unique sweetness of stevia leaf extract gave the panelists a distinctive taste, giving the highest score compared to group one (K1 to K6). Stevia leaves (Stevia rebaudiana) are a sweetener low in total sugar and calories. The sweetness in stevia leaves comes from the glycoside content which consists of 2 main components, namely stevioside (3-10% of the dry weight of the leaf) and rebaudioside (1-3% of the dry weight of the leaf) [10]

Table 6. Organoleptic test on degree of favorite

Groups	Average ± SD
K1	2.67±0.48
K2	3.00±0.79
K3	3.10±0.66
K4	3.20±0.61
K5	3.23±0.57
K6	3.30±0.53

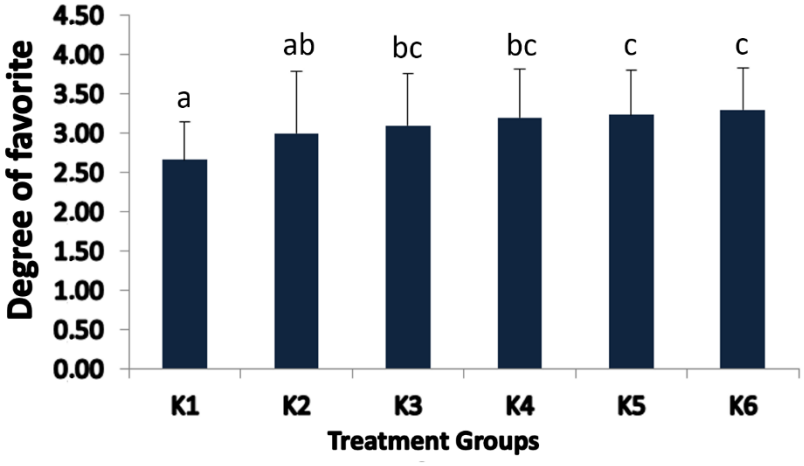


Figure 3. Favorite Assessment

The figure above shows that panelists liked the taste in Group K3 (3.10±0.66) up to an average of 3.30±0.53.

4. Conclusion

Based on the research that has been done, it can be concluded that drinks derived from a mixture of basic ingredients kencur, lemon, brown sugar and stevia contain vitamin C which can function as an antioxidant. The total sugar content contained in the functional instant drink kencur stevia was between 4.56-5.17 mg/mL, and from organoleptic tests the panelists favored samples with stevia levels of 24 mL (levels 24.24 %).

Acknowledgement

Acknowledgments for the assistance of USU's NON PNBP Fund in 2020. In accordance with the Letter of Assignment Agreement for the Implementation of the Skim Community Service "Program - Mono Tahun Reguler", number: 108/UN5.2.3.2.1/PPM/2020, 20 Juli 2020. Community service institutions, Universitas Sumatera Utara, Medan, 2020.

Reference

[1] M. A. Hutasuhut, "Inventarisasi Jenis-Jenis Zingiberaceae Di Hutan Telagah Taman Nasional Gunung Leuser Kabupaten Langkat Sumatera Utara," *KLOROFIL J. Ilmu Biol. dan Terap.*, vol. 2, no. 1, p. 14, 2018, doi: 10.30821/kfl:jibt.v2i1.7824.

[2] V. Andini, R. Rafdinal, and M. Turnip, "Inventarisasi Zingiberaceae Di Kawasan Hutan Tembawang Desa Sumber Karya Kecamatan Teriak Kabupaten Bengkayang," *J. Protobiont*, vol. 9, no. 1, pp. 87–94, 2020, doi: 10.26418/protobiont.v9i1.42165.

[3] S. Y. Wang *et al.*, "Kaempferia galanga L.: Progresses in Phytochemistry, Pharmacology, Toxicology and Ethnomedicinal Uses," *Front. Pharmacol.*, vol. 12, no. October, pp. 1–17, 2021, doi: 10.3389/fphar.2021.675350.

[4] N. Srivastava, S. Mishra, H. Iqbal, D. Chanda, and K. Shanker, "Standardization of Kaempferia galanga L. rhizome and vasorelaxation effect of its key metabolite ethyl p-methoxycinnamate," *J. Ethnopharmacol.*, vol. 271, no. February, p. 113911, 2021, doi: 10.1016/j.jep.2021.113911.

[5] A. S. Manikam, W. S. Pertiwi, A. Hidayanto, and K. Harismah, "Potensi Ekstrak Daun Stevia (Stevia Rebaudiana Bertoni) pada Formulasi Obat Kumur Terhadap Aktivitas Antibakteri Streptococcus Mutans," *6th Univ. Res. Colloq.*, pp. 27–34, 2017.

[6] E. F. Simarmata, M. M. Herawati, and A. J. Sutrisno, "Komposisi Ekstrak Stevia (Stevia Karakteristik Sirup Bit (Beta vulgaris L .) rebaudiana) Terhadap The Composition of Stevia (Stevia rebaudiana) Extract on The Characteristic Beet (Beta vulgaris L .) Syrup," *J. Penelit. Pertan. Terap.*, vol. 17, no. 3, pp. 215–223, 2019.

[7] A. Lingawan *et al.*, "Gula Aren: Si Hitam Manis Pembawa Keuntungan dengan Segudang Potensi," *J. Pemberdaya. Masy. Indones.*, vol. 1, no. 1, pp. 1–25, 2019, doi: 10.21632/jpmi.1.1.1-25.

[8] R. . Ratnani and R. Anggraeni, "Rebaudiana Bertoni," *Momentum*, vol. 1, no. 2, pp. 27–32, 2013.

[9] D. Poernomo, S. H. Suseno, and A. Wijatmoko, "Pemanfaatan Asam Cuka, Jeruk Nipis (Citrus Aurantifolia) dan Belimbing Wuluh (Averrhoa bilimbi) untuk Mengurangi Bau Amis Petis Ikan Layang (Decapterus spp.)," *J. Pengolah. Has. Perikan. Indones.*, vol. 7, no. 2, pp. 11–18, 2004.

[10] S. M. P. N. Semarang, "Online di : http://ejournal-s1.undip.ac.id/index.php/jnc Journal of Nutrition College , Volume 3 , Nomor 4 , Tahun 2014," vol. 3, pp. 647–654, 2014.