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Original Article

Kahwa daun: traditional knowledge of a coffee leaf herbal tea from West Sumatera, Indonesia

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ABSTRACT

Background: Kahwa daun is a herbal tea made from coffee leaves produced by people in West Sumatera, Indonesia. It has an aroma, flavor, and appearance similar to coffee. There is no existing literature describing the traditional production method of kahwa daun. In this article, production techniques, moisture content, and the yield of the product are explored.

Method: Descriptive qualitative research method was used to explore production techniques. Discussion, observation, in-depth interviews, and documentation were conducted in three districts in West Sumatera to collect primary data. Gravimetric method is used to determine the moisture content.

Result: Processing of fresh coffee leaves into kahwa daun includes collection of raw materials, drying, packaging, and storage. Kahwa daun usually was made from robusta coffee leaves. The result showed that there were three main production techniques for kahwa daun in the province which include pendhangan (traditional drying above the cooking fire) smoking, and toasting in a handheld frame over a low heat. All techniques were different from the techniques usually used to produce herbal tea. The moisture content of kahwa daun was 1.6–2.0% (wb), and the yield of the product was 10–20%.

Conclusion: Kahwa daun processing differs from both usual herbal tea production methods and commercial coffee leaf tea production. The efficacy and potential of kahwa daun as a health drink still require further research.

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1. Introduction

Coffee, of genus *Coffea*, is a member of Rubiaceae family that consists of more than 400 species [1,2]. The two main species of coffee cultivated in Indonesia are arabica (*Coffea arabica* L.) and robusta (*Coffea canephora* L.). *Coffea arabica* L. originally came from mountainous regions in Ethiopia and Yemen. The first literature about coffee is found in the Avicenna report that describes burcham, a beverage from Yemen used as medicine for stomach ache. Coffee became a common beverage in the 12th century. The Arabic word for coffee is qahwa). Coffee is made from coffee bean and known to have the properties of keeping drinkers alert and awake [3]. Use of coffee beans as a beverage has continued to develop over

several centuries, but other parts of the plant have not been so commonly used until recently.

The use of coffee leaves to make tea has long been a tradition in West Sumatera, Ethiopia, Jamaica, India, Java, and South Sudan, but the literature about the Sumatran use is limited. The Sumatran drink is called kahwa daun or kawo (Fig. 1A). Kahwa daun is locally regarded to be a healthy drink with a delicious taste. According to Hewitt [3], an infusion of the roasted coffee leaves is used to make a tea with a delicious smell and taste.

Researchers have shown interest in the phenolic compounds of plant and their potency in the prevention of degenerative diseases [4]. Secondary metabolites such as mangiferin, caffeoylquinic acid, caffeine, hydroxycinnamic acid, allantoic acid, allantoin, theobromine, and theophylline have been found in leaves of some species of coffee [5–8]. Some other compounds remain unidentified such as terpenoid, phenylpropanoid, flavonoid, and other alkaloids. The health benefits of these active compounds in coffee leaves have made coffee leaf tea increasingly popular.

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Fig. 1. (A) A coffee leaf herb called kahwa daun from West Sumatera is also known as kahwa daun. (B) Traditional serving of kahwa daun beverage.

Minangkabau (a tribe in West Sumatera) people cultivated coffee plants from before the arrival of the Dutch and used the leaves to produce kahwa. The beverage is traditionally served in coconut shells that are made into cups with a base fashioned from bamboo (Fig. 1B). The kahwa beverage is stored in a bamboo tube (called a perikan) and is covered with a bamboo lid made from the black fibers surrounding the trunk of *Arenga pinnata* (called juk) [9].

Production of kahwa daun correlated with *cultuurwettelijk* system. In the middle of the 19th century, Minangkabau people were ordered by the Dutch to plant the coffee tree. Minangkabau people came from 3 main districts in West Sumatera which were Tanah Datar, Agam, and Lima puluh Kota. They had to deposit coffee beans to the Dutch's *ponkhuis* (a place or a warehouse to store coffee beans) after harvesting. Coffee was the Dutch's most important trading commodity at that time. Local people who wanted the bean must buy it from the Dutch's *ponkhuis*. Minangkabau people did not think that it was a big problem because they had cultivated coffee plants from before the arrival of the Dutch and had used the leaves to produce kahwa. Minangkabau people were famous for their traditions as the merchant. When the price of coffee beans increasingly rose, they were even willing to plant more coffee seeds than what the Dutch had ordered, but the crops were no longer fully handed over to the *ponkhuis*. They sold it themselves to the east coast to Singapore and Malacca. They responded to the *cultuurwettelijk* in a different way [9,10].

Qualitative research was conducted to investigate and help preserve knowledge about the traditional processes used to prepare kahwa daun from fresh coffee leaves in West Sumatera, Indonesia.

2. Material and methods

2.1. Materials and equipment

Materials included a list of questions related to the processing of kahwa daun. The tools used were a camera, audio, and a video recorder to facilitate in grouping and analysis of data. Measurement of moisture content used analytical scales, dishes, clamps, desiccators, and an oven.

2.2. Methods

Data were obtained using a survey and discussions, observations, and in-depth interviews with producers of kahwa daun. Primary data about processing techniques came from producers in three districts of West Sumatera starting from preparation of raw

material to production of kahwa daun. Further data included notes, recording conversations, and photos.

The research was conducted in Tanah Datar, Lima Puluh Kota, and Agam districts in April to June 2017. The reason for choosing the three districts was because there were many sellers of kahwa daun beverage in these districts and they are the center of Minangkabau culture and can be considered to represent the Province of West Sumatera as a whole. Thirty-four sellers of kahwa daun spread throughout the districts were selected. These sellers gave data about suppliers/producers of kahwa daun. These producers were then interviewed, and their production methods were observed. Moisture content analysis of the kahwa daun from these suppliers was conducted using a gravimetric method [11].

3. Results and discussion

3.1. Location of research

Kahwa daun studies came from producers in Tanah Datar and Lima Puluh Kota, West Sumatera with coordinates 0°19'11.5"S 100°37'15.6"E (Tabeik Patah 1), 0°19'19.0"S 100°32'7.0"E (Tabeik Patah 2), 0°25'02.2"S 100°34'06.1"E (Pasir Laweh), and 0°12'34.1"S 100°36'58.8"E (Lampasi) (Fig. 2).

3.2. Production data

Three producers came from Tanah Datar and one from Lima Puluh Kota. A profile of the respondents showed that these producers had educational backgrounds ranging from elementary school alone to senior high school and were aged 35–58 years. The oldest producer acquired knowledge of the production process from her grandmother and has produced kahwa daun continuously since 2001. All three producers had been producing kahwa daun continuously for many years and supplied kahwa daun to outlets spread throughout districts of West Sumatera and as far away as Riau Province. The respondent data are shown in Table 1.

3.3. Raw materials

It was discovered that *robusta*, traditionally referred to as "the old coffee," was the source of the leaves used in making kahwa (Fig. 3). These leaves are large, wide, and green [12].

Coffee leaves were collected from small private plantations between 8 and 11 am and processed without any pretreatment such as washing and sorting. The coffee leaves used were mature rather than young leaves. There was no special requirement for the leaves to be



Fig. 2. (A) Indonesia is an archipelago country with 34 provinces. (B) West Sumatra Province is the place of origin of *Ashwa daun*. (C) Location of research was in 2 districts (Agam, Tanah Datar and Lima Puluh Kota). The producer of *Ashwa daun* was found in Tanah Datar district (1–3) and Lima Puluh Kota district (4).

Table 1
Data of producer of *Ashwa daun*.

Description	Producer 1	Producer 2	Producer 3	Producer 4
Age	50 years old	58 years old	25 years old	45 years old
Address	Taloh Pauh, Tanah Datar	Taloh Pauh, Tanah Datar	Pauh Lurah, Tanah Datar	Lampung, Lima Puluh Kota
Education	Junior high school	Elementary school	Senior high school	Senior high school
Marital status	Married	Widowed	Married	Married
First production	2004	2001	2006	2008
Source of knowledge	Mother	Grandmother	Mother-in-Law	From Tanah Datar

Source: Interview (2017).

regarded as appropriate for making *kahwa daun*. Both leaves attached to branches and individual detached leaves were used (see Table 2).

Leaf pruning is important in the cultivation of coffee plants to maintain long-term productivity. Unwanted parts of the plants such as old, dry, and nonproductive branches are cut away [13]. Leaves from these pruning processes are able to be used to supplement the income of the coffee grower.

3.4. Processing

The producer in the district of Lima Puluh Kota learned how to produce *kahwa daun* from producers in the district of Tanah Datar. But, the Tanah Datar producers have not used this technique since about 2001 because they have been producing *kahwa daun* on a very large scale.



Fig. 3. A coffee tree. The mature coffee leaves are used in making kahwa daun.

Interviews with these larger scale producers and observations indicated that two different methods were now used (see Table 3). For both methods, the leaves were clasped between two 180-cm-long flat sticks made from bamboo or sugar palm leaf spines (Fig. 4A). Small branches containing several leaves were processed

intact. Individual leaves that had separated from the branches were pierced through their centers with skewers made from bamboo to facilitate processing (Fig. 4B). The leaves in the clasp were then processed by one of two methods. Producers 1 and 2 smoked the leaves (Fig. 5A and 5B), where as Producer 3 rotated them 30–40 cm from the flame of a wood fire (preferably from the cinnamon tree) until dry (Fig. 5C). The original method is used by Producer 4. The coffee leaves were pierced with skewers made from bamboo. The leaves were processed over domestic kitchen fires. The coffee leaves were dried over a period of more than 2 weeks (Fig. 5D).

Smoking is one of the oldest known food preservation processes and is commonly used for meat or fish. It can improve both flavor and color. Antibacterial and antioxidant compounds in the smoke prevent spoilage. In some cases, smoking is used to pretreat food in place of drying. Smoking is a slow process and is not easy to control. Smoked food products such as fish can be processed at temperatures as low as 35°C (cold smoke) for a long time or at a minimum of 62.8°C for about 30 minutes [14]. In the case of kahwa daun, the leaves are smoked in 4- to 15-kg batches at high heat for about 1–2 hours.

Wood smoke contains more than 400 volatile compounds including polycyclic aromatic hydrocarbons (PAHs). While the color of smoked products is influenced by nitrogen oxide content, PAH and phenolic compounds affect the flavor [14], and some researchers consider that it may have a negative impact on health. The composition of PAH present in smoked or toasted food products is related to the type of heat source and the length of processing. Foods placed directly on a heat source or close to the flame have the highest PAH content [15]. This indicates that the toasted leaves will produce a tea higher in PAH than the smoked leaves but lower than coffee as both are processed at lower temperatures than coffee beans.

The fact that mature leaves are used in both these processes suggests that tea prepared by both methods may contain higher levels of beneficial phenol and antioxidant activity. Previous research has found that production of kahwa daun from robusta coffee leaves using the 3rd and 4th leaves from shoots directly dried by using cabinet dryer had the highest total phenol and antioxidant activity [16]. Previous research by the author has shown that the

Table 2
Raw materials.

Observation	Producer 1	Producer 2	Producer 3	Producer 4
Source of leaves	Old coffee	Old coffee	Old coffee	Old coffee
Coffee leaves dimension (cm)	L = 20–32, W = 10–11	L = 18–21, W = 9–11	L = 20–30, W = 9–14	L = 22–32, W = 10–14
Part of leaves used	Mature/old leaves	Unripe leaves	Old leaves	Mature leaves
Leaves pre-treatment	No	No	No	No
Leaves plucking time	8–9 a.m.	8–10 a.m.	9–11 a.m.	8–9 a.m.
Leaves quantity (kg/day)	20–30	30–50	20–30	1–2

Source: Interviews and observations (2017).

Table 3
Processing.

Observation	Producer 1	Producer 2	Producer 3	Producer 4
Processing equipment	Furnace closed	Furnace closed	Furnace opened	Furnace opened
Source of energy	Cinnamon burned or other wood	Cinnamon burned or other wood	Wood burned; should not be acid wood	Kitchen fire
Distance of leaves from heat source	10–40 cm	75–400 cm	15–25 cm	>100 cm
Leaves treatment	Leaves and twigs clasped with bamboo	Leaves and twigs clasped with bamboo	Leaves and twigs clasped with sticks	Leaves were pierced through their centers with skewers
Weight of one pile per person (kg)	2–3	2–3	2–3	1–2
Number of fresh leaves per person (kg)	6–8	10–15	4–6	1–2
Time process (minutes)	50–60	75–120	45–60	>2 weeks
The final result kahwa daun (kg)	4–5	3–5	3–4	0.3–0.5

Source: Interviews and observations (2017).



Fig. 4. (A) Small bunches containing several leaves were clamped by flat sticks made from bamboo to facilitate processing. (B) Individual leaves were placed through their centers with skewers made from bamboo.

total phenol content of kahwa daun sourced from drink stall in three districts of West Sumatera province can be anywhere between 87 and 975 mg L⁻¹ gallic acid equivalent [17]. Coffee leaves obtain different health-related functions when processed with different tea-processing methods. Japanese green tea production coffee leaves on the other hand have the potential to be more suitable for producing novel natural health products with antioxidant and anti-inflammatory properties [18].

1.5. Moisture content and yield

Moisture content of the kahwa daun ranged from 3.6 to 7.6% which is well within the standard range of moisture content of black tea (<8.0% w/w according to SNI 01-1903-1990). Consequently, the yield of kahwa daun was in the range of 10–20%, which is lower than the yield of black tea which was about 23% [19] (see Table 4).



Fig. 5. (A, B) Producers were making kahwa daun in a closed furnace at Tibrik Patah. (C) Making kahwa daun used a suspended furnace at Patah Lawoh. (D) Original processing was documented at Lampung.

Table 4
Moisture content and ybm.

Observation	Producer 1	Producer 2	Producer 3	Producer 4
Moisture content (%)	4.1	3.8	4.7	7.8
YBM (%)	17–20	10	11–15	20

4. Conclusion

Kahwa daun is processed differently than most herbal tea that are generally sun-, oven-, or breeze-dried. The two methods used are traditional and differ from methods used to produce coffee leaf tea commercially in other parts of the world. In West Sumatera, kahwa daun is commonly believed to provide health benefits. The efficacy and potential of kahwa daun as a health drink still require further research.

Therefore, further research can be conducted on phytochemical profiles, bioactivity, improvement of processing equipment, and brewing methods of kahwa daun from West Sumatera.

Conflicts of interest

The authors have no conflicts of interest to declare.

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Appendix A. Supplementary data

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