

PHYTOCHEMICAL SCREENING AND PHENOLIC COMPOUND ANALYSIS OF CASHEW LEAF EXTRACT (*Anacardium occidentale*)

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A B S T R A C T

Cashew leaves (*Anacardium occidentale*) contain bioactive compounds such as phenolics and flavonoids that have potential as natural antioxidants. Phenolic compounds commonly found in plants are phenolic quinones, flavonoids, phenylpropanoids, simple monocyclic phenols, polyphenols, and phenolic quinones. **Objective:** The purpose of this study was to determine the level of phenolic compounds in ethanol extracts of cashew leaves from two different locations, namely Lombe and Tolandona. **Method:** The determination of cashew leaf extract was dissolved with methanol and placed in a test tube, then 3 drops of FeCl₃ reagent were added. The determination of total phenolics was carried out using the Folin-Ciocalteu method with gallic acid as the standard. **Results:** The results showed the presence of phenolic compounds in the cashew leaf extracts, indicated by a color change from light green to dark green. The total phenolic content of cashew leaf extract from Lobe waa was 0.1232%, while that from Tolandona was 0.0941%. Based on these results, both samples contained relatively high levels of phenolic compounds. **Conclusion:** Cashew leaf extracts (*Anacardium occidentale*) from two different locations in central Buton Regency were found to contain phenolic compounds, as indicated by the color change to dark green. The sample from Lombe had the highest phenolic content 0.1232, while the sample from Tolandona contained 0.0941%.

INTRODUCTION

The pharmaceutical field is within the scope of the health world which is closely related to products and services for health. Historically, pharmacy higher education in Indonesia was formed to produce pharmacists as the person in charge of pharmacy, with the rapid development of pharmaceutical science, pharmacists or also known as pharmacists, have fulfilled an increasingly wide field of work (Mustiqawati et al., 2023).

Cashew (*Western Anacardium*) includes plants that have two seeds or also called belarusian seeded plants. The right name to classify this plant is a plant that has two leaves called dicots. Cashews have uneven tree trunks and are dark brown in color. The leaves have short stems and are oval (oval) in shape with curved edges and the outline of the leaves is clearly visible, the flowers are white. The fruit is enlarged, soft-fleshed, juicy, and reddish-yellow in color.

Cashews have significant export potential in Sulawesi, especially in Southeast Sulawesi. Cashew production in Indonesia reaches around 95 thousand tons per year, with exports to the international market. The people of Southeast Sulawesi, especially in Central Buton, are familiar with the cashew plant or commonly called cashew dhambu, although with a different name for each region. Cashew plants in Central Buton are used by the local community to increase income and cashews are also known as a typical fruit of Southeast Sulawesi as well as a souvenir from the area (Veriony et al., 2011).

Among Indonesia's abundant biodiversity, one of the most promising candidates is cashews (*Western Anacardium*), plants of the Anacardiaceae tribe. In addition to its high economic value as an export commodity, this plant has a long history in ethnopharmacological use in various regions, including Southeast Sulawesi. Its leaves have traditionally been used to treat a variety of diseases, which are now known to have strong scientific properties related to their rich bioactive content, such as tannins (effective for diarrhea), flavonoids (anti-inflammatory), various other phenolic compounds (Wahyuni & Angelina, 2021). Scientific validation of these traditional claims is essential for the development of standardized herbal products.

Many plant compounds include phenolic compounds. They include simple antibiotic phenols, flavonoids, propanoid phenyls, phenolic quinones, and polyphenols (*tannin, lignin, melanin*). Phenolic compounds are reported to have antioxidant properties (Pamungkas et al., 2016). Due to the ability to release H⁺ ions from their hydroxyl groups, phenolic compounds are soluble in water with a limit of 8.3 grams per 100 milliliters. Phenolic compounds have more acidic properties than alcohol but are more alkaline than carbonic acid, and their melting point is 410 degrees Celsius (Achmad, 2016). Several studies on the levels of phenolic compounds in cashew leaves have been carried out, including by (Yuniarni, 2021), reported that cashew leaf extract, which contains phenolics, has a blackish-green color, and (Nugroho et al., 2013) reported the total phenolic level of cashew leaf extract in Cilellang Palanro Hamlet was 19.78 ± 0.62 grams, which showed that every 100 grams of dry weight of cashew leaf extract contained a phenolic equivalent of gallic acid of 19.78 ± 0.62 grams. Then Nur Hayati. 2024 reported that the level of flavonoid compounds from cashew leaf extract is part of phenolic compounds in Central Buton Regency, namely from the Lombe Area of 265.26 mgQE/g or 26.53% and from the Tolandona Area of 58.14 mgQE/g or 5.81%.

Phenolic compounds are secondary metabolites of plants that have many benefits, such as antioxidants, anti-inflammatory, antidiabetic, anticancer, and antimicrobials that regulate the immune system. The processing and storage of these compounds is very important because they are unstable. Storage should be carried out in a place protected from light, with low temperatures and oxygen levels. In addition, there is not always a correlation between the stability of phenolic compounds and their antioxidant activity; A decrease in phenolic compounds does not necessarily mean a decrease in antioxidant value. This is because there may be other antioxidants with antioxidant activity values (Octavia & Yuanita, 2021).

The mechanism of phenolic compounds as antioxidants is through the ability of phenol groups to bind free radicals by giving their hydrogen atoms through the electron transfer process, so that phenols turn into free radicals (Togo, 2004). Phenolic compounds in plants are found in the form of glycosides or esters (Proestos et al., 2006). The stability of phenolic compounds is influenced by several factors including pH, temperature, light and storage time (Basuki, 2005).

This research is designed with the aim of filling the knowledge gap. The novelty of this study lies in a multifaceted investigative approach: analyzing the total levels of phenolic compounds. It is hoped that This study will improve understanding and provide more solid scientific information about the possible possibility of cashew leaves as a superior natural source of antioxidants.

METHOD

This research uses an experimental laboratory design. The sample extraction process was carried out at the Bina Husada Polytechnic Laboratory, while the analysis of phenolic compound levels was carried out at Hasanuddin University (UNHAS) in the period from May to June 2025. Cashew leaves (*Anacardium occidentale*) from Lombe and Tolandona Villages in Central Buton Regency are the main ingredients used. The chemicals used include ethanol, Folin-Ciocalteu reagents, potassium persulfate, galic acid as phenolic standards. The equipment used includes analytical scales, blenders, rotary evaporators, ovens, UV-Vis spectrophotometers and other laboratory glassware.

The first research procedure was sample preparation, where cashew leaves were cleaned, shredded and dried using aerated until dry, then mashed using a blender until they became simplicia powder. The extraction process uses the maceration method. For three days, 250 grams of simplicia powder are soaked in three liters of ethanol solvent while stirring occasionally. A rotary evaporator is used to evaporate the filtrate at a temperature of 50°C. Then, the filtrate is further dried in the oven at 40°C until it produces a thick extract.

The Folin-Ciocalteu method is used to analyze the total levels of phenolic compounds. After the reaction with the Folin reagent and the Na₂CO₃ solution is saturated, the extract is left to sit for thirty minutes until a blue color is formed. The maximum wavelength (about 743 nm) is used to measure absorbance. Phenolic levels are calculated as galic acid equivalents (mg GAE/g extract). This is done using the standard galic acid curve.

RESULTS & DISCUSSION

Table 1. Phenol phytochemical test results using FeCl₃ Reagents

Sample	Chemical Content	Test methods	Result	Information
Cashew Leaf Extract	Phenol	React FeCl ₃	Green	-

The level of phenolic compounds in cashew leaf extract was measured by the *Ciocalteu Value*, which usually uses galvanic acid. The results of the phenolic content test showed that the samples of cashew leaves from the lombe area had higher levels of phenolic compounds than samples from tolondona.

Table 2. Standard absorbance data of galic acid at various concentrations

Concentration (mg/L)	Absorbance(A) ($\lambda=743$ nm)
1	0.149
2	0.258
4	0.515
8	0.956
16	1.879

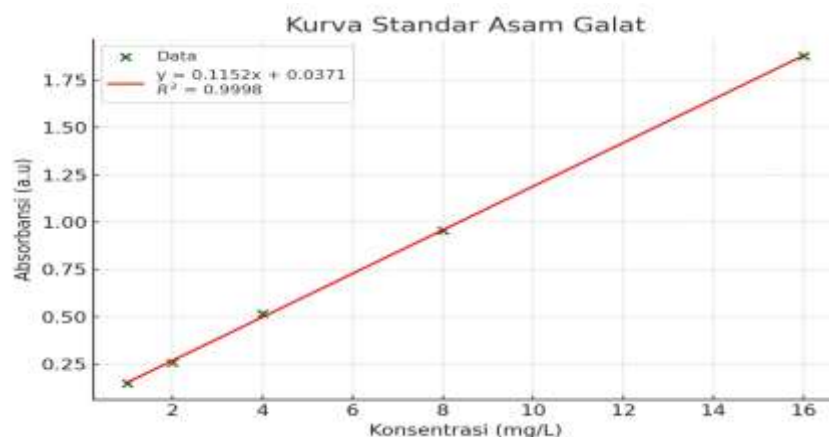


Figure 1. Gallic acid standard curve based on absorbance value at $\lambda=743$ nm

Standard curve data show a linear relationship between gallic acid concentration and absorbance at $\lambda=743$ nm. Regression equation: $y = 0.1152x + 0.0371$, with $R^2 = 0.9998$, showing strong and accurate.

Table 3. Phenolic Compound Levels in Each Cashew Sample

Sample	Replicate	Absorbance	FP	Phenolic (mg/L)	Phenolic (%)
Race	I	1,439	100	1216,927	0,12
	II	1,474	100	1247,309	0,12
	Average			1232,118	0,1232
Tolondona	I	1,12	100	940,017	0,09
	II	1,122	100	941,753	0,09
	Average			940,885	0,0941

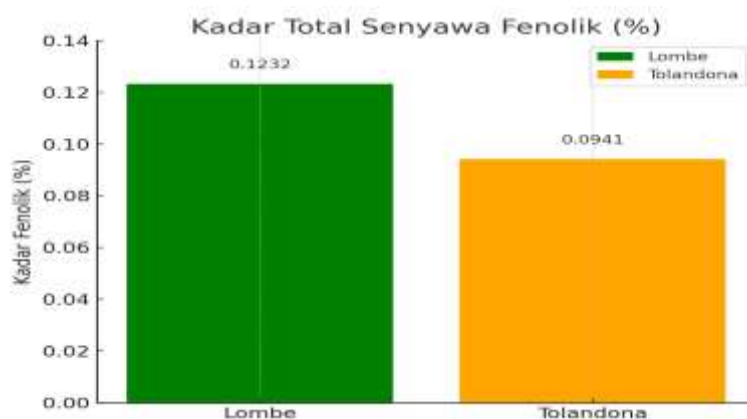


Figure 1. Fetolic Compound Levels Bar Chart in Each Sample

Before determining the level of phenolic compounds of cashew leaf extract (*Western Anarcadium*) first phytochemical tests are carried out as a preliminary test to get an idea of the compounds in cashew leaf extract (*Western Anarcadium*). This study emphasizes phenol compounds so that cashew leaf extract is positive for phenols which is characterized by a dark green color change after administering a few drops of FeCl₃ Reagent in the extract solution (Nurhayati 2024)

According to the results of the study, cashew leaf extract (*Anarcadium ocidentale*) from both regions (Lombe and Tolandona) contain phenolic compounds with significant levels. Phenolic compounds are secondary metabolites in plants that have an aromatic structure with benzene rings and at least one hydroxyl group. These compounds are commonly found in cell vacuole and can bind to sugars as glycosis. More than 8,000 phenolic compound structures have been identified, demonstrating the complexity and diversity of these compounds in plants. (Octavia & Yuanita, 2021). Phenolic compounds are known to be one of the groups of bioactive compounds that play an important role as antioxidants. This compound works by donating hydrogen atoms or electrons to free radicals, thus being able to inhibit oxidative chain reactions in the body (Dhurhanian & Novianto, 2018).

According to (Primadiamanti & Amura, 2020) Secondary metabolites that are abundant in plants include simple phenol compounds, phenolic acids, tannins, flavonoids, ligna, and lignin. Their function is as a dyes, antioxidant, and protector of plants from ultraviolet rays. Quantitative measurement of phenolic compounds can be carried out by various methods, one of which is UV/VIS spectrophotometry which utilizes colorimetric reactions. This method measures the total concentration of phenolic compounds in plant extracts by reacting phenolic compounds with the reagent folin ciocalteu, which forms a blue complex that can be measured with a spectrophotometer. The intensity of the resulting blue color depends on the concentration of phenolic compounds and the alkaline conditions of the solution. Meanwhile, (Dahlia, 2012) It also proves that cashew leaves contain phenolic compounds that can be qualitatively identified through the color change of the solution.

The results showed that the highest total level of phenolic compounds was found in cashew leaf extract from the Lombe Area, which was 0.1232%, while cashew leaf extract from Tolandona had a phenolic level of 0.0941%. Where Lombe is mountainous while Tolandona is coastal so that is why the levels of phenolic compounds of Lombe are higher than the levels of phenolic compounds of Tolandona, where it is known that the phenolic levels are very ceoate contaminated with hot temperatures. Research (Nugroho et al., 2013) In Cilellang Palarro Hamlet, the amount of phenolics in cashew leaf extract ranged from 19.78 to 0.62 percent. This shows that every 100 grams of dry weight cashew (*Anarcadium ocidentale*) leaf extract contains 19.78 to 0.62% phenolic equivalent of gallic acid. These differences in phenolic levels suggest that geographic environments, such as soil type, climate, as well as different sun exposures can affect the synthesis of phenolic compounds in plants (Ramayani et al., 2021).

Differences in the levels obtained from cashew leaves (*Western Anacardium*) is influenced by where the plant grows. Biochemical processes and the formation of secondary metabolites are closely related to these environmental influences. Environmental factors such as the altitude of places with high environmental stress, such as temperature, high humidity and low intensity of sunlight can affect the production of secondary metabolites such as phenolic levels in plant extracts (Sarni et al., 2020)

COVER

Some important conclusions can be made after analyzing the results of the research and the discussion that has been described. This study convincingly answers the purpose of the study by showing a positive correlation between the content of phenolic compounds characterized by dark green color changes. Samples from Lombe, which grow in the highlands, showed higher total phenolic levels (0.1232%) than samples from Tolandona (0.0941%) from the coast. These findings imply that agroecological factors, such as altitude and exposure to UV rays, significantly modulate the expression of secondary metabolites in plants. The limitations in this study need to be acknowledged to provide direction for future research. The main limitation lies in the scope of phytochemical analysis which is limited only to total phenolic levels. These measurements, while useful, do not provide information regarding the identity and quantity of specific phenolic compounds (such as gallic acid, quercetin, or anacardic acid) that may be major contributors to bioactivity.

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