



LITERACY ON CONSUMPTION OF INNOVATIVE HERBAL TEA PRODUCTS AS PREVENTION OF NON-COMMUNICABLE DISEASES BASED ON LABORATORY TESTS

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Abstract

Indonesia's vast regional diversity provides numerous local ingredients with inherent health benefits, such as ant nest tea and Dayak onion, which have the potential to reduce food import dependency and boost local welfare. However, the potential for developing novel, health-focused food and beverage products through the *synergistic combination* and characterization of these specific, underexplored local ingredients remains largely uninvestigated. This study aims to determine the content of herbal tea test results. This research method is carried out by conducting laboratory tests on food ingredients that will be used as processed products. The laboratory test carried out is a proximate test that measures water content, protein content, fat content, ash content and carbohydrate content of foodstuffs. The results of antioxidant tests on healthy tea variations showed that the IC50 value in tambi tea was 4.4251, anthill tea was 24.5073, MSME soy milk was 62.7083 and soybean powder was 42.6356. Variations of tea and soy milk have antioxidant content and healthy tea innovations have protein, fat, ash content, water and carbohydrates. These various ingredients have their own benefits for the body. All formulations are nutritionally robust, particularly the protein-rich Dayak Onion Tea-MSME Soy Milk. However, the high moisture content in most samples necessitates optimization for achieving a long-shelf-life powdered product.

Keywords: *Local Products ; Proximate Test ; Antioxidant Test ; Local Wisdom.*

1. Introduction

Local food is part of Indonesia's food diversity and is produced from various regions. Local food produced from each region has many benefits for the community, for example, the existence of local food can reduce dependence on food imports, improve the welfare of local farmers and maintain biodiversity (Nurmaningsih & Naelasari, 2023).

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Indonesia's local food potential lies not only in its

natural wealth, but also in food creation and the sustainability of the local economy. By utilizing local foodstuffs, Indonesia can reduce dependence on food imports and create a sustainable source of income for local farmers. Empowering farmers in local food production can also improve their well-being and reduce the gap between urban and rural areas. Currently, local food product innovations need to be developed to meet the criteria for alternative and practical food (Indrasari et al., 2020).

Diversity is one of the keywords that define local food in Indonesia. The country has more than 17,000 islands with different types of soil, climate, and topography. This creates ideal conditions for the growth of a diverse range of plants and animals (Nenu, Ngura, & Laksana, 2022). Some local ingredients that can be used as basic ingredients for making products that are beneficial to health include soybeans, tea from anthills, tambi tea and Dayak onion tea. These ingredients have health-related benefits so that various products can be developed from them. In addition, drinks can be made based on the mixing of these ingredients and obtaining mineral content that is beneficial to the body. This study aims to determine the content of herbal tea test results.

2. Method

This research method is carried out by conducting laboratory tests on food that will be used as processed products (tambi tea, anthill tea, MSME soy milk and soybean powder). Testing of local food ingredients is done through the laboratory. The tests carried out were antioxidant test and Proximate test. The antioxidant activity test was carried out using the DPPH method and the amount of antioxidant activity was characterized by the IC50 value. While the Proximate Test is a test that involves measuring the moisture content, protein content, fat content, ash content and carbohydrate content of a food ingredient. The test was conducted on six sample for each ingredients. This research was conducted ethically after obtaining ethical permission and approval on June 5, 2023 from the Ethics Commission of the Health Polytechnic of Semarang No. 0753/EA/KEPK/2023.

3. Result and Discussion

Testing of local food ingredients is conducted through laboratory analysis. The test performed are antioxidant test and Proximate Test. The Proximate Test involves the measurement of water content, protein content, fat content, ash content, and carbohydrate content of a food ingredient. This test is important to determine the basic composition of the food ingredient so that it can be used for evaluating the quality, safety, and nutritional value of the tested ingredient. The results of this test can also assist in the development of food that is healthier and safer for consumption. Antioxidant tests have been carried out using IC50 calculations and the test results are as follows:

Table 1. Antioxidant Test Results on Tea and Soy Varieties

Testing	Tambi Tea	Anthill Tea	MSME Soy Milk	Soybean Powder
IC50	4,4251	24,5073	62,7083	42,6356
Antioxidant Activity	Very powerful	Very powerful	Strong	Very powerful
Wavelength	517 mm	517 mm	517 mm	517 mm

Based on the antioxidant test results, Tambi tea demonstrated the highest potency with an IC50 value of 4.4251. This was followed by Ant's Nest tea (Sarang Semut) at 24.5073, and soybean powder at 42.6356. The IC50 value indicates the concentration of a substance required to reduce free radical activity by 50%. A smaller IC50 value signifies greater effectiveness in combating free radicals and oxidation. Consequently, all three products (Tambi tea, Ant's Nest tea, and Soybean Powder) are categorized as having very good antioxidant ability and are potentially useful in protecting the body from oxidative damage. For comparison, the antioxidant test on Soy Milk sourced from UMKM (Micro, Small, and Medium Enterprises) yielded an IC50 value of 62.7083. While this value still indicates a fairly good antioxidant capacity, its effectiveness is not as strong as the substances with lower IC50 values (i.e., Tambi tea, Ant's Nest tea, and Soybean Powder).

Generally, lower IC50 values are considered more effective in mitigating the damage caused by free

radicals in the body. However, it is important to note that these IC50 values should always be interpreted within the context of the specific study and compared to other tested compounds to comprehensively evaluate their antioxidant potential.

Mixing products such as making tea with basic ingredients from local ingredients can produce a type of tea that has mineral content. Based on the results of the proximate, the following data was obtained:

Table 2. Results of Proximate Tests on Herbal Tea Innovation

Satisfied	Tambi Tea – Soy Powder	MSME Soy Tea	Tea-Soy Powder Ant Nest	Ant Nest-Soy Milk Tea MSMEs	Dayak Onion Tea-Soy Powder	Dayak Onion Tea-MSME Soy Milk
Protein	4,8696%	4,8696%	8,0580%	6,0290%	4,8696%	10,9565%
Fat content	1,0498%	1,9834%	1,1616%	2,9022%	9,2945%	10,742%
Ash content	5,3394%	5,5902%	6,5750%	1,2091%	2,0234%	2,1474%
Moisture content	39,7854%	43,0207%	41,1765%	46,1311%	11,8929%	38,5425%
Carbohydrates	48,9558%	44,5362%	43,0289%	43,7287%	60,9197%	37,6294%

The proximate analysis of the herbal tea innovations shows significant compositional variation across the six tested products. In general, the Dayak Onion Tea-MSME Soy Milk product leads in macronutrient content, boasting the highest Protein content (10.9565%) and the highest Fat content (10.742%). However, in terms of stability and potential shelf life, the Dayak Onion Tea-Soy Powder stands out as the best choice due to its dramatically lowest Moisture content (11.8929%), far below the other products which range between 38% and 46%. Furthermore, this product also contains the highest level of Carbohydrates (60.9197%), making it a primary energy source. In conclusion, Dayak Onion Tea-MSME Soy Milk is the top recommendation for nutritional strength and protein content, while Dayak Onion Tea-Soy Powder is the superior choice for stability and shelf life in a powdered form Indonesia's local food potential lies not only in its natural wealth, but also in food creation and the sustainability of the local economy. By utilizing local foodstuffs, Indonesia can reduce dependence on food imports and create a sustainable source of income for local farmers. Empowering farmers in local food production can also improve their well-being and reduce the gap between urban and rural areas. Currently, local food product innovations need to be developed to meet the criteria for alternative and practical food (Indrasari et al., 2020).

Testing of local food ingredients is carried out through laboratories. The tests carried out were antioxidant tests and Proximate tests. The antioxidant activity test was carried out by the DPPH method and the amount of antioxidant activity was marked with an IC50 value(Purwanto, Bahri, & Ridhay, 2017). While the Proximate Test is a test that involves measuring the moisture content, protein content, fat content, ash content and carbohydrate content of a food ingredient(Hidayat & Insafitri, 2021). This test is important to determine the basic composition of the food to be used as an evaluation of the quality, safety and nutritional value of the food being tested. The results of these tests can also help in the development of healthier and safer foods to consume. After the proxy test, the tested food is socialized to the community to be developed as a local food-based product. Local food ingredients can be made into tea and soy drinks that have high antioxidant content and are beneficial for the body.



Figure 1. Antioxidant Test

Based on the results of antioxidant testing on tambi tea, the IC₅₀ value is 4.4251. Tambi tea result of 4.4251 is extremely low, placing it in the very strong to excellent antioxidant category, comparable to some of the highest-performing green tea extracts. Antioxidant testing on Ant's Nest tea, the IC₅₀ value was 24.5073. While the antioxidant test of soybean powder is 42.6356. This means that at these concentrations, the compound or substance tested can reduce antioxidant activity by up to 50%. This indicates that the compound or substance has a fairly good antioxidant ability, because the smaller the IC₅₀ value, the more effective the compound is in fighting free radicals or oxidation that damage cells in the body. This means that the compound or substance is potentially useful in protecting the body from oxidative damage. This indicates that the compound or ingredient has a fairly good antioxidant ability.

The results of the antioxidant test on Soy Milk from MSMEs, obtained an IC₅₀ value of 62.7083, which means that at this concentration, the compound or ingredient tested is able to reduce free radical activity by 50%. This value indicates that the compound or ingredient has a fairly good antioxidant ability, although the level of effectiveness may not be as potent as a compound with a lower IC₅₀ value.

In general, a lower IC₅₀ value will be considered more effective in fighting the damage caused by free radicals in the body. However, it is important to note that these IC₅₀ values should be viewed in the context of specific studies and compared to other compounds or ingredients tested to evaluate their antioxidant potential.

Soybeans (*Glycine max*) belong to the Legiminosae (legumes) family. Plants that have estrogenic activity are called phytoestrogens. Phytoestrogens are nonsteroidal plant-derived compounds that have estrogenic activity. Phytoestrogens are made up of several groups that contain nonsteroidal estrogens, including isoflavones (Walsh, Zhang, Vodovotz, Schwartz, & Failla, 2003).

Soybeans have been made into several forms of products including soy powder drinks. Melilea is one of the Soy Powder drinks made from organic soybeans grown exclusively in the fertile black soil of Heilong Jiang area, Northeast China. Coffee beans go through strict quality selection and then processed through grinding, vacuum concentration, and spray drying using the most advanced technology available. This technology allows every nutrient in soybeans to be preserved without the use of additional chemicals, preservatives, flavorings and colors(Yudiono, 2020).

Soy milk, also known as soy juice, is a beverage made from soybeans. Soy milk has been known since ancient times, even since the 2nd century BC. Soy milk is an alternative source of protein that can meet 30% of the daily protein requirement if consumed as many as two cups. The nutritional composition of soy milk is almost the same as cow's milk, but Indonesian consumer acceptance of soy milk is still low because of its pungent smell. However, increasing public awareness of the importance of consuming milk has encouraged people to start consuming soy milk to maintain health and meet the nutrients needed by the body. Soy milk contains genistein which can fight cancer cells and isoflavones that prevent premature aging. Additionally, the calcium in soy milk can help prevent osteoporosis. Although soy milk is not categorized as milk because it is not produced by the mammary glands in mammals and humans, soy milk has tremendous health benefits and can be used as a substitute for cow's milk for those who are allergic to lactose or for those who do not like cow's milk(Suarjana, Padmiari, & Sugiani, 2019).

According to research, consuming 100mg of isoflavones in soy milk for 4 months can have a positive effect on menopausal symptoms and heart health. In addition, soy milk can also lower total cholesterol and lipoprotein density. Soybeans are often used as a source of nutrients and protein by the community because of their affordable price and easy availability. The calcium in soy milk helps prevent osteoporosis. Therefore, soy milk is needed to maintain health and meet the nutrients needed by the body(Mayarni, Murwitaningsih, & Yulianti, 2020).

Tambi tea mixed with soy powder is a drink made from a mixture of tambi tea and soy powder. Tambi tea is a type of tea that has a strong flavor. Soybean powder is processed from ground soybeans. The combination of tambi tea and soy powder gives it a unique taste and rich in nutrients.



Figure 2. Proximate Test



Figure 3. Proximate Test



Figure 4. Fat Content Extraction

Tambi tea can also be mixed with soy milk is a drink made from a mixture of tambi and soy milk. The combination of Tambi tea and soy milk creates a potent beverage with multiple health benefits derived from the synergistic properties of both ingredients. This combination is rich in antioxidants, mainly sourced from the Tambi tea's high concentration of catechins and epicatechins. These compounds actively protect the body by neutralizing free radicals, thereby preventing cell damage and premature aging and supporting healthy skin. The combined power of the tea's antioxidants and the protein present in soy milk also contributes significantly to maintaining heart health. Furthermore, the soy milk component offers distinct advantages, particularly its content of isoflavones, which are known to help lower the risk of Type 2 diabetes. Finally, soy milk aids in maintaining strong bone health due to its inherent content of essential micronutrients like calcium and Vitamin D

Ant's Nest Tea has various benefits for the body. The ingredients found in Ant's Nest tea include active compounds such as alkaloids, flavonoids, tannins and tocopherol (vitamin E) and several minerals. (Imaniar et al., 2022). In addition, Anthill tea contains many anti-oxidants, magnesium, potassium and calcium that can help relieve the symptoms of heart disease.

Ant nests mixed with soybean powder have cholesterol-free properties and are rich in proteins,

lecithin, saponins, minerals and isoflavones, with an isoflavone structure which is a phytoestrogen that can be converted into equol, where equol has a phenolic structure similar to the hormone estrogen. Soybeans have been made into several forms of products including soy powder drinks (Mayarni et al., 2020).

Anthill Tea can be used as a drink that can boost the immune system because it has antioxidant compounds. Some of the compounds contained in Ant's Nest tea include polyphenols, saponins and flavonoids (Fitri & Fitriana, 2020). The antioxidant activity of flavonoids comes from the ability to donate hydrogen atoms and can increase the metal and have a hydroxyl group as a compound that can donate electrons as an antidote to free radicals (Rumaolat, 2021).

Ant Nest Tea mixed with soy milk is a drink that combines the benefits of Ant Nest tea and the deliciousness and nutritional goodness of soy milk. It is an interesting and healthy combination, which can provide a variety of health benefits to the body (Imaniar et al., 2022).

The combination of Ant's Nest tea and soy milk creates a drink that is not only delicious but also rich in nutrients. It is a good option for those looking for a healthy alternative to animal milk-based drinks or high-caffeine drinks. Soy also contains compounds such as isoflavones that are beneficial for heart health and help fight certain diseases.

Ant's Nest Tea mixed with soy milk can be enjoyed hot or cold, depending on your taste. You can adjust the ratio of tea and soy milk according to your taste preferences. This drink is not only refreshing, but it also provides your body with essential nutrients, including plant-based proteins and antioxidants.

For tea lovers and those who want to maintain a healthier diet, the combination of Ant's Nest tea and soy milk is an attractive option. It combines delicious flavors with a wide range of health benefits, making it a great alternative in the increasingly diverse and healthy beverage world.

Shallots are a typical plant found in Kalimantan and have been used by the Dayak people as a medicinal ingredient. The plant has a height of about 30-40 cm. The shape of Dayak onion bulbs is red and layered. The leaves are single, ribbon-like with edges that can be pointed or not serrated, and are green. The plant has compound flowers that grow at the tips of the stem, with white flowers and needle-shaped pistils that are about 4 mm in size and yellowish-white in color. The roots are fibrous and light brown in color. In terms of health benefits, Dayak onions contain a number of compounds such as alkaloids, glycosides, flavonoids, phenolics, steroids, and tannins, which have hypoglycemic effects, meaning they can help lower blood sugar levels. In addition, this compound is also antioxidant, helps fight free radicals, and can lower cholesterol levels. From an economic perspective, Dayak onion tea has the potential to be processed into high-value herbal products (Setyawan, Budiman, & Septiawan, 2019).

Dayak onions have the potential as an anti-hypercholesterolemia agent because they contain flavonoids. Flavonoids are one of the groups of phenols that are often found in nature. This compound has the ability to protect the body from the effects of free radicals through antioxidant mechanisms. In the body, flavonoids function as antioxidants. In addition, Dayak onion tubers also contain tannin compounds. The mechanism of tannins in overcoming hypercholesterolemia is by inhibiting adipogenesis and reducing fat absorption in the intestines. In addition, Dayak onion tubers also contain saponin compounds. The mechanism of saponins in lowering cholesterol levels is by inhibiting the reabsorption of bile acids by intestinal cells, thereby increasing the excretion of fats through feces. To compensate for the loss of bile acid, the cholesterol in the serum will be converted by the liver into bile acids, which in turn can reduce cholesterol in the blood. (Saktiawati & Parti, 2021).

Dayak onion tea is an herbal drink derived from Dayak onion (*Eleutherine palmifolia*), a plant that grows in some parts of Southeast Asia. Dayak onions have long been used in traditional medicine by several ethnic groups in the region.

Dayak onion tea mixed with soya milk is an herbal drink combination that may have potential health benefits. This combination combines the properties of Dayak onion with the nutrients and potential benefits of soya milk. The high carbohydrate content can be a source of energy for the body to carry out activities. In addition, the protein content in Dayak onion tea and soya milk can help in the growth of bones and teeth.

Dayak onion, with its previously mentioned anti-inflammatory properties and anti-cancer potential, can also provide additional health benefits when used together with soya milk. In addition, soya milk contains healthy fats, such as monounsaturated fatty acids and polysaccharides, which can help maintain heart health. This combination may also provide antioxidant and anti-inflammatory properties that are good for heart health. High carbohydrate content can be a source of energy for the body to carry out activities. In addition, the protein content in Dayak onion tea and soy milk can help bone and tooth growth.

4. Conclusion and Suggestion

The results of the antioxidant test and proximate test showed that the variety of tea with soy contains various substances namely antioxidants, proteins, fats, ash content, water and carbohydrates. This content has good benefits for the body. Variations of herbal tea can be one of the options to be consumed by various parties. All of the formulations are nutritionally robust, especially the Dayak Onion Tea-MSME Soy Milk, which leverages the protein of soy effectively. However, the high moisture content in most samples suggests a need for optimization if a long-shelf-life, true powdered product is the ultimate goal.

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