

Pharmacognostic Profile of *Ageratum conyzoides* L Plant and Simplicia

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History

- Submission Date: 16-01-2020;
- Review completed: 10-02-2020;
- Accepted Date: 08-06-2020.

DOI : 10.5530/pj.2020.12.151

Article Available online

<http://www.phcogj.com/v12/i5>

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ABSTRACT

Ageratum conyzoides Linn. is known as billy goat weed, including the family Asteraceae. This plant has been used empirically as a medicine for diarrhea, scratches, anti-inflammatory, snakebite, insecticide and nematocidal. This study aims to identify plants based on pharmacognostic profiles including macroscopy, microscopy and non-parametric characters from plant parts of *ageratum conyzoides* to determine the standardization of herbs. The results showed that the leaves were ovoid, pale green, soft hairy and purple, bluish or white flowers. Microscopic observations of cross section of stem and leaf showed the presence of parenchyma cells, collenchyma cells and multicellular non-glandular trichomes, upper and lower epidermal cells, stomata in the upper and lower epidermis of the leaf. The highest value of water content was in the radix. The highest value of ash content was in the stem. The highest value of acid soluble ash content was in the radix. The highest value of water-soluble extract was in the folium. The highest value of ethanol-soluble extract was in the flower. The results of this study can be used as authentication of plant parts and a basis for the analysis of the standard pharmacopoeia *A. conyzoides*.

INTRODUCTION

The development of study on medicinal plants is growing rapidly. Especially the development of pharmacology and phytochemicals study based on indications of medicinal plants that have been used by some people with empirically tested properties. Many plants are considered as raw material for medicine so it is recommended for therapeutic use.¹ The use of plants as traditional medicines and alternative medicines is increasingly in demand because it is relatively safer compared to synthetic drugs. It needs many studies to develop plant properties with various methods such as the study of ethnomedicine or ethnobotany, bio assay, and purification of bioactive compounds. Increasing the need for medicinal plants by the pharmaceutical industry and its own needs by 5-18% per year²

The Asteraceae family consists of 1500 genera and 2500 different species.³ *Ageratum* is one of the genera included in the Asteraceae family and consists of 30 species.⁴ *Ageratum conyzoides* is called goatweed⁵ and has been empirically used as a drug to treat boils and fever medications.⁶ *A. conyzoides* is a tropical plant commonly found in the western and eastern regions of the African continent, in several regions of Asia and South America. The plant is a polymorphic aromatic weed. The leaves of *Ageratum conyzoides* are used as wounds therapy,⁷ hemorrhoids, anti-dysentery, antibacterial,⁸ anti-inflammatory, analgesic, antipyretic, antispasmodic, gastroprotective, anti-ulcer, insecticide,⁹ antihelminthic and antimosquito. The results showed that many plants were recommended for medicinal purposes.¹ The use of plants for medicinal purposes and research can

be used as a basis for reference in the discovery of active compounds as drugs. The recommendation is based on secondary metabolites produced by plants as natural organic chemical compounds.¹⁰ Based on the content of chemical compounds in plants such as terpenoids, alkaloids, flavonoids, tannins, saponins, and steroids whose quality and quantity are sufficient so that they can promise therapeutic efficacy of medicinal plants.⁴ Natural organic compounds can be used as marker compounds either in the synthesis or semi-synthesis processes so that they play an important role in the discovery and development of drugs based on therapeutic targets. Incorrect identification of natural products or herbal medicines causes its use is also wrong,¹⁰ for example, the existence of vernacular names given to two or more completely different species. All of these problems can be solved by pharmacognostic studies in plants.

MATERIALS AND METHODS

Plant materials

Ageratum conyzoides plants were collected from around the campus of Jenderal Soedirman University in Purwokerto. The plant was identified by plant taxonomists from Faculty of biology. The result of plant identity was validated by the dean of the faculty of biology with certificate number 1264/UN.23.02.8/TA.00.01 / 2019.

Macroscopic analysis

Fresh plants and simplicia were observed and performed organoleptically including shapes, colors, odors, tastes, surfaces, characters, textures, and bedding.

Cite this article: Warsinah, Baroroh HN. Pharmacognostic Profile of *Ageratum conyzoides* L Plant and Simplicia. Pharmacogn J. 2020;12(5):1072-6.

Microscopic analysis

Microscopic analysis was determined by preparing a thin section cross-section of leaves and stems. The incision was placed on a glass object and drops of water and covered with a deck glass then observed under a microscope with magnification (40X, 100X). Cells such as epidermal (cells upper and lower), xylem, phloem, collenchyma, and parenchyma were observed. All images were seen photographed and recorded for further analysis.

Examination of non-specific characters

a. Drying shrinkage examination

One gram of powder that placed into a porcelain crucible has been preheated at 105°C for 30 minutes and has been tamed. The powder was flatten in crushed porcelain. Then the powder was put into the oven, heated at a temperature of 105°C for 1 hour, removed and cooled in a desiccator. The results were weighed until a fixed weight and the dry weight was obtained.

$$\% \text{ Drying Shrinkage} = \frac{\text{Wet weight} - \text{dry weight}}{\text{Wet weight}} \times 100\%$$

b. Ash content analysis

One gram of powder was put into porcelain crucifix. The powder was put into a furnace temperature of 600°C for 6 hours, put in the desiccator and weighed. Then the ash of the dried material content was determined.

$$\% \text{ Ash content} = \frac{\text{C-A}}{\text{B-A}} \times 100\%$$

Information:

A= Crucible weight empty

B= Crucible weight + sample before incubation

C= Crucible weight + sample after incubation

c. Determination of ash content which is not soluble in acid

The powder was boiled with 25 ml of dilute sulfuric acid for 5 minutes. The acid-insoluble portion was collected, filtered through an ash-free filter paper which was not soluble in acid to the dried material.

d. Determination of water soluble essence

Simplicia powder was weight carefully about 5 g. The powder was put in a clogged pumpkin, added of 100 mL of saturated chloroform water, shaken repeatedly for the first 6 hours, then settled down for 18 hours and then filtered. The filtrate of 20 mL was evaporated and then dried in a shallow cup that has been heated 105° and tapped. The remainder was heat at 105° until fixed weight. The value of % water-soluble extracts was determined.

e. Determination of ethanol soluble extract

Five gram of powder was put in the clogged pumpkin, added 100 mL of 95% ethanol, shaken repeatedly for the first 6 hours and settled down for 18 hours. The mixture was quick filtered to avoid ethanol evaporation. The filtrate of 20 mL was dried in a shallow flat-bottomed dish that has been heated 105°, tamed, and heat the remainder at 105° until the fixed weight. The value of % ethanol-soluble extract was determined.

f. Specific gravity

Sample of extract as much as 1% was diluted with ethanol in a pycnometer. The pycnometer was calibrated by setting the weight of the pycnometer and the weight of the water which heated at 25°C.

Temperature that used was set at around 20°C. Sample of extract were put in a pycnometer with a temperature of 25°C. The excess of liquid extract was removed and weighed. Specific gravity of extract was calculated employing the weight of the dilute extract divided by the weight of the extract and the weight of water.¹¹

g. Identification of chemical compounds in *A conyzoides*

Identification of essential oils using the steam distillation method, while for other compounds using chemical reagents such as FeCl₃ to determine tannins, HCl 2N to determine saponins, Yodine 0.1 N to find carbohydrates and glycosides with FeCl₃ and HCl addition. This chemical reagent will give a distinctive color or precipitate according to compounds contained in plants.

RESULT

Macroscopic analysis

Ageratum conyzoides is a species that belongs to the family Asteraceae. This plant is a weed that grows wild, can be found around houses, gardens, and bushes. The performed organoleptically of plant including shapes, colors, odors, tastes, surfaces, characters, textures, and bedding were shown in Table 1 and Figure 1. The characteristics of plant was purple, bluish or white flowers. As shown in Figure 1, characteristic of *A.conyzoides* leaf was pale green, aromatic odor, spicy taste, hairy on both sides with cuneate base, 30-70 cm height, petiole 1.1-1.5 cm long and egg-shaped with the wide end at the base (ovoid) (Figure 1). We found the shape of *A.conyzoides* root was soft hairy (Table 1).

Microscopic analysis

Characteristics of fresh plants on the cross-section of the trunk were showed the presence of epidermis, collenchyma reinforcement tissue, sclerenchyma reinforcement tissue, parenchyma, transport beam, trichome gland (Figures 2 and 3), whereas trichome and stomata glands were found in leaves (Figures 3c and 3d). There were tissue fragments such as parenchymal tissue, parenchyma phloem, cork, trichome, mesophyll, parenchyma cortex, fibers, amyllum, secretion cells and stomata in simplicia (Figures 3a and 3b).

Table 1: Macroscopical characters of the leaves of *Ageratum conyzoides*.

The size of Leaf	4.4-5.2 x 3.2-4.3 cm
Leaf color	Pale green
Leaf shape	Egg round (ovoid)
The Aroma of leaves	Aromatic
Root shape	Soft hairy
Plant	Bush

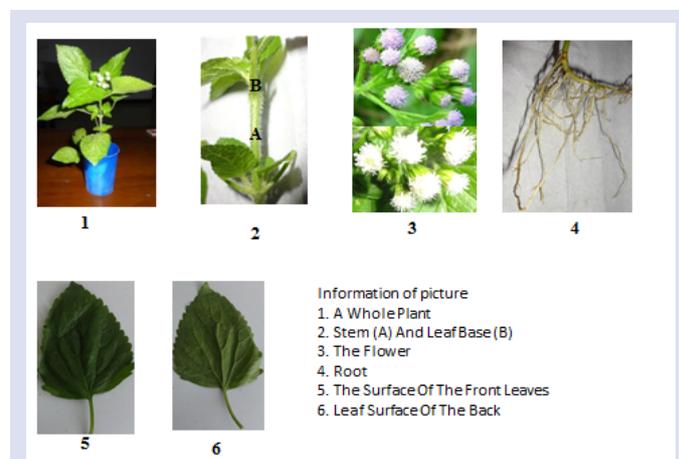


Figure 1: Profile Macroscopical of fresh plant of *Ageratum conyzoides*.

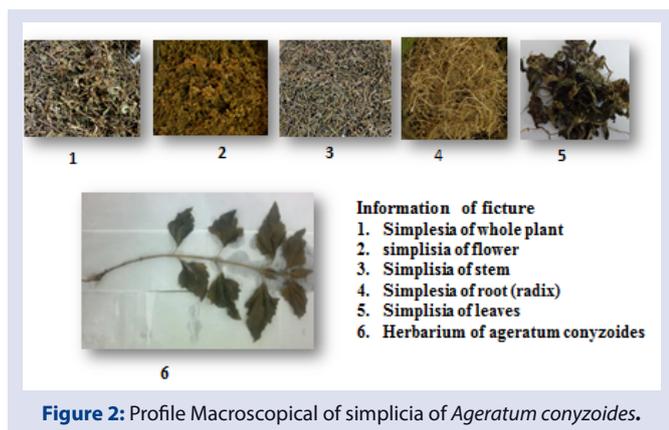


Figure 2: Profile Macroscopical of simplicia of *Ageratum conyzoides*.

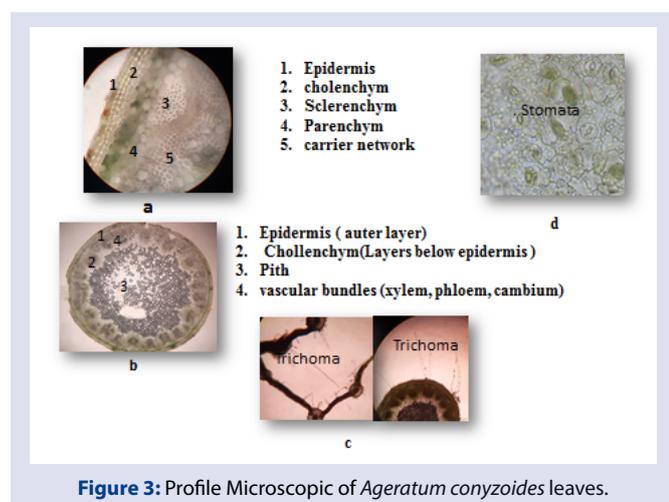


Figure 3: Profile Microscopic of *Ageratum conyzoides* leaves.

Determination of quality of simplicia

Results of the Simplicia powder characterization including determination of water content, determination of total ash content and acid insoluble ash content, determination of drying losses and determination of water-soluble and ethanol extracts are presented in Table 2. Simplicia characterization of *A. conyzoides* was evaluated to determine simplicia specifications and clarify of the material under study because the origin of the growing environment affected the content of active compounds. As shown in Table 2, the highest value of water content was in the radix. The highest value of ash content was in the stem. The highest value of acid soluble ash content was in the radix. The highest value of water-soluble extract was in the folium. The highest value of ethanol-soluble extract was in the flower.

Determination of the specific gravity of extract

Powder of simplicia was extracted by maceration method using ethanol 96% for 3 x 24 hours. The filtrate was collected and evaporated with an evaporator and the value of yield was calculated (Table 3). The specific gravity of extract on the roots, leaves, stems and flowers of *A. conyzoides*, each with the same specific gravity, while the highest yield is in the leaves.

Identification of chemical compounds of *Ageratum conyzoides*

Chemical constituent studies are supporting data on pharmacognitive profiles. In this study identification was carried out using chemical reagents that can change color or precipitate formation in accordance with the character of chemical compounds contained in the sample (Table 4). This research helps determine the compounds that are

efficacious in plants. The compounds identified in *A. conyzoides* are essential oils, tannins, saponins, carbohydrates and glycosides (Table 4).

DISCUSSION

Identification is an inseparable part of the standardization of medicinal ingredients.¹² Before the ingredients are put in Herbal Pharmacopeia, pharmacognostic standards and quality of Simplicia must be specified. Macroscopy standards, microscopy, and quality of Simplicia can be used as an identification parameter to authenticate medicines.¹³ The Macroscopic character from the factory is very needed for the source of diagnostic parameters.¹⁴ The microscopic method is one of the simple and inexpensive methods. This method can be used to identify plant specimens. Previous studies of leaf cross-sections have been reported. Standardization becomes an important measure to determine the quality, quantity, purity, and authenticity of plants.¹⁴ Similarly, macroscopic observations of leaf characters such as color, odor, taste, margins, base, tops and so on can help the identification of *Ageratum conyzoides* plants. Microscopic evaluation can be noticed trichomes, collenchyma, and parenchyma, xylem, and phloem.¹⁵⁻¹⁹ Stomata can also be seen clearly. microscopic Simplicia observation also shows the presence of tissue fragments such as trichome, cork, starch, etc. This study can also help in plant identification.

CONCLUSION

Results of this study can be concluded that information about the quality of drug raw materials can be obtained from the macroscopic analysis, microscopy, and simplicia quality parameters. Identification of *Ageratum conyzoides* with these parameters can be obtained with

Table 2: Determination of quality of simplicia of *Ageratum conyzoides* based on non-specific characters.

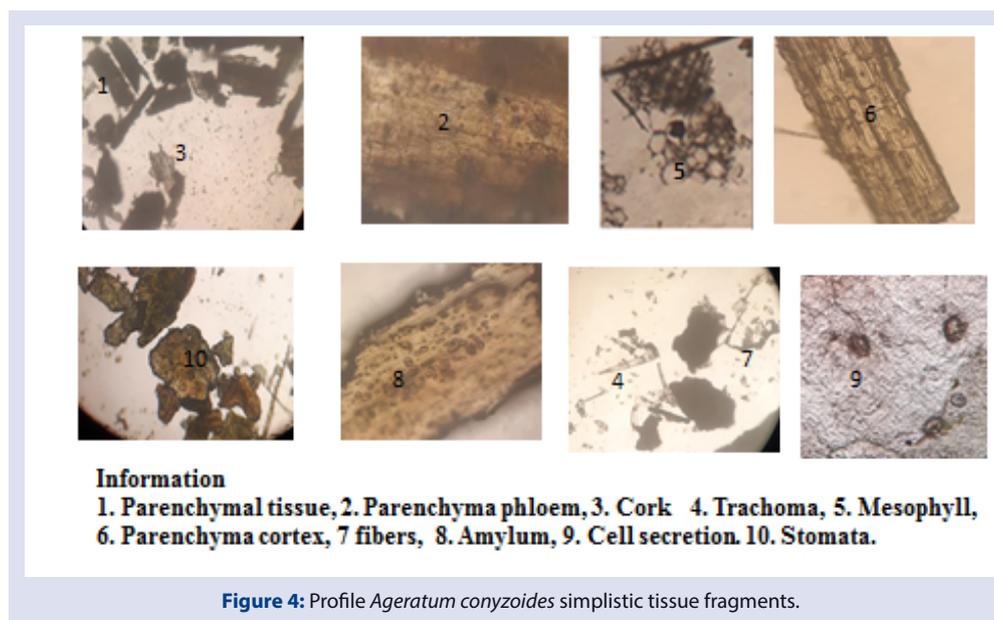
Parameters	The value (% b/b)			
	flower	Stems	folium	Radix
Water content	8.23 ± 3.24	8.83 ± 2.95	8.46 ± 3.92	8.92 ± 3.16
Total ash content	1.61 ± 0.61	1.78 ± 0.53	1.58 ± 0.42	1.58 ± 0.42
Acid insoluble ash content	3.89 ± 0.18	3.59 ± 0.48	4.59 ± 0.78	5.98 ± 0.57
Moisture content	4.21 ± 0.16	4.21 ± 0.26	6.21 ± 0.36	5.21 ± 0.31
Ethanol extract levels	9.28 ± 0.39	9.08 ± 0.29	8.78 ± 0.69	8.67 ± 0.68
Drying shrinkage	15.33 ± 3.32	14.24 ± 3.32	15.42 ± 3.42	14.98 ± 3.22

Table 3: The result of determining the specific gravity.

Plant parts	Weight extract (g)	Yield (%)	Specific gravity
stems	8.23 ± 3.24	8.72	0.800
folium	8.92 ± 3.44	12.8	0.800
radix	8.22 ± 3.04	7.80	0.800
flower	8.86 ± 2.94	8.24	0.800

Table 4: The content chemical of *Ageratum conyzoides*.

No	Identification	Reagen	Colour		Information
			Before reagent	After reagent	
1	essential oil	steam distillation	green	green	+
2	tannin	FeCl ₃	brownish green	black blue	+
3	saponin	HCl (2N)		bubbly	+
4	karbohidrat	Yodine	brownish green	brick red sediment	+
5	glikosida	FeCl ₃ dan HCl	brownish green	brownish green	+



morphological, pharmacognostic and quality of simplicia information. It can be used to find the authentication of species and genus of plants and used to ensure quality control of medicinal plants.

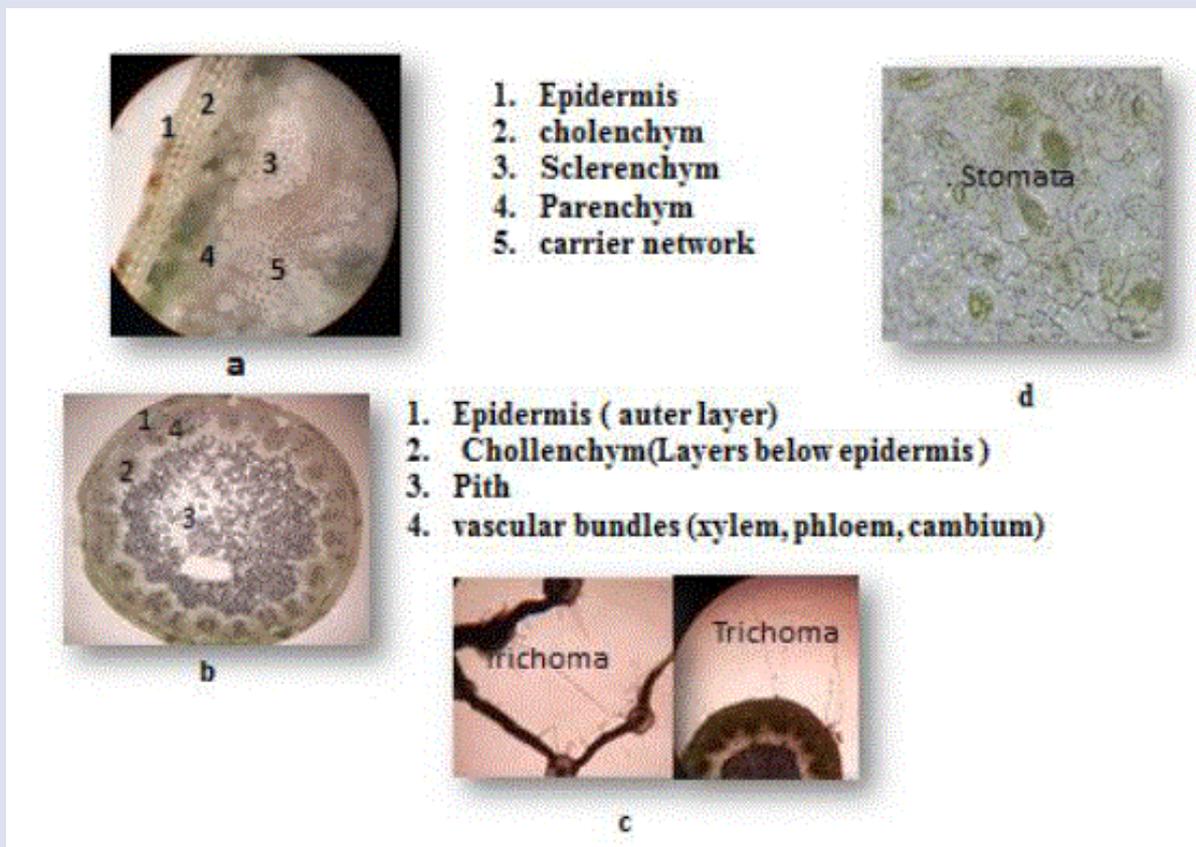
ACKNOWLEDGMENT

The author would like to thank the Directorate of Higher Education Kemenristekdikti for funding this research through Higher Education Applied Research 2019.

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GRAPHICAL ABSTRACT



ABOUT AUTHORS



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Cite this article: Warsinah, Baroroh HN. Pharmacognostic Profile of *Ageratum conyzoides* L Plant and Simplicia. Pharmacogn J. 2020;12(5):1072-6.