

## Ethnobotany of Sasak traditional beverages as functional foods

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Sasak is a native tribe of Lombok Island, West Nusa Tenggara, Indonesia. Like other tribes in the world, Sasak tribe has a variety of traditional cuisines that can also function as functional foods, including the beverages or drinks. The purpose of this study was to explore the Sasak traditional drinks that function as functional foods, from ethnobotany aspects. This study used the ethnosains method, namely purposive sampling method which includes observation, interview, documentation and literature review. There were 8 types of Sasak traditional drinks that are commonly consumed by the public as functional drinks, which can provide positive benefits for the human body. There was also an observation on plants used in the preparation of the drinks. Sasak traditional drinks basically have the potential as functional drinks, and further multidisciplinary studies are needed. This study is one form of preservation efforts on culture, plant resources and traditional botanical knowledge related to its use in human health.

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In addition to meeting the food needs, food can also maintain the health or treat certain diseases. Foods that have a positive effect on the body can be classified as functional foods. Functional food has physiological effects that are beneficial to the body and has the ability to maintain and improve health because of the presence of bioactive compounds in its nutritional content such as food fiber, oligosaccharides, sugar, alcohol, polyunsaturated fatty acids, certain proteins, lactic acid bacteria and certain vitamins and minerals<sup>1</sup>.

Knowledge possessed by the community is basically derived from the results of observations, experiences and information passed from generation to generation in the community. People experience the positive effects of food and hence reuse them. This information then passes orally to become a knowledge that is widely circulated in the community. In Southeast Asian countries, food and health are closely related, because dishes can be combined in a diet to maintain health and cure<sup>2</sup>. Functional food can prevent the emergence of several diseases, improve the body's immune system and improve physical appearance<sup>3</sup>. People's knowledge of local dishes used for health purposes is basically a

potential source of information for developing research related to functional food. Traditional foods from various regions in Indonesia have advantages in terms of taste, nutritional content and rich socio-cultural aspects, so they have the potential to contribute to Indonesia culinary tourism<sup>4</sup>.

Lombok Island is located in the Lesser Sunda region, West Nusa Tenggara Province, Indonesia. Sasak tribe has various types of traditional dishes, including traditional drinks<sup>5</sup>. Some of them are consumed by the community because they have positive physiological effects. It is important to explore local knowledge of many communities, where most have not been well documented and widely known to be well developed. The aim of this research is to explore the potential of Sasak traditional drinks as functional drinks, along with important ethnobotany aspects contained in them. Information and local wisdom related to local knowledge of the community needs to be studied, documented and developed before it is extinct by the current extent of modernization.

### Methodology

Field research is conducted using purposive sampling method<sup>6</sup>. Data was obtained through direct

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observation, participatory-observation, interview, and literature review<sup>7,8</sup>. Semi-structured and open-ended interviews are directed to local informants from four districts and one municipality in Lombok island (West Lombok, East Lombok, North Lombok, Central Lombok, and Mataram city), based on snowball method<sup>9</sup>. The 'local beverages' that are observed are beverages, which Sasak people themselves consider have been known, made and consumed by their family or community for a long time, which are usually prepared with local ingredients and are adapted to local taste. All data is analyzed thoroughly using descriptive and qualitative approaches. Some of nutritional data is taken or converted from Indonesian Food Consumption Table<sup>10</sup>.

### Result and discussion

Based on field observations there were 08 types of drinks that were known and consumed by Sasak people in daily lives, and are believed to have positive benefits for their health. These drinks are *kupi*, *kopi kedele*, *ai' sepang*, *brem*, *tuak manis*, *tuak toaq*, *kenyamen* and *teh gaharu*. All of the plants that make up these drinks grow and are cultivated on Lombok Island.

#### *Kopi (Coffea sp.)*

Coffee is a favorite drink of the community, both for daily household consumption and for ceremonial events. Apart from its taste, people's interest in coffee is also caused by its effects on the body. The caffeine content in coffee causes the body to be refreshed, not drowsy, enhance concentration and mood. Caffeine stimulates the nervous system, heart muscle and respiratory system, thus influencing concentration and mood in activities<sup>11</sup>. This is caused by the presence of caffeine compounds that stimulate the production of adrenal hormones, increase blood pressure, gastric acid secretion and muscle activity, and stimulate the liver to release sugar in the blood to produce energy. However, excessive coffee consumption in the long run will potentially cause heart disease, high blood pressure and reduce sleep quality. Based on nutritional conversion using the Indonesian Food Consumption Table<sup>10</sup>, the nutritional value of coffee per 100 g of ingredients is energy 129 kcal, carbohydrate 35 mg, ash 9.7 mg, calcium 179 mg, phosphorus 383 mg, iron 5.6 mg, sodium 72 mg, riboflavin 0.21 mg and niacin 30.6 mg.

Some West Nusa Tenggara coffee types that have the potential to be developed into specialty coffee are Sembalun coffee from Mount Rinjani (Lombok

Island), Tambora coffee from Mount Tambora (Sumbawa) and Tepal coffee from the highlands of Sumbawa<sup>12</sup>. Coffee cultivation on Lombok Island has been started since decades ago, when people only cultivated *jamaq* coffee (*Coffea robusta* L. Linden). Along with the interest of the world market that has shifted to Arabican coffee, coffee farmers have begun to develop this type of coffee until the population is almost balanced (Fig.1).

Some areas that have long been known as coffee planting centers are Sajang Village (Sembalun District, East Lombok), Lantan Village (Batukliang Utara District, Central Lombok), and Batu Mekar Village (Lingsar District, West Lombok).

#### *Kopi kedele (Glycyne max (L.) Merr.)*

*Kopi kedele* or soya coffee is a steeping drink from roasted soybeans (Fig. 2), as is the case for preparing coffee drinks (*Coffea* sp.). Soya coffee is generally consumed as a substitute coffee, for people who cannot consume *Coffea* sp. for health reasons.



Fig. 1 — *Coffea* sp. bean



Fig. 2 — *Glycyne max* bean

Basically the functional effect of soya coffee is similar with if people consume soybeans in the form of other dishes or drinks. Soybeans are a good source of protein and vegetable fat, besides high nutritional value and can play a role in preventing the emergence of diseases such as cardiovascular, cancer, osteoporosis and alleviating menopausal symptoms<sup>13</sup>. Soya coffee has been classified in a group of plants that have the character of protein and fat content, based on biplot analysis and clusters using the Paleontological Statistics (PAST) program version 2.17<sup>5</sup>. The effect of reducing cholesterol levels due to soya consumption is also the most studied physiological effect. In addition, a study by Anderson and Garner in 1997 stated that consumption of certain amounts of soybean isolates can significantly increase the mineral content and bone density of femur<sup>3</sup>.

#### *Ai' sepang* (*Caesalpinia sappan* L.)

*Ai' sepang* is a Sasak traditional spicy drink, yielded from brewed *Caesalpinia sappan* or *sepang* wood (Fig. 3). According to the community, *ai' sepang* is beneficial to maintain health and cure several diseases. The main content of *sepang* wood is brazilin which has role as antioxidant, antibacterial, anti-inflammatory, anti-photoaging, can reduce fat levels, relax blood vessels, protect liver function and anti-acne<sup>13</sup>.

In addition, the extract of *sepang* wood has anti-tumor, antiviral, and immunostimulant properties<sup>14</sup>. *Ai' sepang* is categorized as functional drink, which has positive effects on health and fitness due to its efficacious compounds<sup>3</sup>. Naturally, spices contain various kinds of bioactive compounds that contribute to the taste formation of a product, for example antioxidants, anti-bacteria, anti-fungi, antiseptics, etc. that can be beneficial to health. *Ai' sepang* is reddish in colour, flavored with spices and is generally given

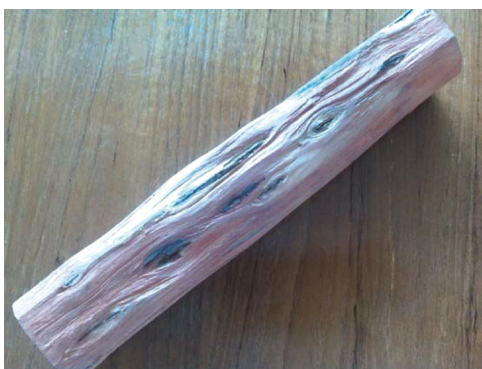


Fig. 3 — *Caesalpinia sappan* wood

additional sweeteners like sugar or rock sugar. It is generally served hot during the cold weather. This drink creates a feeling of warmth in the body shortly after consuming it. In some regions of Indonesia, *ai' sepang* sometimes served with other spices, such as ginger, cloves, cinnamon, lemongrass and cardamom.

#### *Brem* (*Oryza sativa* var. *glutinosa*)

*Brem* is an alcoholic beverage produced from fermented sticky rice (*Oryza sativa* var. *glutinosa*) (Fig. 4). This drink is commonly found in North Lombok Regency, an area which is inhabited by many Hindu-Balinese communities. Apart from being a drink for personal needs in the household, *brem* is also commonly served in certain traditional ceremonies and religious rituals as a complimentary mean. In addition, in certain doses, people consume to keep their body warm and promote blood circulation. Average consumption of alcohol will increase hormone level which is believed to help reduce the risk of arterial blockages and blood clots, thereby reducing the risk of heart disease<sup>3</sup>. In addition to containing alcohol, result of data conversion using Indonesian Food Consumption Table 2005 and biplot analysis, *brem* is characterized by calcium, iron, energy and carbohydrate content<sup>5</sup>.

Lombok *brem* resembles *brem* from Bali Island, which is a liquid product containing alcohol, reduction sugar, CO<sub>2</sub> gas and a little organic acid. *Brem* is yielded from a reaction between carbohydrates with enzyme and water to produce sugar. The sugar then reacts again with the enzyme to produce alcohol and CO<sub>2</sub> gas. *Brem* is generally consumed after eating. It generally tastes sour and sweet, red in colour, with an alcohol content of 3-10%<sup>3</sup>, and can be produced from black or white sticky rice. The first stage of fermentation produces sticky rice



Fig. 4 — *Oryza sativa* var. *glutinosa*

*tape*, which is further fermented for about 7 months and produces alcohol. Sometimes *Sauropus androgynus* (L.) Merr. leaves are added during steaming process to add a fragrant aroma to green *brem*. Excessive consumption of *brem* can cause motion sickness, where people will lose control of speech, balance and emotions, which may ultimately lead to criminal acts.

#### **Tuak (*Arenga pinnata* (Wurmb) Merr.)**

Tuak or palm wine come from water tapped from palm tree (*Arenga pinnata*) (Fig. 5a & Fig. 5b). There are 02 kinds of *tuak*, *tuak manis* (sweet palm wine) and *tuak toaq* (old palm wine). *Tuak manis* is the water tapped from the peduncle without going through the fermentation process, while *tuak toaq* is fermented from *tuak manis*, so that it contains alcohol. *Tuakmanis* is widely produced in Pusuk Forest area, West Lombok. According to the community, if *tuak manis* is consumed regularly, it can cure several diseases such as diabetes, constipation, urinary stone, canker sores and also can neutralize poisons and maintain human health. The tapping process is usually done during the dry season, so that the quality of the leads is not affected by rainwater. Fresh tap is sold directly as *tuak manis*, or processed into brown sugar. To add sweetness to the sweet palm wine, sometimes *tuak* tappers add a piece of *Dysoxylum parasiticum* (Osbeck) Kosterm wood. For making *tuak toaq*, fresh lead water is mixed with *Pterospermum javanicum* Jungh bark to be fermented that contains alcohol.

The results of nutritional data conversion based on Indonesian Food Consumption Table 2005 showed that sweet palm wine was superior in terms of energy content, whereas in biplot analysis *tuak toaq* were grouped together with the beverages characterized by protein and phosphorus<sup>5</sup>.



Fig. 5 — (a) *Arenga pinnata* tree, (b) *Arenga pinnata* peduncle

#### **Kenyamen (*Cocos nucifera* L.)**

Basically *kenyamen* or young coconut water is a popular drink in Indonesia, which is produced from *Cocos nucifera* fruit (Fig. 6). In Lombok Island, coconut plants can be easily found especially in coastal areas. Some of the benefits of young coconut water are eliminating dehydration in the body, neutralizing toxins, removing acne and treating measles.

Nutritional data conversion based on Indonesian Food Consumption Table 2005 followed by a biplot analysis has grouped young coconut water along with other types of drinks that were superior in terms of vitamin C, including sweet palm wine. The nutritional content of young coconut water per 100 g includes 17 kcal energy, 0.2 g protein, 0.1 g fat, 3.8 carbohydrates, 15 mg calcium, 8 mg phosphorus, 0.2 mg iron, vitamin C 1 mg<sup>10</sup>. People usually consume the coconut water along with the fruit flesh. Green coconut water is believed to be effective in expelling urine output and treating urinary tract infections.

#### **Teh gaharu (*Gyrinops versteegii* (Gilg.) Domke)**

*Teh gaharu* or eaglewood tea is obtained from steeping the young or old gaharu leaves (*Gyrinops versteegii*) (Fig. 7), which has been sliced into small pieces and then dried. Eaglewood tea is used by the community to treat body fatigue, cold and coughing. A result of phytochemical screening showed that leaves, stems and agarwood extract contain tannins, terpenoids, alkaloids, and flavonoids and a few anti-bacterial compounds<sup>15</sup>. Another research detected the presence of anti-free radical activity in the methanol extract of *Gyrinops versteegii* leaves<sup>16</sup>.

In addition to *teh gaharu*, *Gyrinops versteegii* also can produce other types of drinks, such as kopi gaharu



Fig. 6 — *Cocos nucifera* fruit



Fig. 7 — *Gyrinops versteegii* leaves

or agarwood coffee, produced from seeds that are dried, roasted, mashed and then brewed like normal coffee. It was informed by local people that agarwood coffee is efficacious to make people stay young. Other type of health drink is *biosol*, which is obtained from the distillation of oil from the agarwood stem. *Biosol* is a solution found below the oil. The benefits of these agarwood drinks are thought to be related to the phytochemical compounds in agarwood plants. Agarwood coffee and *biosol* have not been widely used by the community, but agarwood tea is sometimes used to treat fatigue or cold. This tradition is mainly found in the agarwood cultivation area, such as South Orong Village, West Lombok Regency.

Generally, some types of Sasak functional drinks have been widely available in the market, such as coffee, *brem*, palm wine and young coconut water. While other types such as soya coffee, *ai's sepang* and agarwood tea are drinks that are used in non-routine consumption in daily life. Soya coffee and agarwood tea have begun to be traded even though it is has not popular yet, while *ai's sepang* has begun to be rarely consumed by people, and agarwood tea is only consumed by people lived around the cultivation area. But at least the tradition of consuming these types of functional drinks is maintained in people's lives in Lombok Island, because of the real benefits felt by the community until today. Current functional beverage products are having a very active and high demand market in the community, related to nutrient drink requirements that are packaged in a practical, simple and can-be-stored (durable) package, making it easier for people to consume<sup>17</sup>. The traditional functional drink market can be a potential market given the production of healthy and functional food, in accordance with the

increase in healthcare awareness among people as well as the rising costs of medical treatment<sup>18</sup>.

Hence, more in-depth studies are needed regarding the phytochemical content of plants used in the beverages, so that more valid information is available to be preserved and developed. Traditional food stores a variety of local wisdom in its society and each region and culture will have different wisdoms<sup>19</sup>. Thus, extracting local knowledge will facilitate to preserve natural resources as well as cultural resources.

### Conclusion

Some Sasak traditional drinks can act as functional drinks that have many benefits for the human health and are still consumed by the community currently in daily life. This can be followed up with next development steps considering the current marketing opportunities for functional drinks are quite good. In addition, there are also local wisdoms that accompany the use of plants as a constituent of the drinks. Further studies are needed from various disciplines to strengthen the information related to this, so that preservation and development of functional drinks based on local knowledge can be implemented.

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