

PAPER • OPEN ACCESS

The processing methods and total phenol content of some of West Sumatra's traditional beverages

To cite this article: Nela Eska Putri *et al* 2022 *IOP Conf. Ser.: Earth Environ. Sci.* **1097** 012038

View the [article online](#) for updates and enhancements.

You may also like

- [Determination of caffeine content in tea beverages](#)

Jianbin Shao and Yiping Zhang

- [Thermal-cycling, simulated brushing, and beverages induced color changes and roughness of CAD/CAM poly \(methyl methacrylate\) denture resins](#)

Sara Mohammad Al Taweel, Afnan Al Fouzan, Hanan N Al-Otaibi *et al.*

- ["Sniffing" Toxic Methanol in Laced Beverages By a Fully-Integrated and Portable Analyzer](#)

Andreas T. Guntner, Sebastian Abegg, Leandro Magro *et al.*



The Electrochemical Society
Advancing solid state & electrochemical science & technology

243rd ECS Meeting with SOFC-XVIII

More than 50 symposia are available!

Present your research and accelerate science

Boston, MA • May 28 – June 2, 2023

[Learn more and submit!](#)

This content was downloaded from IP address 182.1.3.152 on 22/10/2022 at 15:02

The processing methods and total phenol content of some of West Sumatra's traditional beverages

Nela Eska Putri, Rilma Novita*, Rozi Satria Utama

Politeknik Pertanian Negeri Payakumbuh, West Sumatera, Indonesia

*rilma.novita@gmail.com

Abstract. West Sumatra is recognized for having various traditional beverages that can boost physical stamina. Farmers drink them to increase their energy levels after working all day. The health advantages of these beverages are producing rich nutrients and improving secondary metabolites, such as phenol compounds that naturally exist in plants as the beverages' raw material. This study aimed to investigate steps to prepare West Sumatra's traditional beverages and their total phenol. The research began with observing beverage samples collected from various locations. The next step was testing the total phenol in the drinks. Five traditional beverage varieties were chosen from Payakumbuh City and Limapuluh Kota Regency by considering a number of factors: (1) how common these beverages were in the community, (2) how freely they were sold, (3) how quickly they were delivered, and (4) how widely they were distributed throughout West Sumatra. These beverages were young coconut drink, *aia niro* (sap drink), sugarcane juice, *kahwa daun* drink, and *teh talua* (egg tea). *Kahwa daun* is made from coffee plant leaves dried by heating, smoking, or roasting. Sugarcane juice is produced by crushing sugarcane stalks and filtering the liquid. *Aia niro* is obtained by extracting the male fruits of palm stems from flower bunches. Meanwhile, *teh talua* is produced with blended egg yolks, filtered hot tea water, sugar, and lime water. The results showed that total phenol content in young coconut, *aia niro*, sugarcane juice, *kahwa daun*, and *teh talua* beverages were 47.86, 84.94, 422.95, 508.52, and 1489.75 mg gallic acid equivalent/L, respectively.

Keywords: *aia niro*, *kahwa daun*, sugarcane juice, *teh talua*, total phenol

1. Introduction

Traditional beverages are those that have been consumed by locals for generations. They are taken because they provide health benefits, such as improving stamina and healing sickness. Meanwhile, farmers in West Sumatra drink traditional beverages to boost their energy levels after work. Some of the traditional beverages that are still consumed by West Sumatra people are *kahwa daun*, *aia niro*, root water, grass jelly, *cendol*, sugar cane juice, *teh talua*, and young coconut water. Traditional beverages are usually produced from endemic plants in a region. Leaves, stems, fruits, flowers, and roots are to produce these beverages using various processing techniques to create the optimal recipe with a particular flavor, aroma, and appearance. In addition, natural food additives are used to provide a certain flavor or improve the shelf life of traditional drinks.

The *kahwa daun* drink is made by steeping dried coffee leaves. The type of coffee leaves that are commonly used is Robusta leaves [1]. This drink has a similar color to tea water and is commonly served in coconut shells [2]. West Sumatra farmers usually grow coffee in their gardens or even in their yards. The statistical data reported that West Sumatra produced 29,539 tons of coffee in 2020, and it



was planted in almost all regions of the province. Robusta and Arabica are two varieties of coffee cultivated in West Sumatera [3].

Aia niro is a colorless drink derived from palm sap, and its taste is similar to coconut water's. *Aia niro* is consumed fresh, whereas the natural fermentation of *aia niro* is called *tuak*. Unfermented palm sap is one of the ideal health drinks [4]. The statistical data reported that Tanah Datar Regency produced the most palm products in West Sumatera, followed by Limapuluh Kota Regency [3].

Young coconut water is one of the most popular beverages since it is consumed fresh. The osmolarity of an isotonic drink of coconut water is similar to that of bodily fluids. According to [5], consuming young coconut water helps minimize the work fatigue of fishermen because it contains electrolyte ions, such as potassium and sodium, which restore body fluids lost via perspiration. Furthermore, drinking young coconut water can reduce job tiredness in transportation workers by up to 42.3 milliseconds [6]. The statistical data denoted that the production of coconut plants in West Sumatera Province was 78,348 tons in 2020. Coconut trees are grown in every district, and Padang Pariaman Regency is the biggest producer [3].

Sugarcane juice, commonly known as *aia tabu*, is popular among West Sumatera people. This beverage may be found in traditional markets, schools, hospitals, sporting events, and roadsides. The statistical data informed that sugarcane production of West Sumatera was 4,894 tons in 2020; Tanah Datar and Agam Regencies were the most producers of sugarcane [3].

The *teh talua* drink is made by mixing tea with egg yolks, sugar, and multiple additional ingredients and has a particular flavor. The local people believe that this beverage may give them better stamina or vitality. In West Sumatera, this drink is often available at stalls or restaurants.

Plants naturally contain bioactive compounds that can function as antioxidants or metabolic stimulants. Phenolic compounds are one of the numerous bioactive components contained in plants, and they can prevent oxidation reactions. According to [7], phenolic compounds, which include phenolics and polyphenols, have strong antioxidant activities. In the oxidation reaction, phenol molecules contribute to a bitter taste and a brownish color. Food processing and preservation aim to improve the taste and increase the shelf life of the food. Moreover, processing can affect the physical and chemical properties of food. This research aimed to identify the processing methods of some traditional beverages in West Sumatera and investigate their total phenol.

2. Methodology

This observational research started with collecting traditional beverage samples from various places, followed by analyzing the total phenol contained in the beverages.

Step 1. Observational research. Five varieties of traditional beverages were selected from Payakumbuh City and Limapuluh Kota District based on four factors: (1) how common they were in the community, (2) how freely they were sold, (3) how fast they were delivered, and (4) how widespread they are in West Sumatera. Five varieties of traditional beverages were selected: young coconut drink, *aia niro* (sap drink), sugar cane drink, *kahwa daun* drink, and *teh talua* drink (egg tea). In addition, a literature review was conducted to investigate the process of these beverages regularly consumed by West Sumatera residents.

Step 2. Total phenol levels in young coconut drink, *aia niro* (palm sap), sugar cane drink, *kahwa daun* drink, and tea talua (egg tea). A spectrophotometer using the Folin-Ciocalteu reagent was used to measure total phenol. In a 100 mL volumetric flask, 1 mL of each drink sample was inserted. After that, 70 mL of distilled water and 5 mL of Folin-Ciocalteu reagent were added and incubated at room temperature for 1-8 minutes. Then 15 mL of sodium carbonate solution were added. Then, distilled water was added until the mixture reached a volume of 100 mL, and the mixture was incubated at room temperature for 2 hours. A total of 2 mL of the sample solution was placed into a cuvette, and the absorbance was measured at a wavelength of 765 nm using a spectrophotometer. To obtain a standard curve, this operation is repeated for blanks (without adding samples). The standard curve is used to determine the expected gallic acid content in the sample. Total phenol contents were measured in mg of gallic acid equivalent per liter.

3. Result and Discussion

Preparation of *kahwa daun* drink

We found two types for preparing *kahwa daun* drink by considering [1] and [8] methods. This drink is made using Robusta coffee leaves in the following fashion. Firstly, the leaves are sorted and cleaned. Then they are reduced in size and dried at 45°C for two hours. Then, they are roasted for five minutes at 40°C. After that, they are blended and sieved using a 30-mesh sieve. The dried coffee leaf powder is brewed in hot water at 80–90°C and then filtered [8]. The process of making *kahwa daun* drinks has developed among West Sumatra people and consists of three steps: cooking, brewing, and dissolving methods. In the cooking method, coffee leaves are boiled until boiled. Then, the coffee leaves are brewed in hot water at a temperature of 80-90°C. The dissolving method for coffee leaves is to heat water until it boils. The coffee leaves are added. Finally, let them simmer for 3-5 minutes. The coffee leaves used in this recipe are dried coffee leaves [1].

Preparation of *aia niro* (palm sap)

The *aia niro* drink is produced from the sap of palm trees, which are collected with a bamboo tube. Pieces of mangosteen peel are put into the container tube to slow the occurrence of sap damage [9]. The sap tapping procedure might take up to 15 hours. *Aia niro* is consumed fresh (unfermented). The suggested storage duration for people who want to consume *siwalan* sap from afternoon tapping is three hours. There will be a fermentation process after three hours of storage; however, this process may be prevented by keeping the palm sap at a low temperature or pasteurizing it to inhibit the microbial growth in the palm sap [10]. Temperature and storage duration affect the pH and color of palm sap. When the storage temperature is higher, the pH declined faster, and the values of L (lightness) and b (yellowness) decrease [11].

Preparation of young coconut water drink

Coconut water is found inside the coconut (endosperm). To make this beverage, break a young coconut and pour the coconut water into a glass. This drink can be consumed pure or flavored with ice and brown sugar. The age, variety, and environment where the coconut grows influence the composition of young coconut water. A four-month young coconut has thin and soft flesh, whereas a six-month coconut has thick and soft flesh [12]. Meanwhile, six-to-eight-month coconuts have a high potassium content; thus, drinking young coconut water will get more potassium [13].

Preparation of sugarcane juice

Sugarcane juice is made by pressing and filtering cleaned sugarcane stalks. It is usually served cold and chilled in a food cooler or ice cubes. Fresh sugarcane juice contains a total dissolved solid of 19.4 brix, a pH of 4.35, and an acidity level of 0.085% [14]. Sugarcane juice has a self-life of 94 days after being pasteurized for 30 seconds at 90°C and then kept at 4°C. Cane stalks are peeled, washed, and steeped in a solution of sodium dichloroisocyanurate at 25°C for 20 minutes before being extracted with an electric grinder and bottled aseptically [15]. Sugarcane stalks are cleaned, peeled, and chopped into 30 cm lengths before being used to extract the juice. Then, they were blanched at 90°C for two minutes. The sugarcane pieces are crushed using a twin roller machine and filtered through a filter cloth after cooling [16].

Preparation of *teh talua* drink

Teh talua is made from free-range chicken or duck eggs, tea, sugar, and a bit of salt. It is made by beating eggs with a stick or a drink shaker and then steeping them in hot tea water. Cinnamon, coffee powder, vanilla, lime, ginger, or nutmeg powder can be added to the drink before serving [17]. *Teh talua* may be produced into an instant drink using a spray drier [18].

Total phenol of West Sumatra's traditional drink

The total phenol of some beverages from West Sumatra is presented in Table 1.

Table 1. Total phenol content of West Sumatra's traditional drink

| Name of drink | Total phenol (mg of gallic acid equivalent/L) |
|---------------------|---|
| <i>Kahwa daun</i> | 508.52 |
| <i>Aia niro</i> | 84.94 |
| Young coconut water | 47.86 |
| Sugarcane juice | 422.95 |
| <i>Teh talua</i> | 1489.75 |

The total phenol value of the *kahwa daun* drink sample was 508.52 mg of gallic acid equivalent/L. The antioxidant activity of coffee leaf extract is related to phenol levels [19]. Old Liberika coffee leaves are potentially used as a natural component for food fortification, resulting in antioxidant-rich food product developments. The total phenol value of *kahwa daun* drink is 86.99–975.38 mg/L. It also has antioxidant activities, inhibiting DPPH activity by 51–80% at 50 μ M. Variations in the range of total phenol levels and antioxidant activity of *kahwa daun* drinks are caused by three factors: extraction process, time, and temperature [1].

The total phenol value of the *aia niro* beverage sample was 84.94 mg gallic acid equivalent/L. While the total phenol value of the young coconut water drink sample was 47.86 mg gallic acid equivalent/L. The IC 50 value of phenolic compound from young coconut water is 68.4 [20]. Gallic, protocatechuic, and ferulic acids are the primary phenolic acids in young coconut water. From day 180 to day 190 following pollination, the phenolic content and antioxidant activities of young coconut water increased and then declined on day 225 after pollination. Catechins and salicylic acid are the main phenolic compounds found in coconut water; whereas, gallic, caffeic, salicylic, and p-coumaric acids are found in coconut meat [21].

The total phenol content of the sugarcane juice drink sample was 422.95 mg gallic acid equivalent/L. In contrast, [16] discovered that sugarcane juice had a total phenol content of 0.43 mg GAE/mL, while sugarcane juice treated using the microfluidization method had a total phenol level of 0.34–0.39 mg GAE/mL. It indicates that sugarcane juice processing can lower the total phenol concentration. According to [22], sugarcane juice is a natural drink that provides instant energy and contains antioxidant properties. Enzymatic browning of sugarcane juice drinks reduces antioxidant activities. This browning reaction is caused by the activities of the polyphenol oxidase enzyme.

The total phenol value of *teh talua* drink sample was 1489.75 mg gallic acid equivalent/L. The folin technique for determining total phenol is less selective because it may react to ascorbic acid, sugar, and aromatic amines [7]. Total phenol content of *secang* drinks increases with the addition of granulated sugar (sucrose) due to the same chemical reduction reaction between sugar (glucose and fructose) and phenol from reagents (tungsten and molybdenum) in the formation of metal oxides in the Folin-Ciocalteu method, which influences spectrophotometer readings [23].

4. Conclusion

The dried leaves of the coffee plant are used to make *kahwa daun* drink, which is subsequently prepared using boiling, brewing, or dissolving procedures. *Aia niro* (palm sap) is extracted from the male fruit bunches of palm stalks and consumed fresh. Sugarcane juice is prepared by crushing sugarcane stems and then filtering the liquid. *Teh talua* is prepared by adding egg yolks and filtering hot tea water. Sugar and lime juice are added to *teh talua* to disguise the unpleasant smell of eggs. The total phenol values of young coconut water, *aia niro*, sugarcane drink, *kahwa daun* drink, and *teh talua* were 47.86, 84.94, 422.95, 508.52, and 1489.75 mg gallic acid equivalent/L, respectively.

Acknowledgement

The research was supported by Politeknik Pertanian Negeri Payakumbuh.

References

- [1] R. Novita, A. Kasim, T. Angraini, and D. P. Putra, "Survei proses pembuatan minuman kahwa daun di Propinsi Sumatera Barat, Indonesia," *J. Teknol. Pertan. Andalas*, vol. 22, no. 1, p. 32,

- 2018.
- [2] R. Novita, A. Kasim, T. Anggraini, and D. P. Putra, "Kahwa daun: traditional knowledge of a coffee leaf herbal tea from West Sumatera, Indonesia," *J. Ethn. Foods*, vol. 5, no. 4, pp. 286–291, 2018.
 - [3] (BPS) Badan Pusat Statistik, " *Produksi tanaman perkebunan rakyat (ton) 2020*," 2021. <https://sumbar.bps.go.id/indicator/54/51/1/produksi-tanaman-perkebunan-rakyat.html>.
 - [4] K. B. Hebbar, R. Pandiselvam, M. R. Manikantan, M. Arivalagan, S. Beegum, and P. Chowdappa, "Palm sap—quality profiles, fermentation chemistry, and preservation methods," *Sugar Tech*, vol. 20, no. 6, pp. 621–634, 2018.
 - [5] P. Buwana, B. Widjasena, and S. Suroto, "Pengaruh Pemberian Air Kelapa Muda (Cocos Nucifera) Terhadap Kelelahan Kerja pada Nelayan di Tambak Mulyo Semarang," *J. Kesehat. Masy.*, vol. 4, no. 1, pp. 350–358, 2016.
 - [6] R. D. Puspongoro, R. S. Pujiati, and R. I. Hartanti, "Coconut Water to Work Fatigue on Transporter Workers at Tanjung Traditional Market of Jember Regency," *J. Ikesma*, pp. 95–100, 2019.
 - [7] S. A. Salim, F. A. Saputri, N. M. Saptarini, and J. Levita "Review artikel: kelebihan dan keterbatasan pereaksi folin-ciocalteu dalam penentuan kadar fenol total pada tanaman," *Farmaka*, vol. 18, no. 1, pp. 46-57, 2020.
 - [8] E. A. Setiawan, D. Rahadian AM, and Siswanti, "The effect of roasting on robusta coffee (*Coffea robusta*) leaves on the chemical and sensory characteristics of refresher beverage," *Jurnal Teknosains Pangan*, vol. 4, no. 2, pp. 1-9, 2015.
 - [9] S. Salma, R. Revianda, and T. Hidayat, "Perspektif hukum Islam (Hadd Al-Syurb) tentang aia niro dan tuak (khamr) di Nagari Batu Payuang Halaban," *Society*, vol. 8, no. 1, pp. 260-277, 2020.
 - [10] S. Hotijah, A. Rofieq, S. Wahyuni, A. M. Hudha, and F. J. Miharja, "Pengaruh waktu penyadapan nira dan lama penyimpanan terhadap kualitas nira siwalan (*Borassus flabellifer* L.)," *Prosiding Nasional V 2019-Peran Pendidikan dalam Konservasi dan Pengelolaan Lingkungan Berkelanjutan*, pp. 259-265, 2019.
 - [11] Ansar, Nazaruddin, and A. D. Azis, "Effect of temperature and time storage to pH and color changes of palm sap (*Arenga pinnata* Merr) after tapping," *Jurnal Teknik Pertanian Lampung*, vol. 8, no. 1, pp. 40-48, 2019.
 - [12] J. M. Azra, B. Setiawan, Z. Nasution, and A. Sulaeman, "Effects of variety and maturity stage of coconut on physicochemical and sensory characteristics of powdered coconut drink," *Foods and Raw Materials*, vol. 9, no. 1, pp. 43-51, 2021.
 - [13] S. Ibrahim, "Potensi air kelapa muda dalam meningkatkan kadar kalium," *Indonesian Journal of Nursing and Health Science*, vol. 1, no. 1, pp. 9-14, 2020.
 - [14] I. M. Geremias-Andrade, A. C. Rocheto, F. A. Gallo, and R. R. Petrus, "The shelf life of standardized sugarcane juice stored under refrigeration," *Food Science and Technology*, vol. 40, no. 1, pp. 95-101, 2020.
 - [15] C. O. Silva, F. A. Gallo, L. Q. Bomdespacho, M. M. Kushida, and R. R. Petrus, "Sugarcane juice processing: microbiological monitoring," *Journal of Food Processing and Technology*, vol. 7, no. 8, pp. 1-5, 2016.
 - [16] A. Tarafdar, S. G. Nair, and B.P. Kaur, "Identification of microfluidization processing conditions for quality retention of sugarcane juice using genetic algorithm," *Food and Bioprocess Technology*, pp. 1-13, 2019.
 - [17] E. Novra, and S. Ariani, "Egg tea, tourist attraction from West Sumatra," *Menara Ilmu*, vol. XIV, no. 01, pp. 33-41, 2020.
 - [18] R. Yenrina, D. A. Permata, D. Rasjmida, and R. Tayandi, "In vitro protein digestibility and physical properties of instant teh talua dried by spray dryer," *International Journal on Advanced Science Engineering Information Technology*, vol. 6, no. 1, pp. 84-87, 2016.
 - [19] D. V. Pristiana, S. Susanti, and Nurwantoro, "Antioxidant activity and phenolic content of coffee leaves (*Coffea Sp.*) extract: potential application as natural substance for food fortification," *Jurnal Aplikasi Teknologi Pangan*, vol. 6, no. 2, pp. 89-92, 2017
 - [20] V. Geetha, K.P Bhavana, R. Chetana, A. G. G. Krishna, and G. S. Kumar, "A studies on the composition and in-vitro antioxidant activities of concentrates from coconut testa and tender

- coconut water," *Journal of Food Processing & Technology*, vol 7, no. 5, pp. 1-5, 2016.
- [21] B. Mahayothee, I. Koomyart, P. Khuwijitjaru, P. Siriwongwilaichat, M. Nagle, and J. Muller, "Phenolic compounds, antioxidant activity, and medium chain fatty acids profiles of coconut water and meat at different maturity stages," *International Journal of Food Properties*, vol. 19, pp. 2041-2051, 2016.
- [22] H. A. Kamble, A. A. Gatade, A. K. Sahoo, and U. S. Annapure, "Effect of blanching treatment on antioxidant activity and color values of sugarcane juice," *Materialstoday Proceedings*, vol. 47, no. 16, pp. 5663-5667, 2021.
- [23] Zulfahmi, and D. E. Nirmagustina, "Pengaruh sukrosa terhadap kandungan total fenol minuman rempah tradisional (minuman secang) ," *Jurnal Penelitian Pertanian Terapan*, vol. 12, no. 2, pp. 125-130, 2012.