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(RESEARCH ARTICLE)

A study of pharmacognostic profile and antifungal activity of ethanolic extract of kapok banana weevil (*Musa balbisiana*)

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Abstract

Dandruff is an anomaly on the scalp caused by Pityrosporum ovale. Dandruff-treated Ketoconazole shampoo, Excessive caused dermatitis and hair damage. The problem was solved using the kapok banana weevil as an alternative treatment. This study aims to determine the quality of kapok banana weevil simplicia and its anti-functional activity against *P. ovale*. The study was conducted in two stages, the first of which involved Pharmacognostic profiles on macroscopy, microscopy, Simplicia quality, and phytochemical screening. Examining the inhibitory zones of the ethanolic extract of *P. ovale* at doses of 0.5%, 1%, 2%, 4%, 5%, 10%, 20%, and 40% reveals stage 2 antifungal activity. Employing the Kirby-Bauer diffusion as a positive control with ketoconazole and a negative control with sterile aqua dest. A 95% confidence level LSD post hoc test, one-way ANOVA, and description technique were used to evaluate the data. Results: The Kapuk banana weevil's Simplisia met high standards for Simplisia quality, and its ethanol extract was able to stop *P. ovale* growth by creating an inhibition zone. The ethanol extract of the Kapuk banana weevil was able to suppress the development of *P. ovale* with an inhibition zone extending from 0.5 to 17.16 mm and positive control (ketoconazole) of 23.5 mm. The Simplisia of the Kapuk banana weevil had good simplicia quality standards. Extract with concentration of 40%and a 17.16 mm inhibition zone, the activity was at its peak. The pharmacognostic profile demonstrates the high quality of Simplicia, and the activities of the kapok banana weevil extract are at their peak at a concentration of 40% at a diameter of 17.16 mm.

Keywords: Banana kapok; *Pityrosporum ovale*; Anti-fungal; Extract; Simplicia

1 Introduction

In nations with Humid, tropical climates, fungi are one of the causes of skin illnesses. *Pityrosporum ovale* is one of the fungi that can result in skin diseases [1,2]. when there is an overproduction of oil gland secretion, this fungus, which is a normal component of the scalp flora [3,4,5], causes dandruff. an abnormality of the scalp called dandruff is defined by excessive horny layer exfoliation, resulting in tiny scales, red areas that resemble small boils, soreness, itching, chafing, moist, sticky, and smelly scalp, as well as hair loss. [3] hair. 50% of adults and 15–25% of the global population experience dandruff, according to [6, 7]. 60% of people in America and Europe have dandruff problems[8, [9]. After China, India, and the US, Indonesia ranks fourth in the world for the percentage of people who suffer from dandruff [8][10]. Shampoos using synthetic chemicals like zinc pyrithione and ketoconazole have been successful in treating dandruff. Toxicities in the eyes, dermatitis on the scalp, and hair damage are some of the negative effects of synthetic materials[11]. We, therefore, require additional natural materials as alternatives. The negative effects of natural substances used in traditional remedies are generally less severe than those of synthetic anti-fungal medications [9,12,13]. The kapok banana plant is one of the plants. According to empirical research, dandruff is used to treat the kapok banana plant [14,15]. The shampoo is used to blacken and mend hair, while the weevil is used empirically to cure diarrhea [16,4]. Kapok banana peel extract has been proven in numerous tests to be more effective than fluconazole in

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treating Candida albicans [10]. Furthermore, found that kapok banana peel had superior antifungal activity than tomato leaves, *Erythrina subumbrans* leaves, and avocado leaves against Malessezia furfur [17,5]. According to recent studies, S. aureus and E. coli bacteria can't develop when exposed to kapok banana weevil extract [15,18,19]. Tannins, flavonoids, and saponins are all present in banana weed [20,21,19]. According to the kapok banana weevil has the potential to affect herbal goods [18,11]. Indonesia's growth in the production of herbal items. The Indonesian Herbal Pharmacopoeia [22,23]and the Indonesian Materia Medika [24] quality standards were employed in the creation of herbal goods in Indonesia. These specifications ensure that simplicia utilized for therapeutic and health maintenance purposes is of a high standard [25]. In order to assess the quality of the kapok banana weevil simplicia and test its antifungal activity to assess the potency of the ethanol extract of kapok banana weevil against *P. ovale*, it is required to examine the pharmacognostic profile in this study.

2 Material and methods

2.1 Material

Banana kapok have made from plant components that the gathered from the Pegalongan village in Patikraja, Banyumas. The taxonomist's lab in the faculty of biology, where plants of the identified. It was approved by the dean of the Biology Faculty and given the certificate number 264/un.23.02.8/ta.00.01/ 2022.

2.2 Methods

2.2.1 Macroscopic Test

The simplicial of kapok banana weevils, was examined closely for the macroscopic test in order to determine its shape, size, color, flavor, and odor.

2.2.2 Microscopic Test

The microscopic test uses a microscope with a magnification of 12.5x10 and 70% Chloralhydrate to see the identification pieces of the kapok banana weevil Simplicia powder in the form of cells, cell contents, or plant tissues [22].

2.2.3 A review of generic characters

Ash content analysis

Putting one gram of Simplicia into a ceramic cross. the powder was weighed after being placed in a desiccator and heated to 600 ^{o}C for six hours. the dry material content's ash was then calculated.

Determining the amount of ash that isn't soluble in acid

One gram Simplisia was diluted in sulfuric acid 10% (25 cc) and heated for 5 minutes. The component that was acid-insoluble was separated out and put through a filter made of dried material that was ash-free and acid-insoluble.

Determining the water soluble - essence.

100 ml of saturated chloroform water and five grams of Simplicia were poured to a blocked pumpkin, agitated vigorously for the first six hours, then allowed to settle for 18 hours before being filtered. Twenty milliliters of the filtrate were evaporated, dried heated to 105 ^{o}C, and tapped. They heated still the set weight at 105^{0}C. Determine the quantity (%) of extracts that are water-soluble.

Determining the extract's ethanol solubility

100 ml of ethanol and five grams of Simplicia powder were introduced to a clogged pumpkin, agitated vigorously for the first six hours, and then allowed to sit for 18 hours. The mixture was filtered right away to prevent ethanol from evaporating. 20 ml of the filtrate was dried in the flat-bottomed dish at 105^{0} C, and the remaining filtrate was tamed and heated until the weight. The extract that dissolves in ethanol was identified.

2.3 Screening for phytochemicals

2.3.1 Test for flavonoids

On a test tube with ten-milligram ethanol extracts of the kapok banana weevil, two milliliters of ethanol, and four drops of HCl were added. If a solution is orange, it means flavonoid.

2.3.2 Test for tannin

A test tube containing 2 ml of distilled water and a ten-milligram ethanol extract. then add 1% fecl3 solution in four drops. Tannin is present if a black, blue-black or blue ink solution develops.

2.3.3 Saponin test

One milliliter of distilled water and ten milligrams of ethanol extract were combined, and the mixture was violently shaken for 10 seconds. Then, after 10 minutes, inspect the foam or foam with HCl 2 n added. Saponins were indicated by the foam that formed for 10 minutes and reached a height of 1-3 cm.

2.4 Antifungal Activity Test

The ethanol extract of the kapok banana weevil was tested for antifungal efficacy against *P. ovale*, using the Kirby-Bauer diffusion method. at *P. ovale*, the medium had solidified and was compared to a typical 0.5 mc. use of a clean cotton swab by farland. the ethanol extract, the positive control, and the negative control had all already been soaked into the paper discs. 18 to 24 hours at 37^0c in the petri dishes. Use a ruler to measure the clear area that has developed around the paper disc. Three times were repeated.

2.5 Data Analysis

Analyzed descriptively were the macro- and micro-scale, the ash content, the ethanol-soluble extract, the water-soluble extract, the water content, and the phytochemical screening. a one-way ANOVA test was used to compare the antifungal activitymeasured by inhibitory zone widths between treatment groups; the LSD was then used to identify the statistically significant difference between the data from each treatment group (extract, positive control, and negative control).

3 Results and discussion

3.1 Macroscopic Examination

The Musaceae family includes the kapok banana (*Musa paradisiaca*). Simplicia is rectangular in shape, 2.5 cm long by 1.5 cm wide, light brown, tasteless, and emits a distinct odor (figure 1a).

3.2 Microscopic Analysis

By identifying the anatomical features and fragments of the kapok banana weevil's simplicial. the results of the findings, the kapok banana weevil Simplicia powder had fragments of the trachea and parenchyma (figure 1b).

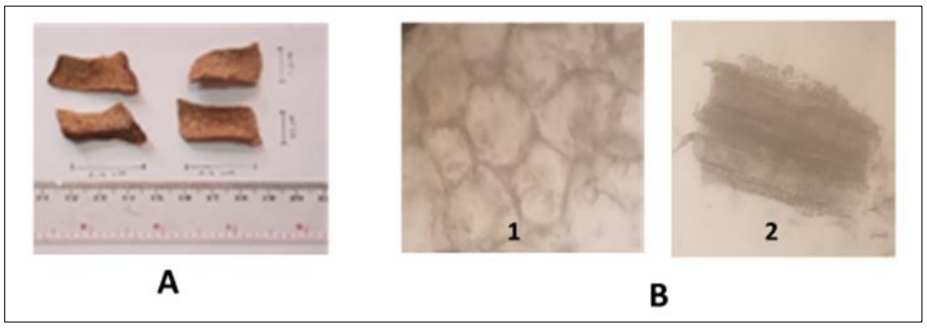

Figure 1 Macroscopic and microscopic test results of simplicia kapok banana weevil with 10x magnification. A. macroscopic. B. microscopic, 1. Parenchyma, 2. Trachea

3.3 Determining The Simplicial's Quality

The present study, calculating simplicity quality characterization of the total ash content, water-soluble extract content, ethanol-soluble extract content, and water content are among the outcomes of Simplicia powder characterization (table 1). because the origin of the environment that it grows impacts the active chemical content, the characterization of the kapok banana weevil Simplicia was assessed to define the simplicial's specifications and clarify the subject matter.

Table 1 Determination of quality of Simplicia of weevils kapok banana based on non-specific characters

Parameters	$\bar{x}$ **± SD (%)**	**MMI(%)**	**Information**
Water content	5,32±0,30	<10	Meet standards
Water soluble extract	15,26±0,39	>14,5	Meet standards
Ethanol soluble extract	5,65±0,46	>2	Meet standards
Total ash	7,83±0,40	<12,5	Meet standards

3.4 Phytochemistry screening

Data on Pharmacognosy profiles supported by research on chemical constituents. In this investigation, chemical reagents that can alter color or precipitate formation depending on the characteristics of chemical compounds present in the sample for identification (table 4). the molecules that are effective in plants can be identified thanks to this research. The tannins and saponins found in meviils banana kapok were the chemicals studied (table 2).

Table 2 The result of Phytochemistry Screening

Compounds	**Reagent**	**Colour**		**Information**
		Before reagent	**After reagen**	
Flavonoid	Mg + HCl pekat	brownish	Red brownish	-
Tanin	$FeCl_3$	brownish	black blue	+
Saponin	HCL(2N)	brownish	bubbly	+

3.5 Antifungal Properties

The outcomes demonstrated that *P. ovale* was resistant to the antifungal effects of the weevil banana ethanol extract (table 3, figure 2). The level of tastelessness was highest at the 40% concentration (table 3, figure 2). The tannin and saponins found in banana weevils, which have antifungal properties.

Table 3 The Zone In which the Kapok Banana Weevil's Ethanolic Extract Inhibits *P. ovale*

Treatment	**Concentration (%)**	**Inhibition zona (** $\bar{x}$ **± SD (mm)**
Extract ethanol weviils kapok banana	40	17,16 ± 1,04
	20	14,33 ± 0,76
	10	12,33 ± 1,52
	5	10,16 ± 1,04
	4	8,33 ± 1,52
	1	2,83 ± 1,04
	0,5	0,5 ± 0,5
Control (+):Ketokonazole	2	23,5 ± 1,32
Control (-):Akuades steril	-	0± 0

(1) ethanol extract of kapok banana weevil 40%, (2) ethanol extract of kapok banana weevil 20%, (3) ethanol extract of kapok banana weevil 10%, (4) ethanol extract of kapok banana weevil 5%, (5) ethanol extract of kapok banana weevil 4%, (6) ethanol extract of kapok banana weevil 1%, (7) ethanol extract of kapok , (8) k(+): ketoconazole 2% and (9) k(-): sterile distilled water.

Figure 2 The area of *P. ovale* where the kapok banana weevil was inhibited by an ethanol extract

In this investigation, the inhibition zone varied depending on the concentration. (See Figure 3 and Table 3). With an increase in concentration, the inhibition zone expands most dramatically [9][26][27]. One-way ANOVA statistical analysis revealed significant differences in the antifungal activity between treatment groups in preventing the growth of *P. ovale*, with a significance level of 0.000 (p 0.05). The banana weevil ethanol extract and all concentrations were significantly different from the positive control in the LSD test (p=0.000). The diameter of the greatest inhibitory zone at a concentration of 40% was substantially different from 20%, 10%, 5%, 4%, 1%, and 0.5% (p 0.05) when comparing the concentrations. Additionally, there was a significant difference between the 40% concentration therapy and the positive control treatment (p=0.000). The difference between extract concentrations of 40%, 20%, 10%, 5%, 4%, and 1% with the negative control was statistically significant (p=0.000). However, there was no discernible difference between the 0.5% concentration extract and the negative control in the diameter of the inhibitory zone ($p > 0.05$).

The standardization of pharmaceutical substances includes identification as a necessary component. Medicines can be authenticated using standard macroscopy, microscopy, and Simplicia quality as an identification parameter. For the source of diagnostic parameters, the macroscopic character from the manufacturer is crucial. 14 One of the easy and affordable approaches is the microscopic method. This technique makes use of actual plant specimens. To gauge purity, authenticity, quantity, and quality, standardization is a crucial tool. Macro observations such as the color, taste, odor, borders, base, and tops of banana weevil plants. Trichomes, collenchyma, parenchyma, xylem, and phloem can be seen as microscopic. Stomata can also be transparent. Tissue fragments like trichomes and trachea are visible through microscopic simplicial inspection. The current study can be used to identify plants. The ethanol extract of the kapok banana weevil possessed antifungal activity, as evidenced by the activity clarity since it included tannins and saponins, which act as antifungals. Tannin inhibits the growth and division of the *P. ovale* fungus by breakdown of cell membranes, mitochondrial malfunction, and inhibition of cell formation. By lowering the sterol membrane of the *P. ovale* cell wall's surface tension and increasing its permeability, saponins can inhibit or kill *P. ovale*. The more concentrated intracellular fluid is drawn out of the cells due to the greater permeability, allowing nutrients, enzymes, and proteins to enter[14,7,6,11].

4 Conclusion

Based on the study's findings, it can be said that Simplicia quality parameters, microscopy, and macroscopic examination can all provide data on the quality of medication raw materials. With these factors, it is possible to identify kapok bananas weevil using morphological, pharmacognostic, and quality of simplicia. It can be used to confirm the authenticity of plant species and genera and to guarantee the control of medicinal plant quality. With an inhibitory zone ranging from 0.5 to 17.16 mm, the ethanol extract of the kapok banana weevil may prevent *P. ovale* from growing. The extract concentration of 40% in zone 17.16 had the highest activity, with a value of p = 0.000.

Compliance with ethical standards

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Disclosure of conflict of interest

Have declared that no competing interests exist.

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