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# Phytochemical Screening of Coconut Pistil Extract (Pistillum *Cocos nucifera*) as Traditional Medicine

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**Abstract**

*The coconut plant is a plant that has many benefits for human life. Every part of the coconut plant has great benefits for life, such as the trunk, roots, fruit, even the fruit or pistil of the coconut also provides many health benefits. Villagers use coconut pistil as a traditional medicine in the treatment of diarrhea. Traditional medicine can be obtained from plants that contain secondary metabolite compounds. Secondary metabolite compounds are active compounds found in plants to defend themselves from harmful environmental attacks. The purpose of this study is to identify secondary metabolite compounds present in coconut pistils. Identification of secondary metabolite compounds is carried out qualitatively, namely conducting phytochemical tests (phytochemical screening) in the laboratory. Phytochemical Screening is a simple and effective method. The results of this study indicate that coconut pistil (pistillum Cocos nucifera) positively contains secondary metabolite compounds of flavonoids, saponins, tannins, terpenoids and phenolics. So that coconut pistil can be used as one of the traditional medicinal ingredients.*

**Keywords:** *Phytochemicals, Coconut Pistil, Traditional medicine*



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## INTRODUCTION

Coconut trees are plants that grow in tropical areas such as Indonesia. Coconut has the Latin name cocos nucifera which is the sole member of the cocos genus, the aren-arenan tribe. The coconut tree gets the nickname "tree of life", because every part of this tree provides a variety of versatile benefits for human life. The roots, trunk, fronds, leaves, and fruit each contribute great benefits to life. Starting from young coconut to old coconut has many benefits (Ningrum, 2019). Coconuts grow up to 30 meters above sea level. Coconuts can grow in areas with annual rainfall intensity of 70-130 cm per year.

Plants that have the potential as medicinal plants are plants that contain secondary metabolite compounds such as albumin compounds, flavonoids, beta-carotene, vitamin C and others. Secondary metabolite compounds are compounds or active substances in plants (Erlidawati & Zahrina, 2023). Compounds such as flavonoids are compounds that act as natural antioxidants that can capture other free molecules (Kusumowati, 2012).

Coconut as a living plant that has a variety of benefits is very likely as a traditional medicinal plant. The test results of alkanoids, phenolics, flavonoids, saponins as well as steroids in coconut leaf extract showed positive presence of these compounds (Katja & Suryanto, 2008). The results of the coconut fiber extract test showed good antidiabetic activity which can reduce blood glucose levels. Secondary metabolite compounds found in coconut roots are flavonoids, polyphenols, monoterpenes and sesquiterpenes (Agustina et al., 2021). The content of compounds in coconut leaves and coconut fibers so that it is also possible to be found in the pistil of coconut or coconut fruit.

Research conducted (Mulyani et al., 2021) found that coconut pistil juice contains tannin compounds as anti-diarrhea compounds, which were carried out on male white mice. Similar research was conducted by Yuli Wahyu and friends. The study also concluded that giving the ethanol fraction of coconut fruit to mice can inhibit diarrhea. based on interviews with residents of several villages in West Aceh's Kaway XVI District that coconut pistil can be used as a diarrhea medicine and headache medicine by rubbing its puree on the sick body or drinking the extract. Previous research stating that coconut pistil contains tannin compounds, it is also very likely that there are other compounds such as flavonoids, phenolics, saponins and terpenoids.

Secondary metabolite compounds include bioactive compounds that can be tested through phytochemical screening. Phytochemical screening is carried out to determine the presence of biologically active compounds that are beneficial in plants (Condro, 2020). Phytochemical testing is a fast and accurate method in determining the activity of biological compounds. Phytochemical tests of coconut pistils need to be done to prove the presence of secondary metabolite compounds that act as antioxidants or others. This study was conducted to analyze secondary metabolite compounds in coconut pistils.

## METHODS

Secondary metabolite compound test or phytochemical test aims to determine the chemical compounds contained in plants. Plants that contain secondary metabolite compounds are characterized by color changes that refer to the Munsell Color Chart (Appendix 3). Plants containing secondary metabolite compounds are marked with a symbol (+) and for plants that do not contain secondary metabolite compounds are marked with a symbol (-) (Sangi et al., 2012).

**Alkaloid Test**
A sample of coconut pistil that has been mashed as much as 200 mg and added enough chloroform solution and mashed again, after which 10 ml of ammonia-chloroform is added. Then the solution was put into a test tube using filter paper and the filtrate was given $H_2SO_4$ 2 N as much as 10 drops. The solution is shaken, let stand for a few minutes until two layers appear. The top layer was put in a test tube and then added Dragendrof reagent as much as three drops. Positive results for the presence of alkaloids when the solution forms an orange red to brown precipitate (Sangi et al., 2012).

**Flavonoid Test**
A sample of coconut pistil that has been mashed as much as 200 mg, after which it is given 70% ethanol as much as 5 ml and then heated for 5 minutes. Then added 3 drops of concentrated HCl, then added 0.2 grams of magnesium powder. Positive results for the presence of flavonoids if an orange to dark red color is formed for 3 minutes (Sangi et al., 2012).

**Saponins Test**
The sample of coconut pistil that has been mashed as much as 200 mg, put into a test tube, added aquadest so that the entire sample is submerged, boiled for 2 to 3 minutes and then cooled and shaken vigorously. Positive results are indicated by the formation of a stable froth (Sangi et al., 2012).

**Tannin Test**
A 20 mg sample of coconut pistil that has been mashed is added to 70% ethanol until the sample is completely submerged, then 1 ml of the solution is transferred into a test tube and 2-3 drops of 1% $FeCl_3$ solution are added. Positive results are indicated by the formation of bluish black or green color.

**Terpenoids and Steroids Test**
Coconut pistil samples as much as 50-100 mg were mashed then added to glacial acetic acid until the sample was completely submerged, let stand for 15 minutes. Furthermore, 6 drops were taken and put in a test tube and given concentrated $H_2SO_4$ as much as 2 - 3 drops. Positive test for the presence of steroids if a bluish green color is formed. Positive results for the presence of terpenoids when an orange or purple red color is formed (Sangi et al., 2012).

## RESULTS AND DISCUSSION

Testing of active compounds, namely secondary metabolite compounds, is carried out through phytochemical screening, namely alkaloid, steroid, terpenoid, saponin, flavonoid, phenolic and tannin tests. Phytochemical screening is carried out to determine the active compounds of secondary metabolites as natural pesticides for plants (Rachmawan & Dalimunthe, 2017). Data on the results of phytochemical screening of coconut pistils are listed in the table below Table.1 and in Figure 1.

**Table 1.** Phytochemical Test Results of Coconut Pistil

| Metabolites Content | Reagen | Description |
|---|---|---|
| Alkaloid | Mayer | - |
| | Wagner | - |
| | Dragendorff | - |
| Steroid | Liebermann- burchard | + |
| Terpenoids | Liebermann- burchard | + |
| Saponin | Shuffling | + |
| Flavonoid | HCl and metal Mg | + |
| Phenolic | $FeCl_3$ | + |
| Tannin | Gelatin + $H_2SO_4$ | + |


**Figure 1.** Phytochemical test results of coconut pistil extract samples (Pistillum *Cocos nucifera*)

**Alkaloid Test**

Alkaloids are organic compounds containing nitrogen atoms that exert various physiological effects on humans. Alkaloid compounds are found in plants that can be used as medicine. The results of alkaloid testing using mayer, wagner, and Drangendorf reagents on coconut pistil extract showed negative results. This indicates that the coconut pistil extract does not contain alkaloid compounds. In general, alkaloids are colorless solid crystals and have a bitter taste, while in coconut pistils there is no bitter taste like in large coconut husks, so coconut pistil extracts are not identified alkaloid compounds (Mulyani et al., 2021).

**Terpenoids and Steroid Test**

Terpenoids and steroids are compounds derived from dehydrogenation and oxygenation of terpene compounds that act as bioactive and resistant to parasite and

insect attacks (Feransiska et al., 2021). Terpenoid and steroid compounds were tested using Liebermann-burchard reagent. The sample is reacted with the reagent and a change occurs where the solution becomes an orange-red color, which states that the coconut pistil extract contains terpenoid and steroid compounds (Sari, 2021).

The libermann burchard reagent consists of a mixture of anhydrous acetic acid compounds with 98 percent sulfuric acid. Terpenoids and steroids are positive in coconut pistil extract, this can be seen from the formation of an orange red color in the mixture.


**Figure 2.** Steroid and terpenoid Tests

**Saponin Test**

The second compound tested for phytochemistry was a saponin compound. Saponins are compounds that have many benefits in the form of complex glycoside compounds, which are the result of condensation of sugar compounds with the -OH group of organic compounds. So that saponins are like soap when we shake it will produce foam (Halimu et al., 2020).

Saponins showed positive results in coconut pistil extract, where there was froth when shaking. Saponin compounds are compounds that are very good against fungi and can help in the wound healing process (Erlidawati & Zahrina, 2023). The reaction of saponins during shaking can be seen in Figure 3 below.


**Figure 3.** Test for saponin compounds

**Flavonoid Test**

Flavonoids are secondary metabolid compounds that are widely found in foods such as chocolate which are derivatives of polyphenolic compounds. In addition, flavonoids are also secondary metabolite compounds found in plants (Arifin & Ibrahim, 2018). Most flavonoids found in plants are bound directly to their glycosides mixed with other compounds. Carbon atoms are atoms forming the basic structure of flavonoid compounds (Noer et al., 2018).


**Figure 4.** Flavonoid test

Positive flavonoid compounds are present in the coconut pistil, this is evident from the formation of an orange solution. The addition of HCl is used to hydrolyze flavonoids so that there is a change in color and flavonoid salt precipitate (Sangi et al., 2012). Flavonoids as secondary metabolites can be used as external wound healing drugs because flavonoids can stop bleeding (Erlidawati & Zahrina, 2023). Coconut pistil can be used as a wound healing medicine because of flavonoid compounds that act as antioxidants. Antioxidants contained in coconut husk extract are higher than coconut meat. This can be seen from the comparison of the IC50 value of coconut fiber extract, which is 63.95 ppm (Jauziyah et al., 2019).

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**Tannin Test**

Tannin is a compound that is widely found in plants. Tannin can be said to be a polyphenolic compound that has a large molecular weight and can form complex compounds with proteins. The structure of tannin is a benzene ring that has 6 carbons that are cyclically bonded with hydroxyl side groups. Tannins can act as biological antioxidants because they can precipitate protein compounds and remove metals (Noer et al., 2018).


**Figure 6.** Tannin Test

Tannins tested positive in coconut pistils. A positive test for tannins can be seen from the formation of a greenish solution and black precipitate. Tannins will form green, red, purple or black colors due to the formation of $Fe^{3+}$ ions, namely the Ferri (III) trisianoferritic potassium complex (Halimu et al., 2020). The tannin reaction can be seen in Figure 7 below. Tannins include phenolic group complex compounds that can inhibit bacterial growth and are often used as antiseptic materials. Tannins in young and old coconut fiber extract 95% can inhibit the growth of E Coli bacteria very well (Wulandari et al., 2019). Research on tannins in coconut fiber was also conducted by Fitriah in 2018 where the concentration of young coconut fiber extract had a major effect on bacterial growth in corn juice (Fitriah et al., 2019).

**Phenolic Test**

Phenolic compounds are secondary metabolite compounds that play an important role as natural antioxidant compounds found in plants. Phenolic compounds can dissolve in water, phenolics can bind to sugars as glycosides. Phenolic compounds are found in many cell walls in plants that play a role in preventing decay in plant tissues (Dhurhania & Novianto, 2019).

The content of phenolic compounds tested positive in coconut pistil extract. The change in color of the solution to blackish green occurs due to the reaction between Fe (III) reacting with the -OH group contained in the phenol compound (Erlidawati & Zahrina, 2023). The content of polyphenolic compounds contained in coconut pistils

can function as antibacterial and antiseptic by counteracting radicals that cause oxidative damage (Dhurhania & Novianto, 2019).


**Figure 8.** Phenolic test

## CONCLUSIONS

The results of the phytochemical test of coconut pistils (Cocos nucifera pistillum) are positive for secondary metabolite compounds such as tannins, flavonoids, terpenoids, phenolics, and saponins. However, secondary metabolic compounds of alkaloid and steroid groups are not found in coconut pistils. So that coconut pistil can be used as one of the traditional alternative medicines.

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