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PHYTOCHEMICAL SCREENING OF MANALAGI MANGO (Mangifera indica L.) LEAF INFUSE

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ABSTRACT

Mango is an incredibly popular fruit in Indonesia and plays a significant role in its agriculture. Among the many varieties of mango, the Manalagi (Mangifera indica L.) stands out for its remarkable taste and abundant size. Moreover, the leaves of this type of mango have been found to contain a medicinal property due to the presence of a compound called mangiferin. This compound is known to offer a wide range of benefits, including pain relief, antioxidant effects, anti-inflammatory effects, anti-diabetic properties, tumor-fighting abilities, and stamina-boosting effects. This study aimed to identify the presence of various phytochemical compounds, such as flavonoids, alkaloids, tannins, saponins, and steroids in Manalagi mango leaf infuse. The extraction was done using the infundation method and distilled water as the solvent. Based on the research results, Manalagi mango leaf infusion showed positive results for flavonoid, tannin and steroid tests. The qualitative phytochemical screening showed positive results on flavonoids, tannins, and steroid compounds.

Keywords: *phytochemical screening, infusion, Manalagi mango leaf*

INTRODUCTION

The mango plant is an annual fruit plant in the form of a tree that originates from India. The mango plant comes from the Anarcadiaceae (Oktavianto, Sunaryo, & Suryanto, 2015). The main product of the mango plant is the fruit which is usually consumed fresh and in various processed products. Apart from the fruit, mango leaves can also be used as a medicinal plant. Manalagi mango leaves (Mangifera indica L.). One type of mango plant that is efficacious as a traditional medicine. The content of mango leaf extract is mangiferin which has been studied by several researchers as having functions including as an antioxidant, anti-inflammatory, analgesic, antimicrobial, anti-diabetic, anti-tumor, and increasing stamina or endurance (Jutiviboonsuk A, 2010). The cultivation of Manalagi mangoes (*Mangifera indica* L.) has increased due to the rise in market demand. Apart from the fruit, the leaves of the Manalagi mango can also be used for medicinal purposes. These leaves contain mangiferin, which has anti-inflammatory, pain relief, antidiabetic, antioxidant, anti-aging, antiviral, cardioprotective, and hepatoprotective properties (Nurcahyanti, 2019). According to (Anggraeni, Yulianti, & Panjaitan, 2020) research, mango leaves contain flavonoids, alkaloids, and saponins, but steroids and triterpenoids are not found in all mango varieties. Flavonoids work as antioxidants and help in insulin production by regenerating pancreatic β-cells (Susilawati *et al*., 2018). Additionally (Gondi, Basha, Bhaskar, Salimath, & Prasada Rao, 2015) demonstrated that mango peel exhibits increased antioxidant enzyme activity, leading to improvements in hyperglycemia, hyperlipidemia, and nephroprotective properties in streptozotocin-induced diabetic rats.

Phytochemical screening is a method used to identify bioactive compounds in plants. The purpose of this method is to gain an overview of the different classes of compounds present in the plant being studied (Minarno, 2015). This is achieved by using color reagents to observe the color reaction formed. The selection of extraction methods and solvents are

important factors that influence the accuracy of phytochemical screening. This phytochemical screening is the initial step in determining the secondary metabolite compound content of Manalagi mango leaves. The objective of this research is to identify the exact secondary metabolite compounds present in these leaves.

METHODS

A qualitative phytochemical screening study was conducted on Manalagi mango leaf infuse at the laboratory of the Jamu Department of Poltekkes Kemenkes Surakarta. The infusion method involved weighing 10 grams of Manalagi mango leaf powder and adding 100 mL of distilled water, which was then heated for 15 minutes at a temperature of 90°C. Several phytochemical screening tests were performed to analyze the components present in the infusion.

1. **Flavonoid test**
   A 3 mL Manalagi mango leaf infuse was put in a test tube, added with hot water, and then heated for 5 minutes. A 0.05 mg of magnesium (Mg) powder and 1 mL of hydrochloric acid (HCl) were added to the tube and then shaken vigorously. The presence/absence of color changes to red/orange/yellow indicates the presence of flavonoid compounds in the sample (Oktavia, Wahyuningsih, & Andasari, 2020).
2. **Alkaloid test**
   A total of 3 mL of Manalagi mango leaf infuse in an evaporating dish was evaporated until a residue formed, then added with 5 ml of HCl 2N. The solution obtained was divided into 2 test tubes. Three drops of Dragendrof reagent were added to the first tube while 3 drops of Meyer reagent were added to the second tube. A positive result is indicated by the formation of an orange precipitate with Dragendrof reagent and a white to yellowish precipitate with Mayer reagent (Farnsworth, 1966).
3. **Saponin test**
   A mixture was prepared by adding 3 mL of Manalagi mango leaf infusion and HCl 2N to 10 mL of hot water in a test tube. The mixture was then shaken vigorously for 15 seconds. A positive result is indicated by the formation of stable foam that remains constant for at least 10 minutes (Lolok, Awaliyah, & Astuti, 2020).
4. **Tannin test**
   A total of 3 mL of Manalagi mango leaf infuse added with 3 drops of iron (III) chloride ($FeCl_3$) 10% in a test tube. A positive result is indicated by a color change into dark blue, blackish blue, or greenish black (Anggraeni, Ramdanawati, & Ayuantika, 2018).
5. **Steroid test**
   In a test tube, 3 mL of Manalagi mango leaf infuse added with acetic acid anhydride (as needed). The mixture was boiled and then let cool. A concentrated sulfuric acid was slowly poured into the test tube, allowing it to flow down through the tube walls. A positive result is indicated by brown ring formation at the mixture's surface (Nugrahani *et al*., 2016).

RESULT AND DISCUSSION

A 50 mL liquid extract was obtained through the infundation method using distilled water as a solvent. The extracted secondary metabolites can be influenced by the selection of solvents and extraction methods. The principle of "like dissolves like" is usually followed when selecting solvents. This means that non-polar compounds dissolve in non-polar solvents, while polar compounds dissolve in polar solvents (Seidel, 2008). The phytochemical screening was performed based on the solubility properties of each compound. The

phytochemical screening result revealed the presence of three compounds in Manalagi mango leaf infuse are flavonoid, tannin, and steroid.

Table 1. Phytochemical Screening Results of Manalagi Mango (*Mangifera indica* L.) Leaf Infuse

Phytochemical Compounds	Reagent	Positive Indicator	Result	
Flavonoid	Mg powder + HCl conc.	Red, orange, or yellow color	Red solution	+
Alkaloid	HCl 2N + Dragendorf	Orange sediment	No sediment	-
	HCl 2N + Mayer	White sediment	No sediment	-
Saponin	Aquadest + HCl 2N	Stable foam for ± 10 minutes	No foam	-
Tannin	$FeCl_3$	Blackish blue or blackish green	Blackish green	+
Steroid	Acetic acid anhydrous + $H2SO_4$ conc.	Formation of brown ring	Brown ring formed	+

Table 1 displays the outcomes of the phytochemical screening test. Flavonoids are antioxidant compounds due to their hydroxyl groups, which act as a reductor and hydrogen donors for free radicals (Ningtias, 2020). The presence of flavonoid compounds in Manalagi mango (*Mangifera indica* L.) leaf infuse samples was determined through the flavonoid test, which produced a reddish color upon the addition of magnesium (Mg) powder and HCl. The antioxidant effects of flavonoids are beneficial in treating chronic and degenerative illnesses such as heart problems, cancer, arthritis, stroke, and Alzheimer's disease (Hasan, Ain Thomas, Hiola, Nuzul Ramadhani, & Ibrahim, 2022).

In the alkaloid test, both in test tube 1 and 2, there was no precipitate formed. This indicates that the Manalagi mango (*Mangifera indica* L.) leaf infuse does not contain alkaloid compounds. However, the results of this study contradict the research of (Ningsih, 2017), which showed that the methanol extract of mango leaves contained alkaloid compounds. This happened because of the semi-polar characteristics of alkaloids and the polar properties of distilled water. When extracted with distilled water, alkaloids cannot be identified due to their insolubility in free form. However, they are soluble in chloroform, ether, and other relatively non-polar organic solvents.

According to the research of (Simaremare, 2014), saponins usually produce foam when shaken due to the presence of their hydrophilic groups that bind to water while their hydrophobic groups bind to air. However, in the saponin test, no foam was formed, indicating that the Manalagi mango (*Mangifera indica* L.) leaf infuse does not contain saponin.

The tannin test of Manalagi mango (*Mangifera indica* L.) leaf infuse performed a color change into a blackish-green solution after being added with 1% $FeCl_3$ reagent, indicating the presence of tannin. This finding is aligned with the research of (Alshammaa, 2016) which also identified tannin compounds in mango leaf extract.

The steroid test of Manalagi mango (*Mangifera indica* L.) leaf infuse performed a formation of a brownish ring at the mixture's surface which indicates a positive result for steroids. The acetylation process of the hydroxyl group with acetic acid anhydrous is necessary for testing steroid group compounds, which leads to the formation of a brownish ring. The acetyl group releases hydrogen and its electrons, resulting in the movement of double bonds (Ainia, 2017).

CONCLUSION

Based on the results of the conducted research, it can be deduced that the Manalagi mango (*Mangifera indica* L.) leaf infusion contains compounds such as flavonoids, tannins, and steroids. These findings suggest that the Manalagi mango leaf infusion could potentially yield significant health benefits due to the presence of these beneficial compounds. The

results of this research provide valuable insights into the composition of the Manalagi mango leaf infusion and could pave the way for further exploration into the potential health benefits of this natural resource.

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BIBLIOGRAPHY

Ainia, N. (2017). Uji Fitokimia Infusa Pekat Buah Pare (Momordica charantia L.) dan Pengaruh Lama Terapi dengan Variasi Dosis Terhadap Penurunan Kadar Glukosa Darah Tikus (*Rattus norvegicus*) yang Diinduksi Aloksan. *Skripsi of Maulana Malik Ibrahim State Islamic University of Malang*, pp. 1–161.

Alshammaa, D. (2016). Preliminary Screening and Phytochemical Profile of Mangifera indica Leave's Extracts, Cultivated in Iraq. *International Journal of Current Microbiology and Applied Sciences*, Vol. 5, pp. 163–173. https://doi.org/10.20546/ijcmas.2016.509.018

Anggraeni, V. J., Ramdanawati, L., & Ayuantika, W. (2018). Determination Total Anthocyanin in Brown Rice (*Oryza nivara)*. *Jurnal Kartika Kimia*, *1*(1), 11–16. https://doi.org/10.26874/jkk.v1i1.11

Anggraeni, V. J., Yulianti, S., & Panjaitan, R. S. (2020). Artikel Review: Fitokimia Dan Aktivitas Antibakteri Dari Tanaman Mangga (Mangifera Indica L) Article Review: Phytochemistry And Antibacterial Activities Of Plants Mango (*Mangifera indica L*). *Indonesia Natural Research Pharmaceutical Journal*, *5*(2), 102–113.

Farnsworth, N.. (1966). Biological and Phytochemical Screening of Plants. *Journal of Pharmaceutical Sciences and Research.Pharm.Sci*, 55.

Gondi, M., Basha, S. A., Bhaskar, J. J., Salimath, P. V, & Prasada Rao, U. J. . (2015). Anti-diabetic effect of dietary mango *(Mangifera indica L.)* peel in streptozotocin-induced diabetic rats. *Journal of the Science of Food and Agriculture*, *95*(5), 991–999. https://doi.org/10.1002/jsfa.6778

Hasan, H., Ain Thomas, N., Hiola, F., Nuzul Ramadhani, F., & Ibrahim, A. S. (2022). Skrining Fitokimia dan Uji Aktivitas Antioksidan Kulit Batang Matoa *(Pometia pinnata)* Dengan Metode 1,1-Diphenyl-2 picrylhidrazyl (DPPH). *Indonesian Journal of Pharmaceutical Education*, Vol. 2, pp. 67–73. https://doi.org/10.37311/ijpe.v2i1.10995

Jutiviboonsuk A, S. C. (2010). Mangiferin in leaves of three thai mango (Mangifera indica L.) varieties. *Indian J Pharm Sci*, *6*(3), 122–129.

Lolok, N., Awaliyah, N., & Astuti, W. (2020). Formulasi Dan Uji Aktivitas Sediaan Sabun Cair Pembersih Kewanitaan Ekstrak Daun Waru *(Hibiscus tiliaceus)* Terhadap Jamur *Candida albicans*. *Jurnal Mandala Pharmacon Indonesia*, *6*(01), 59–80. https://doi.org/10.35311/jmpi.v6i01.53

Minarno, E. (2015). Skrining Fitokimia Dan Kandungan Total Flavanoid Pada Buah Carica pubescens Lenne & K. Koch Di Kawasan Bromo, Cangar, Dan Dataran Tinggi Dieng. *El-Hayah*, *5*(2), 73–82.

Ningsih, D. R. (2017). Ekstrak Daun Mangga *(Mangifera Indica L.)* Sebagai Antijamur Terhadap Jamur *Candida albicans* Dan Identifikasi Golongan Senyawanya. *Jurnal Kimia Riset*, Vol. 2, p. 61. https://doi.org/10.20473/jkr.v2i1.3690

Ningtias, A. K. (2020). Desain Dan Uji Coba Poster Gel Antiseptik Ekstrak Daun Matoa *(Pometia pinnata)* Sebagai Alternatif Sumber Belajar Pada Materi Koloid. *Kaos GL Dergisi*, Vol. 8, pp. 147–154. Retrieved from

https://doi.org/10.1016/j.jnc.2020.125798%0Ahttps://doi.org/10.1016/j.smr.2020.02.002%0Ahttp://www.ncbi.nlm.nih.gov/pubmed/810049%0Ahttp://doi.wiley.com/10.1002/anie.197505391%0Ahttp://www.sciencedirect.com/science/article/pii/B9780857090409500205%0ahttp:

Nugrahani, R., Andayani, Y., & Hakim, A. (2016). Skrining Fitokimia Dari Ekstrak Buah Buncis *(Phaseolus vulgaris L)* Dalam Sediaan Serbuk. *Jurnal Penelitian Pendidikan IPA*, *2*(1). https://doi.org/10.29303/jppipa.v2i1.38

Nurcahyanti, A. R. (2019). Mangifera and Impatiens from Sumatra: Phylogenetic positions and their modes of action as anticancer agents. *Pharmacognosy Reviews*, *13*(25), 16. https://doi.org/10.4103/phrev.phrev_26_18

Oktavia, S. ., Wahyuningsih, E., & Andasari, S. . (2020). Skrining Fitokimia Dari Infusa Dan Ekstrak Etanol 70% Daun Cincau Hijau *(Cyclea barbata Miers)*. *Jurnal Ilmu Farmasi*, *11*(1), 2685–1229.

Oktavianto, Y., Sunaryo, & Suryanto, A. (2015). Kabupaten Kediri Characterization Of Plant Mango *(Mangifera Indica L.)* Cantek , Ireng, Empok, Jempol. *Jurnal Produksi Tanaman*, *Volume 3*(2), 91–97.

Seidel, V. (2008). Initial and Bulk Extraction. In S. D. Sarker, Z. Latif, & A. I. Gray (Eds.), *Natural Products Isolation* (2nd ed., pp. 33–34). New Jersey: Humana Press.

Simaremare, E. S. (2014). Skrining Fitokimia Ekstrak Etanol Daun Gatal *(Laportea decumana (Roxb.) Wedd)*. *Pharmacy*, Vol. 11, pp. 98–107.

Susilawati, E., Aligita, W., Adnyana, I. K., Patonah, Sukmawati, I. K., Anneesha, & Putri. (2018). Activity of karehau *(Callicarpa longifolia lamk.)* leaves ethanolic extract as a wound healing. *Journal of Pharmaceutical Sciences and Research*, *10*(5), 1243–1247.