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Phytochemical Test, Total Antioxidant Capacity and Toxicity of Lobi-Lobi Fruit Extract (Flacourtia Inermis)

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KEYWORDS
Flacourtia Inermis, Antioxidant, BSLT, Phytochemical.

ABSTRACT
This study aims to determine the phytochemical profile, total antioxidant capacity, and toxicity of lobi-lobi fruit extract (Flacourtia inermis). The lobi-lobi fruit is small, round, and dark red when ripe, with a sour and often astringent taste and containing seeds. In Indonesia, it is commonly used to make rujak, syrup, sweets, pickles, and canned fruit. Despite its potential, the lobi-lobi fruit is not widely known in Indonesia, and information about its contents is limited. This research uses experimental methods including in vitro and bioassay tests. The in vitro tests include a phytochemical test and an antioxidant capacity test using a total phenolic test. The bioassay uses Artemia salina larvae with the BSLT method. The results show that lobi-lobi fruit extract contains alkaloids, cardioglycosides, glycosides, flavonoids, steroids, saponins, quinones, coumarins, anthocyanins, betacyanins, phenolics, and terpenoids. The total phenolic content of the extract is 1492.5 µg/mL. The DPPH antioxidant capacity test result is 104.223 µg/mL, the ABTS antioxidant capacity test result is 29.818 µg/mL, and the FRAP antioxidant capacity test result is 104.223 µg/mL. The LC50 value for the toxicity test is 158.489 µg/mL.

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INTRODUCTION

Indonesia, with more than 17,000 islands, is the largest archipelago in the world. Located between two continents, namely Asia and Australia, and nestled between two oceans, namely the Indian and Pacific Oceans, Indonesia is known for its extraordinary biodiversity of flora and fauna. Moreover, about 63% of Indonesia's land area, or equivalent to 120.6 million hectares, is forested areas (Basuki et al., 2022). According to data recorded in Indonesia's Forestry Status in 2018, the country has extraordinary natural resources, including 91,251 species of spore plants, 120 species of gymnosperms and 19,112 species of flowering plants (angiosperms).

In the midst of global challenges such as climate change, land degradation, and food insecurity, the diversification of food sources is important. Fruits that are still rarely known to the public or have not been used optimally can be a very valuable alternative in reducing dependence on more common types of staple foods. One of the many fruits which has potential, is the fruit of lobbying (Rahman, 2018).

Indonesia has genetic resources (SDGs) of tropical fruits of various types, and they are very diverse. There are more than 400 types of fruit plants that can be consumed in Indonesia (Kumoro et al., 2020). However, currently most of the SDGs in Indonesia are still not well inventoried or identified, resulting in very limited information in the community (Dahono & Zurriyati, 2018).

Tropical fruits are one of the potential sources of natural antioxidant compounds (Can-Cauich et al., 2017; Moo-Huchin et al., 2015; Pereira-Netto, 2018; Sarkar et al., 2023). One type of fruit that shows promising antioxidant activity is the lobbying fruit (Flacoutia inermis), which is popularly found in the Southeast Asian region, including Indonesia (Yasin et al., 2022). The lobi-lobi fruit itself has a small shape and looks round, the ripe lobi-lobi-fruit is usually dark red which has a sour taste but it is

not uncommon for it to taste sour and has seeds. In Indonesia itself, lobi-lobi fruits are usually used to make rujak, syrup, sweets, pickles and canned fruits (SWARA & Risa, 2012).

However, even though there is quite a lot of potential, it turns out that the fruits of lobbying are still not widely known by the Indonesian people. In addition, information about the content in the lobbies is still not widely known to the Indonesian people (Dahono & Zurriyati, 2018). The purpose of this study is to find out information on the content of lobbi-lobby fruits, by focusing on the analysis of the content of flanoids, saponins, tannins, alkaloids and phenolics.

Previous research has highlighted the phytochemical properties, antioxidant capacity, and toxicity of lobi-lobi fruit (Flacourtia inermis). Umam et al. (2023) characterized the morphological and phytochemical attributes of lobi-lobi fruits at various maturity stages, identifying 34 different compounds and noting high levels of phenolics and anthocyanins, which provide antioxidant benefits. Another study compared the antioxidant activity of lobi-lobi and jamblang (Syzygium cumini) fruits, using DPPH and UV-Vis spectrophotometry methods to demonstrate the potent antioxidant properties of lobi-lobi fruit. These studies provide a robust foundation for understanding the phytochemical content, antioxidant capacity, and potential health benefits of lobi-lobi fruit.

However, based on the above background, there is still very little information about the level of toxicity and antioxidant potential in lobbying fruits in Indonesia, which encourages researchers to find out more about the antioxidant capacity and toxicity of lobbying fruits in Indonesia.

METHOD

This study is an experimental research that is in vitro and bioassay (Agarwal et al., 2014; Indrayanto et al., 2021; Jia et al., 2015; Yu et al., 2016). In vitro tests consist of phytochemical tests, and antioxidant capacity tests using total phenolic tests. Bioassay examination uses Artemia Salina larvae using the BSLT method. This research took place at the Faculty of Medicine, Tarumanagara University, Building J, Laboratory of the Department of Biochemistry and Molecular Biology, Grogol, West Jakarta.

RESULT

Phytochemical Test of Fruit Extract of Lobbies

From the results obtained, the fruit extract of the lobi-lobi contains Alkaloids, Cardioglycosides, Glycosides, Flavonoids, Sterid, Saponins, Quiones, Coumarin, Anthocyanins, Betasianin, Phenolic and Terpenoids. (Table 1.)

Table 1. Phytochemical Content

Phytochemicals	Lobby-lobby Fruit Extract	Methods/Reagents
Alkaloids	+	Meyer and dragendaff
Cardioglycosides	+	Keller Killiani
Glycosides	+	Borntrager
Flavonoids	+	NaOH 1 N
Steroids	+	Liebermann Burchad
Saponins	+	Foam
Kuinon	+	H2SO4
Coumarin	+	NaOH 1N
Anthocyanins	+	NaOH
Betasianin	+	NaOH
Phenolic	+	Folin ciocalteau
Tannins	-	FeCl3 5%

Terpenoids	+	Liebermann Burchad

Table source: Personal Documentation

Total Phenolic Content Test of Fruit Extract Lobby

From the results obtained, the results of the Lobi-lobi fruit extract were obtained with a total phenolic compound of 1492.5 µg/mL, converted to 74.62 mg GAE/g DW. (Table 2)

Table 2. Phytochemical Content

Average Absorbance	Phenolic Content 6x dilution (µg/mL)	Total Phenolic Levels (µg/mL)	Total Phenolic Levels (mg GAE/g DW)
0,274	298.5	1492.5	74.62

Table source: Personal Documentation

Antioxidant Capacity Test using 1,1-diphenyl-2-picryhydrazyl (DPPH) fruit extract

From the results obtained, the results of DPPH IC 50 compound were obtained from the Lobi-lobi fruit extract of 193,897 µg/mL.

Table 3. Data Concentration, %Inhibition and IC50 Fruit Extract Lobbying

Concentration (µg/mL)	Average Absorbant	%Inhibition	IC50
50	0.504	7.692	
100	0.433	20.696	193.897
150	0.394	27.839	
200	0.261	52.198	
250	0.155	71.612	

Table source: Personal Documentation

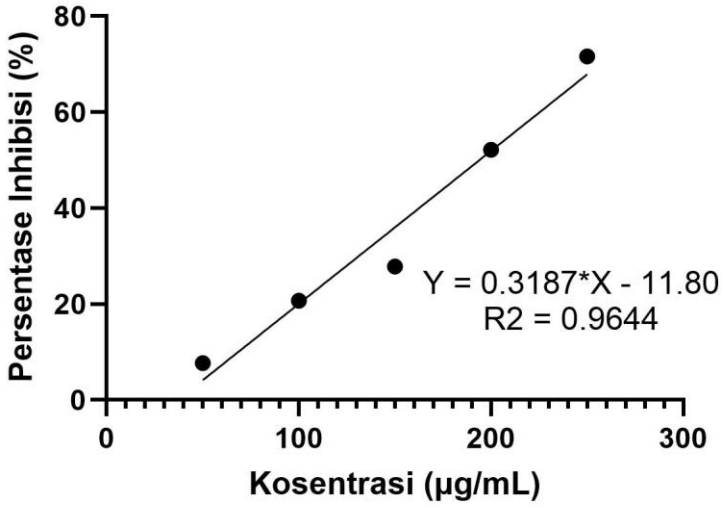

Figure 1. Curve of Fruit Extract Test Results of Lobi-lobi

Total Antioxidant Capacity Test Using the FRAP (Ferric Reducing Antioxidant Power) method on Lobi fruit extract

From the results obtained that the fruit extract of Lobi-lobi was obtained with a FRAP of IC_{50} compound of 9,884 µg/mL.

Table 4. Antioxidant Content of Lobby-lobbie fruit extract using FRAP

Concentration (µg/mL)	Average absorbant	%Inhibition	IC50
5	0.138	34.783	
10	0.2	55	9.884
20	0.361	75.069	
25	0.502	82.072	

Table source: Personal Documentation

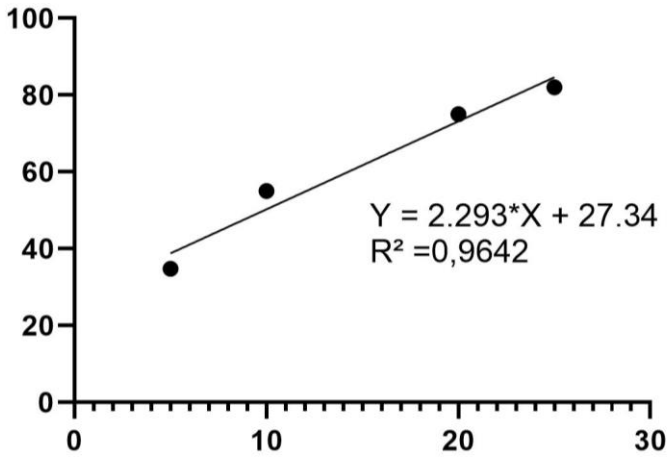

Figure 2. Curve of FRAP Test Results of Fruit Extract Lobby

Total Antioxidant Capacity Test Using ABTS Method on Lobby-Lobi Fruit Extract

From the results obtained, the fruit extract of Lobi-lobi was obtained with ABTS of IC_{50} compound of 29.818 µg/mL.

Table 5. Antioxidant Content of Lobby Fruit Extract using ABTS

Extract concentration Fruit lobbies	%inhibition	IC50
10	15,789	
20	40,789	
30	52,632	29,818
40	67,105	
50	75,000	

Table source: Personal Documentation

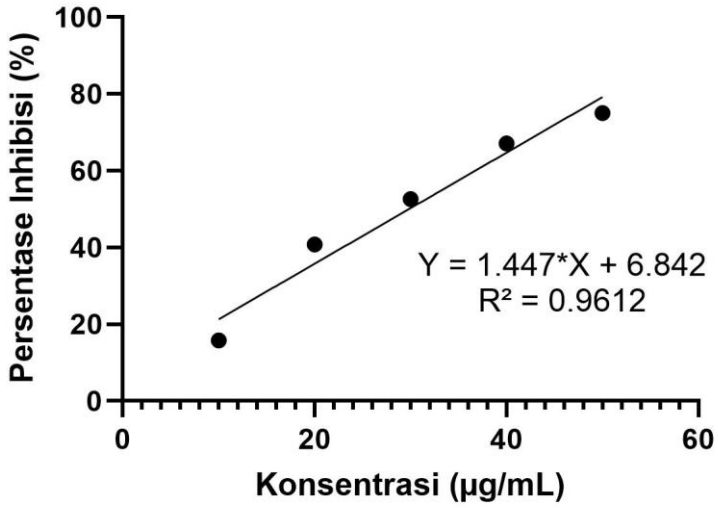

Figure 3. ABTS Antioxidant Capacity Test Curve Fruit Extract Lobby

Toxicity Test using Brine Shrimp Lethality Test (BSLT)

From the results obtained that the Lobi-lobi fruit extract obtained the result of BSLT LC50 compound of 158,489 µg/mL

Table 6. Larval Death of A. Salina Per Concentration

Concentration (µg/mL)	Concentration Log	% Death	LC50
50	1.70	13.559	
100	2.00	29.091	
200	2.30	48.077	158.489
300	2.48	68.627	
500	2.70	89.091	

Table source: Personal Documentation

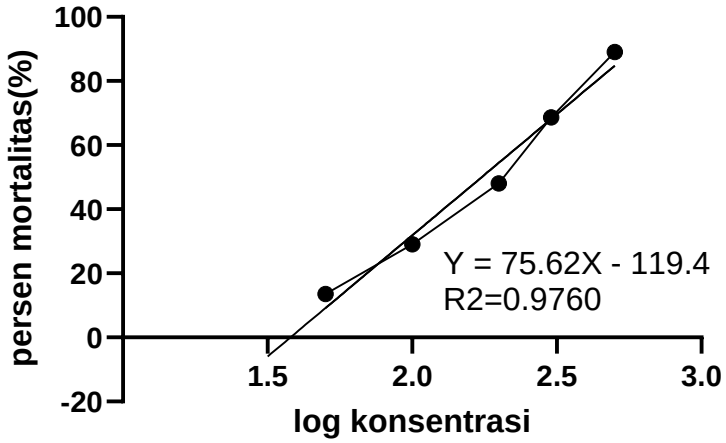

Figure 4. BSLT Test Curve Fruit Extract Lobby

Discussion

Phytochemical Test of Fruit Extract of Lobbies

In this study, the phytochemical content of Lobi-lobi fruit extract was tested. From the results obtained, the fruit extract of Lobi-lobi contains alkaloids, cardioglycosides, glycosides, flavonoids, sterids, saponins, quions, coumarins, anthocyanins, betacyanins, phenolics and terpenoids. This study is in line with the research of Femi A. Ajayi et al, containing various phytochemicals, including flavonoids, alkaloids, and phenolics (Salmiyah & Bahruddin, 2018).

Total Phenolic Content Test of Fruit Extract Lobby

The phenolic test on the methanol extract of the lobi-lobby fruit in this test obtained a total phenolic compound result of 74.62 mg GAE/g DW. In this study, in line with the research of Dwi Ratna Sari et al, it contains 21.3 mg of GAE/g DW.

Antioxidant Capacity Test

Antioxidant Capacity Test of Lobbying Fruit Extract by DPPH Method

The results of the antioxidant capacity test of Lobi-lobi fruit extract were calculated to obtain an IC50 of Lobi-lobi fruit extract of 104,223 µg/mL. In this study, in line with the research of Dwi Ratna Sari et al, an IC50 of 235.7 µg/mL was obtained, which can be classified as a potential source of natural antioxidants.[5]

Antioxidant Capacity Test of Lobby-lobby fruit extracts using the ABTS method

The results of the antioxidant capacity test of Lobi-lobi fruit extract were calculated to obtain an IC50 of Lobi-lobi fruit extract of 29.818µg/mL. This study is in line with the research of Femi A. Ajayi, et al. An IC50 of 145.7 µg/mL was obtained.

Antioxidant Capacity Test of Lobi-lobi-lobi-lobby fruit extract with FRAP method

The results of the antioxidant capacity test of Lobi-lobi fruit extract were calculated to obtain an IC50 of Lobi-lobi fruit extract of 104,223 µg/mL. In this study, in line with the research of Dwi Ratna Sari et al, an IC50 of 218.6 µg/mL was obtained.

Brine Shrimp Lethality Test (BSLT) Toxicity Test

The use of the BSLT method showed that the toxicity of Lobi fruit extract against A. salina larvae increased with increasing extract concentration. This is evidenced by the higher percentage of larval mortality after 24 hours at higher extract concentrations. The $LC_{50\ result}$ was obtained at 158,489 µg/mL, at a low extract concentration 0% mortality was found. Based on the results of the toxicity test, the leaf extract of the Lobi-lobi fruit is categorized as non-toxic because the value is greater than $LC_{50} \geq 1000$. This is different from substances that are categorized as very toxic if the LC value $_{is\ 50<}$ 30 and categorized as toxic if the LC value is 50< 1000.

CONCLUSION

The phytochemical test of lobi-lobi fruit extract reveals the presence of alkaloids, cardioglycosides, glycosides, flavonoids, steroids, saponins, quinones, coumarins, anthocyanins, betacyanins, phenolics, and terpenoids. The total phenolic content of the extract is 74.62 mg GAE/g DW, equivalent to 1492.5 µg/mL. The total antioxidant capacity of the extract was evaluated using three methods. The DPPH method yielded an IC50 value of 104.223 µg/mL, the ABTS method produced an IC50 value of 29.818 µg/mL, and the FRAP method also resulted in an IC50 value of 104.223 µg/mL. Additionally, the BSLT method indicated that the toxicity of the lobi-lobi fruit extract against A. salina larvae resulted in an LC50 value of 158.489 µg/mL.

Suggestion

1. It is important to conduct more in-depth research on the phytochemical content, total phenolic levels, antioxidant activity, and toxicity levels of lobbies fruit extracts and other parts of the plant, such as the leaves of lobbi-lobb trees and their roots. This aims to strengthen existing data and explore the full potential of the lobbying plants.
2. It is important to conduct direct animal studies in-vivo to understand the antioxidant potential of lobbly plants better.

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