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IDENTIFICATION OF THE SECONDARY METABOLITES AND CHARACTERIZATION OF LAGERSTROEMIA LOUDONII T. & B.

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ABSTRACT

Bungur (Lagerstroemia loudonii)[1] is a type of plant widely grown in Indonesia and can be found in teak forests, mixed forests, and is found as ornamental plants or protective trees on the roadside. In the fruit section, Lagerstroemia loudonii[2] is used as antituberculous and antimalarial. On the bark, the part is used as antidiarrheal. Based on some parts of the bungur[3] plants' activity data, this plant has the potential to be developed into traditional medicine for standardized herbs and herbal medicines. Standardized traditional medicine material is necessary to identify efficacious compounds and characterization in some parts of bungur[4] plants. Identification of efficacious compounds and characterization of crude leaf drugs, bark, stems, and bulgur fruit. Methods and Material: The phytochemical screening phase of the Crude drugs of leaves,

bark, stems, and fruit bulgur (Lagerstroemia loudonii[5] T. & B.) against includes examining alkaloids, flavonoids, quinones, tannins, polyphenols, saponins, steroids and triterpenes, monoterpenoids and sesquiterpenoids. The determination of the characteristics of raw material carried out includes nonspecific parameters. Nonspecific parameters are the determination of total ash content, water-soluble ash content, acid insoluble ash content. Statistical analysis used: each experiment was carried out three times and calculated the average yield and deviation. Identification results of the class of efficacious compounds in some parts of the bungur[6] plant are on the leaves and fruits containing alkaloids, flavonoids, saponins, quinones, tannins, polyphenols, monoterpenoids, and sesquiterpenoids as well as steroids and triterpenoids. At the bark and stem, the bark contains alkaloids, flavonoids, saponins, quinones, tannins, polyphenols, monoterpenoids, and sesquiterpenoids. Characterization results of bungur[7] leaf extract total ash content 4.45 ± 0.30% w/w, water-soluble ash content 4.08 ± 0.27% w/w, acid insoluble ash content 0.59 ± 0.06% w/w, the extract type weight was 0.59 ± 0.063. Bungur stem bark extract, total ash content 1.94 ± 0.12% w/w, water-soluble ash content 1.47 ± 0.03% w/w, acid insoluble ash content0.24 ± 0.02% w/w, the extract type weight is 0.82 ± 0.01. Bungur stem extract, total ash content3.18 ± 0.16% w/w, water-soluble ash content 2.36 ± 0.38% w/w, acid insoluble ash content 0.43 ± 0.07% w/w, extract type weight 0.81 ± 0.01. Bungur fruit extract, total ash content 11.45 ± 1.16%w/w, water-soluble ash content 10.1 ± 1.49% w/w, acid insoluble ash content 1.46 ± 0.88% w/w,extract type weight 0.81 ± 0.01. Based on phytochemical screening data and the characterization of bungur[8] plants potential to be developed into raw materials for traditional medicine

Keywords: bungur[9] (Lagerstroemia loudonii[10] T. & B.), secondary metabolite identification and raw material characterization

1. Introduction

Medicinal plants to overcome the disease have long been carried out, since many years ago. Medicinal plants are the basis for the development of modern medicine for human health. Drug development and research traditional (mainly herbal) in line with the national market's needs that began to give great attention to traditional medicine. Based on the 2013 Riskesdas data, 49 % of the community. Indonesia uses traditional medicinal ingredients to maintain health and fitness. Indonesia has a tropical climate, a variety of plants, some plants that can be used as medicinal ingredients traditional (1,2). Therapy with traditional ingredients has become part of the culture of people in various parts of the world. Almost every country has its own culture about the use of nature (plants) for treatment (3). Based on WHO estimates, more than 80 % of developing countries' population depends on traditional ingredients to overcome their health problems (4). Therapy with traditional ingredients is felt to be cheaper with an easy procedure compared to synthetic chemical drugs. The opportunity to get potent and easily obtained herbs is still vast, given the high potential of Indonesian medicinal plants that have not been utilized. The importance of specific information about traditional medicines through systematic testing, research and development so that their utilization and efficacy can be accounted for scientifically.

A plant contains compounds drug that is Bungur (Lagerstroemia speciosa Pers.). This part of the plant is frequently used as medicine for seeds, leaves, and skin wood. Seeds can be used to treat high blood pressure and diabetes. The leaves are used to treat urination stones, diabetes, and high blood pressure, while the bark part is used to treat diarrhoea, dysentery, and urinary blood (5,6). This plant is a tree with a height of about 10 m to 20 m. Bungur plants are very widely found on the islands of Sumatra and Java, Indonesia. Generally, there are teak forests whose soil conditions are arid, while infertile land, such as the mixed forest of the bungur[11] plants, is tall trunks (7). Bungur leaf extract from several solvents is known to have hypoglycemic activity both in vivo and in vitro (8,9,10,11). In the fruit section, Lagerstroemia loudonii[12] is used as antituberculous and antimalarial (12). On the bark, the part is used as antidiarrheal (13).

A crude drug is of good quality if it meets the quality requirements stated in the crude drug monograph, including drying shrinkage, total ash content, acid insoluble ash content, and water-soluble extract content, ethanol-soluble extract content, and chemical, crude drugs content. This quality requirement applies to the crude drugs used for medical treatment and maintenance (14). Secondary metabolite compounds in plants are usually spread evenly throughout plant parts but at different levels (15, 16).

Extracts as pharmaceutical ingredients must meet the requirements have been determined to be a standardized herbal drug or phytomedicine. Parameter nonspecific is needed to know the quality of the extract. Therefore, this study aims to compare some of the crude drugs and specific parameter values-specific parameter extract. Crude drugs specific parameters and nonspecific parameters the extract refers to the requirements of the Indonesian Herbal Pharmacopoeia (14) so that the crude drugs are limited to the determination of

drying shrinkage levels, water-soluble extract levels, and the content of the extract is soluble in ethanol. The extract is limited to the determination of water content, ash content, and acid content is not soluble.

2. Materials and Methods

Plant materials used in this study were leaves, bark, stems, and bulgur fruit (Lagerstroemia loudonii[13] T. & B.). The chemicals used in this study were distilled water, 96% ethanol, toluene, ammonia, chloroform, Mayer reagent, Dragendorff reagent, gelatin solution, FeCl3 reagent, concentrated hydrochloric acid, HCl 2N, magnesium powder, amyl alcohol, KOH, ether, Liebermann–Bourchard reagent, vanillin sulfate reagent. The tools used in this study are analytic scales, dryer cabinets, evaporator plates, silicate crusts, ovens, electric stoves, furnaces, desiccators, water baths, filter paper, ash-free filter paper, aluminium foil, plastic wrap, drop pipette, volume pipette, spatial and stirring rod.

2.1 Phytochemical screening

The phytochemical screening phase of the Crude drugs of leaves, bark, stems, and fruit bulgur (Lagerstroemia loudonii[14] T. & B.) against includes examining alkaloids, flavonoids, quinones, tannins, polyphenols, saponins, steroids and triterpenes, monoterpenoids and sesquiterpenoids.

Identification of alkaloids

A total of 1 g of the sample was based on 5 mL of diluted ammonia, then crushed in a mortar, then added 20 mL of chloroform while continuing to crush. Then filtered, the filtrate is put into a test tube, and then 5 mL of 2 N hydrochloric acid is added. The mixture is shaken vigorously until two layers are formed. The acid layer is separated, then divided into three parts. The first part is used as blank; the second part is dripped with 2 to 3 drops of Mayer reagent and observed whether there is a white precipitate. The third part is dripped

with 2 to 3 drops of Dragendorff reagent, observed whether or not there is a brown-orange deposit.

Identification of flavonoids

As much as 1 g of the sample is heated with water over a water bath, then filtered. Put 5 mL filtrate into a test tube and add magnesium powder and 1 mL 2N hydrochloric acid. The mixture is steam over the heat of water, then filtered. The filtrate is put into a test tube, and 5 mL amyl alcohol is added. The mixture is then shaken vigorously and left to separate. The presence of flavonoids is indicated by the formation of yellow in the amyl alcohol layer.

Identification of polyphenols

As much as 1 g of the sample is heated with water over a water bath, then filtered. The filtrate is dripped with 2 to 3 drops of iron (III) chloride reagent solution. The formation of green-black colour indicates the presence of polyphenols.

Identification of tannins

A total of 1 g of the sample is dissolved with 15 mL of water, then transferred into a test tube and boiled for several minutes, then filtered. The filtrate is dripped with a 5 % 1 % gelatin solution. Observed the presence or absence of white deposits

Identification of saponins

Several samples are stored in a test tube and heated with water on a water bath, then filtered. After cold, the filtrate in the test tube is shaken vigorously for 30 s. The formation of solid foam for no less than 10 s as high as 1 cm to 10 cm indicates saponins' presence, and the addition of 1 drop of 2N hydrochloric acid does not disappear.

Kinnon identification

Much as 1 g of the sample is heated with water over a water bath, then filtered. The filtrate is added 2 to 3 drops of potassium hydroxide solution. The presence of quinones is indicated by the formation of a solid red colour.

Identification of monoterpenoid and sesquiterpenoid

As much as 1 g of the sample is crushed with 20 mL of ether, then filtered. The filtrate is evaporated on the evaporating dish to dry. In the residue, the vanillin reagent drops 10 % as much as 2 to 3 drops. The formation of colours shows the presence of monoterpenoid and sesquiterpenoid compounds.

Identification of steroids and triterpenoids

As much as 1 g of the sample is crushed with 20 mL of ether, then filtered. The filtrate is evaporated on the evaporating dish to dry. In the residue, there were 2 to 3 drops of Liebermann–Burchard reagent. The formation of violet or blue-green colour indicates the presence of steroid and triterpenoid compounds.

2.2 Characteristics of raw material

The determination of the characteristics of raw material carried out includes nonspecific parameters. Nonspecific parameters are the determination of total ash content, water-soluble ash content, acid insoluble ash content.

Determination of content, total ash level

Carefully weighed 2 g of test extract that has been crushed, inserted into the silica crucible that has been incandescent and previously held, levelled. Slowly put it on the stove until it is fabricated, then sprinkled again in the furnace at a temperature of 500 ° C to 600 ° C until the charcoal runs out, cooled, and weighed.

Soluble ash content

The ash obtained from the total ash content determination was boiled in 25 mL of water for 5 min. Filtered using ash-free filter paper, washed with hot water. The residue put on the stove for 15 min, then respawned at a temperature of about 450 ° C until a fixed weight is obtained.

Ash levels not soluble in acid.

The ash obtained from the total ash content determination was boiled in 25 mL P hydrochloric acid for 5 min. Filtered using ash-free filter paper, washed with hot water.

Determination of extract type weight

Determination of the weight of the extract type is done using a vial. Vials measuring 10 mL are dried and have been weighed weighing their weight (w0). The vial was then added with 1 mL extract with a concentration of 1% and weighed the weight (w2). The formula calculates the weight of the extract type:

Statistic analysis

each experiment was carried out three times and calculated the average yield and deviation standard.

3. Result

Phytochemical screening of crude leaf drugs, stem bark, and bulgur was carried out to determine the content of secondary metabolites such as alkaloids, flavonoids, saponins, quinones, tannins, polyphenols, monoterpenoids and sesquiterpenoids and steroids, and triterpenoids—phytochemical screening results on crude drugs in Table I.

The specific test was also carried out on extracts, such as determining total ash content, water-soluble ash content and acid insoluble ash content, and determining 1 % extract specific gravity. The results of the examination of the characteristics of each ethanol extract are shown in Table 2.

Table 1. Result of crude drugs phytochemical screening

Secondary Metabolites

Leaf

Stem

Bark

Stem

Fruit

Alkaloid

+

+

+

+

Flavonoid

+

+

+

+

Saponin

+

+

+

+

Kinnon

+

+

+

+

Tanin

+

+

+

+

Polyphenol

+

+

+

+

Monoterpen and Seskuiterpen

+

+

+

+

Steroid and Triterpenoid

+

-

-

+

No

Test

Result

Leaf

Stem

Bark

Stem

Fruit

1

total ash content (% w/w)

4.45 ± 0.3

1.42 ± 0.12

3.185 ± 0.166

11.455 ± 1.165

2

water soluble ash content (% w/w)

4.08 ± 0.275

1.472 ± 0.032

2.362 ± 0.385

10.1 ± 1.492

3

acid insoluble ash content (% w/w)

0.595 ± 0.063

0.247 ± 0.016

0.43 ± 0.077

1.467 ± 0.883

4

1% extract specific gravity

0.816 ± 0.004 7

0.816 ± 0.0033

0.815 ± 0.004

0.814 ± 0.0042

Tabel 2. Result of characteristic extract

Determination of total ash content aims to determine the total amount of substances remaining in the spawning, including physiological ash content derived from the plant itself and non-physiological ash derived from external contamination, such as air, soil, and water pollution. Determination of water-soluble ash levels indicates the presence of ash from water-soluble salts contained in the crude drugs. The determination of acid-insoluble ash content indicates the presence of silica in crude drugs.

4. Discussion

Leaves, bark, stem, and collected fruits are cleaned using running water and dried to avoid damage to the test material that can cause damage substances in crude drugs and increase the crude drug resistance to be stored for a long time. Dry crude drugs are then mashed to powder to facilitate the extraction process.

Crude drugs are a natural material derived from plants, animals, and minerals used as drugs that have not been treated anything unless stated otherwise has

undergone a drying process. Crude drugs can be in the form of crude vegetable drugs, crude animal drugs, and crude drugs pelicans or minerals. Vegetable crude drugs are crude drugs in plants whole, plant parts, or plant exudates. Plant exudates are contents spontaneously coming out of the plant or the cell's contents released from the cell with specific ways or substances that are separated from the plants in specific ways, which is still not pure chemical. Animal crude drugs are crude drugs in whole animals, animal parts, or useful substances produced by animals and not pure chemicals. Mineral crude drugs are crude drugs in the form of mineral material that has not been processed or processed with a simple and not yet pure chemical.

The formation of foam indicates saponin compounds after shaking, and the foam is not lost after adding a hydrochloric acid solution. Foam formed due to a combination of its constituent compounds, namely non–polar sapogenin chains and water-soluble polar side chains. Quinone compounds are shown by their ability to form yellow to red salts formed from the reaction of hydroquinone with a strong base (KOH). The formation of blackish-blue shows polyphenol compounds due to the reaction between a phenyl group and a solution of iron (III) chloride. Tannin compounds are compounds belonging to the polyphenol group. Tanin is indicated by the formation of white deposits after added with gelatin. Tannin compounds have unique properties that can precipitate proteins.

The formation of colours indicates the presence of monoterpenoid and sesquiterpenoid compounds after adding 10 % vanillin reagent. Monoterpenoids and sesquiterpenoids are compounds that make up essential oils. Steroid and triterpenoid compounds are shown by their ability to form green after the Liebermann-Burchard reagent addition. The colour formed is

caused by an oxidation reaction through the formation of a conjugated double bond.

Alkaloids are compounds derived from living things, mostly plants, generally synthesized, contain bound nitrogen in heterocyclic rings, and are alkaline and generally have activities biology at low doses. Alkaloids' physical properties are mostly crystalline or amorphous, generally colourless except berberine and betaine, alkaloid solubility free, or the salt is essential in isolation. Generally, the base will dissolve in organic solvents, psedoalkaloid[15], and protoalkaloid[16] will dissolve in water, and those containing quaternary ammonium are also water-soluble. The introduction of alkaloids is based on their ability to form compounds insoluble complex with metal-containing reagents such as Mayer reagent and Dragendorff reagent.

Flavonoids are one of the largest natural phenol groups. According to an estimate, approximately 2 % of all carbon photosynthesis by plants is converted into flavonoids or closely related compounds. In-plant aglycone flavonoids (sugarless flavonoids bound) is in the form of a structure. Flavonoids are polyphenols and have the chemical properties of phenol compounds, which are somewhat acidic to dissolve in base. The introduction of flavonoids is based on the carbonyl group's reduction reaction on the circumference of δ–lakton[17] becomes an alcohol group to form a hydroxy compound colour depends on the functional group bound to circumference A or B. The colour that occurs can be drawn by amyl alcohol.

Phenol compounds have to do with lignin bound as an ester or present in the leaves in an insoluble fraction in ethanol, or maybe contained in the fraction dissolved in ethanol, namely as a glycoside simple. Natural polyphenol compounds are easily recognized through the introduction phenol group, giving a blue-black colour with reagents iron (III) chloride.

Tanin is widespread in vascular plants, in angiosperms specifically for wood tissue. Tanin is easily recognized through cluster recognition phenol, giving blue-black colour with iron reagent (III) chloride. To distinguish tannins from natural polyphenols used properties tannins, which can precipitate a 1 % gelatin solution. Saponins are surface-active compounds and are like soap, and can be detected based on their ability to form foam of blood cells. Search for saponins in plants has stimulated by the need for sapogenin sources that can be obtained and quickly converted into animal sterols, which have important. Triterpenoids and steroids Triterpenoids are compounds with a carbon frame from six isoprene units, and biosynthesis is derived from C30 hydrocarbons acyclic, which is squalene. The Triterpenoid can be chosen as a minimum of four classes of compounds: actual triterpene, steroids, saponins, and cardiac glycosides. This compound has a cyclic structure of compound groups. Triterpenoids are compounds of secondary metabolite groups that have a similar basic structure. Steroids are compounds that contain the cyclopentane perhydrophenanthren[18] core. Steroids are a component that is found in natural materials that are very widely distributed.

Diversity of biological activities from steroids, including controls in the reproductive tract in humans, is included in hormone group reproduction. The introduction of triterpenoid and steroid compounds is based on their ability to form colours with Liebermann Burchard reagents (acetic anhydride Concentrated H2SO4) with most triterpene and sterols giving a green colour blue.

5. Conclusion

Identification results of the class of efficacious compounds in some parts of the bungur[19] plant are on the leaves and fruits containing alkaloids, flavonoids, saponins, quinones, tannins, polyphenols, monoterpenoids and

sesquiterpenoids as well as steroids and triterpenoids. At the bark and stem, the bark contains alkaloids, flavonoids, saponins, quinones, tannins, polyphenols, monoterpenoids, and sesquiterpenoids. Based on phytochemical screening data and the characterization of bungur plants' potential to be developed into traditional medicine raw materials.

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1.	*loudonii*	Unknown words	Correctness
2.	*loudonii*	Unknown words	Correctness
3.	~~bungur~~ → bulgur	Misspelled words	Correctness
4.	~~bungur~~ → bulgur	Misspelled words	Correctness
5.	*loudonii*	Unknown words	Correctness
6.	~~bungur~~ → bulgur, burger	Misspelled words	Correctness
7.	~~bungur~~ → bulgur	Misspelled words	Correctness
8.	~~bungur~~ → bulgur	Misspelled words	Correctness
9.	~~bungur~~ → bulgur, burger	Misspelled words	Correctness
10.	*loudonii*	Unknown words	Correctness
11.	~~bungur~~ → bulgur, burger	Misspelled words	Correctness
12.	*loudonii*	Unknown words	Correctness
13.	*loudonii*	Unknown words	Correctness
14.	*loudonii*	Unknown words	Correctness
15.	*psedoalkaloid*	Unknown words	Correctness
16.	*protoalkaloid*	Unknown words	Correctness
17.	~~lakton~~ → Oakton, plankton	Misspelled words	Correctness
18.	*perhydrophenanthren*	Unknown words	Correctness
19.	~~bungur~~ → bulgur, burger	Misspelled words	Correctness
20.	~~bungur~~ → bulgur	Misspelled words	Correctness
21.	Datta,	Punctuation in compound/complex sentences	Correctness

22.	~~tumor~~ → tumour	Mixed dialects of English	Correctness
23.	~~speci~~ → species	Misspelled words	Correctness
24.	~~Mopoung~~ → Young	Misspelled words	Correctness
25.	~~, How~~ → . How, ; How	Punctuation in compound/complex sentences	Correctness