

Standardization of Simplisia of Dutch Teak Leaves (*Guazuma ulmifolia*) and Root of Mud (*Rheum officinale*)

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ABSTRACT

Standardization of simplicia is one of the important stages in ensuring the quality of herbal simplia. This study aims to conduct specific and non-specific standardization of simplicia of Dutch teak leaves (*Guazuma ulmifolia*) and kelembak root (*Rheum officinale*) based on the parameters of the Indonesian Herbal Pharmacopoeia (FHI) 2017. The parameters tested included moisture content, total ash content, insoluble ash content, drying shrinkage rate, ethanol soluble juice content, and water soluble juice content. The results showed that the simplicia of Dutch teak leaves had a moisture content of $7.90 \pm 0.27\%$, a total ash content of $8.53 \pm 0.19\%$, an acidic insoluble ash content of $1.95 \pm 0.52\%$, drying shrinkage of $4.36 \pm 0.28\%$, the content of ethanol soluble juice $26.20 \pm 0.79\%$, and water-soluble juice $16.29 \pm 0.44\%$. Meanwhile, the root of the pond showed a moisture content of $3.93 \pm 0.25\%$, a total ash content of $5.76 \pm 0.90\%$, an acidic insoluble ash content of 0% , drying shrinkage of $3.23 \pm 0.09\%$, the content of ethanol soluble juice $88.6 \pm 1.03\%$, and water-soluble juice $3.11 \pm 0.51\%$. All non-specific parameters meet the requirements of FHI. The high value of ethanol-soluble juice in the root of the lembak indicates the richness of semipolar compounds, while Dutch teak leaves excel in the content of polar compounds. These results suggest that both simplicia are suitable for use as raw materials for phytopharmaceuticals, either singly or in combination, particularly in the development of herbal products for metabolic disorders.



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INTRODUCTION

The use of medicinal plants as an alternative in traditional and modern medicine to treat various disease disorders is increasing, along with public awareness of the dangers of the side effects of synthetic drugs. Among the many medicinal plants, two of which are widely used by the community are Dutch teak leaves (*Guazuma ulmifolia*) and the roots of the spear (*Rheum officinale*). Both plants have ethnobotanical histories (Smaradhana et al., 2023; Nurhasanah & Iriani, 2021; Kumar & Gurunani, 2019). Dutch teak leaves are known to have pharmacological activities such as antidiarrheal, antioxidant and anti-inflammatory (Michelin et al., 2010; To'bungan et al., 2025), while the root of the lembak is commonly used as a laxative and various other digestive disorders (Clementi & Misiti, 2010). The combination of these two plants has the potential to be developed as synergistic herbal preparations, particularly in weight management and metabolic disorders.

However, in addition to the study of its benefits and safety, before a natural ingredient is widely used in medicine, it is necessary to carry out a standardization process to ensure its quality, safety, and effectiveness (Wibowo et al., 2024). Standardization of simplicia is the initial stage in the quality control of traditional medicine raw materials, which includes many. This step is important to ensure the consistency of the raw materials that will be used for the manufacture of herbal preparations or phytopharmaceuticals.

Dutch teak leaves and kelembak roots that come from nature have variations in phytochemical content. This is influenced by various factors such as the growing location, harvest season, and post-harvest processing methods (Tiwari & Cummins, 2013). Therefore, measurable and scientifically tested quality standards are needed for these two simplifications. Research on the standardization of simplicia of Dutch teak leaves and lemlem root is still limited, especially in the context of the use of both in combination as medicinal ingredients. Through comprehensive standardization data, it can be used as the basis for the development of herbal preparations based on the two plants in a more responsible manner.

The purpose of this study was to standardize the simplicia of Dutch teak leaves and kelembak root, including specific and non-specific tests, including water content parameters, total ash content, insoluble ash content of acid, drying shrinkage rate, ethanol soluble juice content, and water-soluble juice content. Through the results of this research, it is hoped that it can be a reference in the development of safe, effective, and quality herbal products based on Dutch teak leaves and kelembak root.

METHOD

Simplification

The simplicia used was obtained from PT. CIA, in the form of simplicia powder.

Non-specific parameters

Determination of the water content

The determination of the moisture content is carried out by the gravimetric method. A total of 10 grams of samples were put into a taged container. The sample is dried at a temperature of 105oC for 5 hours, then weighed. Drying and weighing continued with an interval of 1 hour,

until the difference between two consecutive weighings was obtained of no more than 0.25% (Ministry of Health of the Republic of Indonesia, 2017)

Determination of total ash content

Simplisia powder of 2-3 grams, put in a tared silica cross. set at 600 °C using the oven for 5 hours. Let the oven sit for 1 night until the temperature drops to 27°C. Porcelain cups are taken and weighed using analytical scales (Ministry of Health of the Republic of Indonesia, 2017).

Determination of drying shrinkage rate

Simplisia powder is put into the weighed rate of 2 grams. Porcelain cups are heated at 105 °C for 5 hours. The exchange rate is weighed, then the drying process is continued every 1 hour until constant results are obtained (Ministry of Health of the Republic of Indonesia, 2017).

Determination of acid insoluble ash levels

The results of the measurement of the total ash content were added to HCl 2N as much as 8 mL. The mixture of ash with HCl was filtered using Whatmann 41 filter paper. Porcelain cups are roasted at 800 °C using a kiln for 5 hours. Let the oven sit for 1 night until the temperature drops to 27°C. Porcelain cups are taken and weighed using analytical scales (Ministry of Health of the Republic of Indonesia, 2017).

Specific parameters

Determination of ethanol soluble cider levels

The dried simplisia powder is taken as much as 5 grams, put in a stuffed pumpkin, then 100 ml of 96% ethanol is added. The sample is whisked for 6 hours, then left for 18 hours. Pellets and supernatant are filtered, then 20 mL of supernatant is taken. The supernatant is put in a porcelain cup and baked at 105°C for 5 hours, then weighed. Ovening is done until the weight on the scale is stable. The time needed to stabilize $\pm 1 \times 24$ hours (Ministry of Health of the Republic of Indonesia, 2017)..

Determination of water-soluble pollen levels

The dried simplisia powder is taken as much as 5 grams, then put in a stuffed pumpkin. A total of 100 ml of chloroform-saturated water is added, then beaten for 6 hours, then left for 16 hours. Pellets and supernatant are filtered, then 20 mL of supernatant is taken. Ovening is done until the weight on the scale is stable. The time needed to stabilize $\pm 1 \times 24$ hours (Ministry of Health of the Republic of Indonesia, 2017).

Data Analysis

The standardization data was analyzed descriptively with comparative parameters listed in the Indonesian Herbal Pharmacopoeia, 2017.

RESULTS AND DISCUSSION

Standardization of simplisia is an important first step in ensuring the quality, safety, and consistency of herbal raw materials before further processing. In this study, specific and non-specific tests have been carried out on the simplisia of Dutch teak leaves and kelembak roots. The results of the standardization obtained were then compared with the parameters listed in the 2017 Indonesian Herbal Pharmacopoeia.

Table 1. Specific Standardization of Dutch Teak Leaves and Kelembak Roots

Yes	Parameters		Result	
			Dutch Teak Leaves	Root of Fleas
2.	Water-soluble content	cider	16.29±0.440	3.11±0.513
3.	Soluble ethanol	essence of	26.20±0.785	88.6±1,028

Table 2. Non-Specific Standardization of Dutch Teak Leaves and Kelembak

Yes	Parameters	Yield (%)	
		Dutch Teak Leaves	Root of Fleas
1.	Moisture content	7.90±0.267	3.93±0.248
2.	Total ash content	8.53±0.190	5.76±0.895
3.	Acid insoluble ash content	1.95±0.515	0
4.	Drying shrinkage rate	4.36± 0.280	3.23±0.089

The results of the standardization of simplicia of Dutch teak leaves (*Guazuma ulmifolia*) and simplicia root (*Rheum officinale*) show that both simplicia meet the requirements listed in the Indonesian Herbal Pharmacopoeia (FHI) second edition of 2017. The moisture content parameters in the simplicia of Dutch teak leaves and kelembak root were $7.90 \pm 0.267\%$ and $3.93 \pm 0.248\%$, respectively. The moisture content value is below the 10% threshold as set. The low moisture content indicates that the simplicia is quite dry, so it has good storage stability. This will extend the shelf life of simplicia, and prevent the enzymatic process of growth of microorganisms in simplicia before further processing in the form of health products (Ulfah et al., 2022).

Meanwhile, the total ash content parameters were $8.53 \pm 0.190\%$ for Dutch teak leaves and $5.76 \pm 0.895\%$ for kelembak root, respectively. This value is still within the maximum limit of ash content based on FHI. Meanwhile, the acid insoluble ash content was $1.95 \pm 0.515\%$ for Dutch teak leaves and 0% for kelembak root. This indicates a low content of insoluble inorganic contaminants such as silicates or sand, and is still in accordance with FHI standards which require no more than 9.1% for Dutch teak simplicia and no more than 6.1% for lemlem root. The total ash content is representative of the total amount of inorganic or mineral residues left after the burning of all simplicia organic matter (Pangestuti and Darmawan, 2021). According to FHI standards, it is known that Dutch teak and kelembak simplicia do not contain excessive inorganic contaminants. As for organic contaminants that are often a source of contamination in herbal simplicia such as soil, dust, or other additives that should not be present. This signifies the purity and integrity of good plant materials and hygienic post-harvest practices. Similarly, the content of insoluble ash in acids is part of the total insoluble ash content in hydrochloric acid. The level of acid-insoluble ash that meets the standard, indicates that there is no gross physical contamination from the environment where the plants grow or the processing process during harvest or post-harvest such as stones, soil, silicates or sand that may be carried (Guntarti et al., 2015).

The drying shrinkage rate parameters for Dutch teak leaves and root were $4.36 \pm 0.280\%$ and $3.23 \pm 0.089\%$, respectively. The drying shrinkage rate parameter in simplicia indicates the amount of simplicia weight loss due to evaporation of water and volatile solvents during the heating process. The rate set by FHI is no more than 10%. This parameter is one of

the non-specific parameters that is very important in quality assurance of herbal simplia. This value shows that the simplia of Dutch teak leaves and the root of the lemlem do not contain excessive moisture. At the same time, it shows that the simplia drying process has been carried out optimally. The drying shrinkage value according to the standard indicates that the drying process has been carried out well and long enough, so it is stable for storage. It also prevents the growth of microorganisms during storage (Fikayuniar et al., 2023).

At specific parameters, the level of ethanol-soluble juice in Dutch teak leaves reached $26.20 \pm 0.785\%$, while in the root of the spear was very high, which was $88.6 \pm 1.028\%$. This indicates that the roots of the yam are rich in semipolar active compounds such as ethanol properties. On the other hand, the water-soluble juice content of Dutch teak leaves was $16.29 \pm 0.440\%$ and the root of the lemlem was only $3.11 \pm 0.513\%$, which indicates that the dutch teak leaves contain more polar compounds such as tannin alkaloids and flavonoids than the root of the lemlem (To'bungan et al., 2025). This can be used as a basis for selecting the right solvent for the extraction of phytochemical compounds.

Overall, the data obtained through a series of standardization tests support the potential use of simplia of Dutch teak leaves and kelembak root as raw materials for herbal preparations. All nonspecific parameters tested, are within the range allowed by FHI. Meanwhile, the specific parameters of simplia of the root of the pond for the level of water-soluble juice are below the value set by FHI. The consistency of quality and purity of these two simplia suggests that both can be developed into safe, stable, and quality phytopharmaceutical products, either singly or in combination formulations for the management of metabolic disorders or as herbal slimming agents.

CONCLUSION

All non-specific parameters of the standardization results show that the simplia of Dutch teak leaves and lemlem root meet the quality requirements based on the 2017 Indonesian Herbal Pharmacopoeia. Specific parameters can be the basis for the selection of solvents for the extraction of phytochemical compounds. These results support the potential use of the two simplia as raw materials for phytopharmaceutical preparations. The high levels of ethanol-soluble juice in the roots of the pond indicate the richness of its semipolar bioactive metabolites. This data can be used as a scientific basis in the development of safe and quality combination herbal products.

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