



Micromorphological and Phytochemical Studies of *Aloe barbadensis* Mill Root

Poonam Sethi

Department of Plant Biology and Plant Biotechnology, Guru Nanak College (Autonomous), Chennai, India

Email address:

poonam123.73@rediffmail.com

To cite this article:

Poonam Sethi. Micromorphological and Phytochemical Studies of *Aloe barbadensis* Mill Root. *International Journal of Clinical and Developmental Anatomy*. Vol. 6, No. 1, 2020, pp. 14-16. doi: 10.11648/j.ijcda.20200601.13

Received: July 4, 2019; **Accepted:** January 13, 2020; **Published:** February 4, 2020

Abstract: In Siddha system of medicine dried roots of *Aloe barbadensis* Mill. Synonyms *Aloe vera* Tourn ex Linn. *Aloe indica* Royle belonging to family Liliaceae is known as Kumari Ver. *Aloe vera* is the oldest medicinal plant ever known and the most applied medicinal plant worldwide. The plant produces at least six antiseptic agents such as lupeol, salicylic acid, urea nitrogen, cinnamonic acid, phenols and sulphur. All of these substances are recognized as antiseptics because they kill or control mold, bacteria, fungus and viruses, hence has the ability to eliminate many internal and external skin infections. The morphological and anatomical characteristics of the root were investigated by hand sectioning and then camera lucida diagrams to ascertain the relevance of these characters in establishment of interspecific similarities and differences in the taxa. The results showed that there is many layered cork cells followed by cortex and a vascular bundle with radial arrangement and exarch xylem. Although, the size and number of vascular bundles are varying the presence of one or two raphide bundles and starch grains is prominent. Phytochemical screening reveal the presence of tannin, saponin and flavonoids. These features both anatomy and phytochemistry clearly help in identification of this plant.

Keywords: Aloe, Anatomy, Phytochemistry, Powder Microscopy Root, Siddha

1. Introduction

The plant kingdom has been the best source of remedies for curing a variety of disease and pain. This is why medicinal plants have played a key role in the worldwide treatment of epidemics. The present study relates the authenticity of the plant in relation to the anatomical features. Anatomical structure is very important for studying biological specimens for the purpose of classification.

The name was derived from the aeabic alloeh' meaning 'bitter' because of bitter liquid found in the leaves. It is also known as 'lily of the desert'

Aloe Vera is a stem-less or very short-stemmed plant, growing approximately 80-100 cm tall, spreading by offsets and root sprouts [1]. The leaves are lanceolate, thick and fleshy, green to grey-green, with a serrated margin. The flowers are produced on a spike up to 90 cm tall, each flower pendulous, with a yellow tubular corolla 2-3 cm long. The tissue in the center of the aloe leaf contains a gel which yields aloe gel or aloe vera gel.

The important constituents are the two Aloins, Barbaloin

and Isobarbaloin, Other constituents are amorphous Aloin, resin and Aloe-emodin. A mild purgative, soothes skin, Acts as a mild antimicrobial. Normalizes kapha and pitta a very, goodaphrodisiac diuretic, soothes skin, and anti inflammatory widely used in conditions of sun burn, dry skin conditions, burns, scars. The leaf pulp 2-4 gms is effective remedy in Dysmenorrhea (Kashtarthava). This should be administered with sugar on empty stomach once a day, for three days prior to the expected date of menstruation. Kamala (infective hepatitis) the mucilage with curd is a very effective medicine. This can be given single dose 3-5 days. If the patient develops loose motions can with drawn for a day or two and if needed can be continued for another course of 3-5 days.

Aloe vera is the oldest medicinal plant ever known and the most applied medicinal plant worldwide. Extracts of *Aloe vera* is a proven skin healer. *Aloe vera* help to soothe skin injuries affected by burning, skin irritations, cuts and insect bites, and its bactericidal properties relieve itching and skin swellings [2]. It is known to help slow down the appearance of wrinkles and actively repair the damaged skin cells that cause the visible signs of aging. Aloe is a powerful detoxifier,

antiseptic and tonic for the nervous system. It also has immune-boosting and anti-viral properties. The plant produces at least 6 antiseptic agents such as lupeol, salicylic acid, urea nitrogen, cinnamonic acid, phenols and sulphur. All of these substances are recognized as antiseptics because they kill or control mold, bacteria, fungus and viruses, explaining why plant has the ability to eliminate many internal and external infections [3].

2. Materials and Method

The dried roots were procured from local market and identified by botanist of CSMDRIA Chennai, Tamil Nadu, India.

2.1. Morphological Studies

The roots were studied for their external features: size, colour, surface, appearance, odour and taste.

2.2. Microscopical Studies

Hand sections were taken and treated with chloral hydrate and phloroglucinol and HCl. Microscopical characters were studied [4]. Microtome sections were taken and treated with chloral hydrate and phloroglucinol and hydrochloric acid. Sections were stained in saffranin and then mounted in glycerine. Diagrams were drawn using camera lucida fixed to the compound microscope.

2.3. Powder Microscopy

To evaluate the tissues present in the experimental plant. Drug powder was treated with chloral reagent and Jefferys reagent. The stains ruthenium red was used to identify mucilage cells while SudanIII for evaluation of oil globules [5]. Diagrams were drawn using camera lucida fixed to the compound microscope.

2.4. Phytochemical Screening

Different extracts such as methanol, ethanol and chloroform were screened for the presence of phenols, flavonoids, tannin, saponin, alkaloids, glycosides, phytosterols by using standard protocols [6]. Extract preparation was done by dissolving 10 gms of the dried plant extract in 100 ml of the solvents respectively. Vacuum dried and used for further screening.

3. Results

3.1. Macroscopic Characters

Roots fibrous, cylindrical, 5-3 cm in length and 2-3 cm thick with few rootlets and scars of fallen scale leaves; outer surface dark brown, wrinkled; cut surface creamish white; fracture fibrous, no characteristic taste or odour.

3.2. Microscopic Characters

A transverse section of the root shows a circular outline,

cork cells eight to twelve layered, outer layer slightly compressed and brown coloured, inner layer made up of thin walled tangentially elongated cells, arranged compactly; cortex parenchymatous, circular with intercellular spaces; cortex rich in starch grains and raphides, endodermis single layered with barrel shaped cells; a single layered discontinuous pericycle; xylem and phloem radially arranged; xylem exarch, vessels circular to oval, a continuous ring of sclerenchyma following the inner zone of vascular bundle (Figure 1).

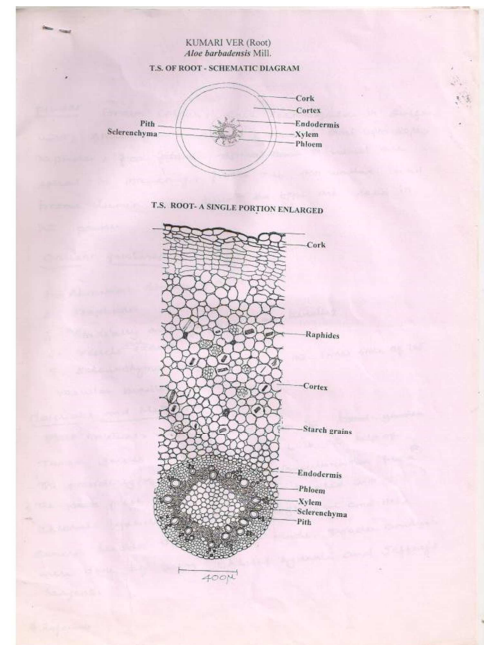


Figure 1. Transverse Section of Root of *Aloe barbadensis* Mill.

3.3. Powder Microscopy

Brown cork rectangular in surface view, starch simple round to oval upto 20 μ , raphides, fibres vessels with spiral thickenings present (Figure 2).

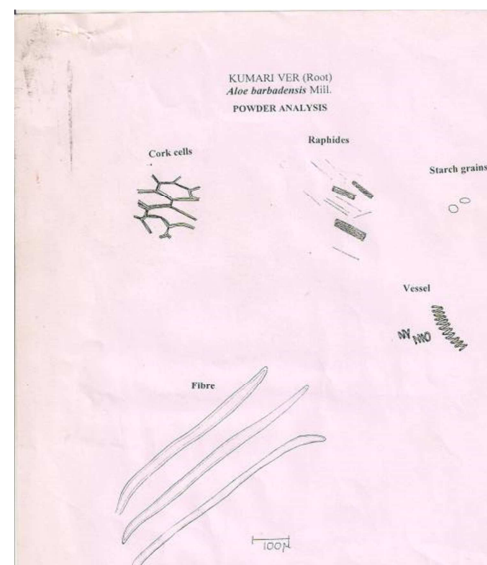


Figure 2. Powder Microscopy of Root of *Aloe barbadensis* Mill.

3.4. Phytochemical Constituents

Phytochemical screening reveal the presence of tannin, saponin and flavonoids. (Table 1).

Table 1. Qualitative phytochemical properties of the *Kumari ver.

S. No	Compound	Methanol extract	Ethanol extract	Chloroform extract
1	Alkaloids	-	-	+
2	Steroids	-	-	-
3	Tannin	+	+	+
4	Saponin	+	+	+
5	Flavonoids	+	+	+
6	Phenols	-	-	+
7	Phlobatannins	-	-	-
8	Glycosides & sugars	+	+	-
9	Fats & oils	-	-	-

*Shade dried powdered material. (+) presence and (-) absence.

4. Discussion

There are several references to aloes root in the Bible but since it was then used as a perfume or incense, identification with the modern species of *Aloe* (family *Liliaceae*), which are not known for their aromatic properties, is doubtful. The one used in this study is *Aloe barbadensis* Miller, commonly called *Aloe vera*; the juice of this plant has an unpleasant odour and taste. [HOLY BIBLE, Numbers 24: 6, Psalms 45: 8, Proverbs 7: 17, Song of Solomon 4: 14, John 19: 39].

Phytochemistry of *Aloe vera* gel has revealed the presence of more than 200 bioactive chemicals. Commercially, aloe can be found in pills, sprays, ointments, lotions, liquids, drinks, jellies, and creams, to name a few of the thousands of products available. In the present scenario, the aloe industry is blooming. So, there is a burning need to educate about the importance of *Aloe vera* for human race and popularize it for greater interest [7]. The pericyclic cells located at the top of the vascular bundles contains the "Yellow Sap" or "Latex". This sap is rich in aloin and similar anthraquinones having laxative properties. [8, 9]

5. Conclusion

The above parameters help in identifying the species and to establish the authenticity of this plant and can possibly help to differentiate the drug from its other adulterants. Even today, the World Health Organisation serves it as alternate medicine of immortality and the medicinal plant with qualities for thousands of years to come [10, 11].

Enormous work is done on the antimicrobial activities but the authenticity of this experimental plant has been discussed in this research article [12-15].

Aloe are typical of monocotyledonous plant has been discussed on the basis of both morphological and anatomical

characteristics to prove the authenticity of this experimental plant *Aloe barbadensis*.

References

- [1] Reynolds T. (2004). *Aloes: The Genus Aloe*. CRC Press.
- [2] Eshun K, He Q. (2004). *Aloe vera: A Valuable Ingredient for the Food, Pharmaceutical and Cosmetic Industries*.
- [3] Edeoga HO, Okwu DE, Mbaebie BO (2005). Phytochemical constituents of some Nigerian medicinal plants. *Afr. J. Biotechnol.*, 4 (7): 685-688.
- [4] Evans, WC., Trease and Evans. (1997). *Pharmacognosy* (14th Ed), Harcourt Brace and Company. Asia Pvt. Ltd. Singapore 343.
- [5] Harborne JB (2005). *Phytochemical methods – A guide to modern techniques of plant analysis*. 3rd edition. Springer Pvt. Ltd., New Delhi.
- [6] AOAC. (1990) *Official methods of analysis*. 16th ed. Association of Official Analytical Chemists. Washington. D. C.
- [7] Sampath KP, Bhawmik D and Chiranjib B: *Aloe vera: A potential herb and its medicinal importance*. *J. Chem. Pharmaceut. Res.* 2010; 2: 21-29.
- [8] Christaki EV, Florou-Paneri PC (2010) *Aloe vera: a plant for many uses*. *J Food Agric Environ* 8 (2): 245–249.
- [9] Khanam, N., Sharma, GK. (2013) A critical review on antioxidant and antimicrobial properties of *Aloe vera* L. *Int J Pharm Sci Res*; 4: 3304-3316.
- [10] Kumar, S., Yadav, JP. (2014) Ethnobotanical and pharmacological properties of *Aloe vera*: A review. *J Med Plant Res*; 8: 1387-1398.
- [11] Moses, A., Bernard, S., Oriko, OR., Edward A.(2014) Preliminary Qualitative Analysis of Phytochemical Constituents of the Endemic *Aloe tororoana* Reynolds in Tororo, Eastern Uganda. *Glo Adv Res J Agric; Sci* 3: 096-099.
- [12] Davis HR. (1997) *Aloe Vera: A Scientific Approach*. New York: Vantage Press; p. 3-5.
- [13] Saba Irshad, Muneeba Butt and Hira Younus (2011). In-Vitro antibacterial activity of *Aloe Barbadensis* Miller (*Aloe Vera*), *International Research Journal of Pharmaceuticals*, 1 (2), pp. 59-64.
- [14] R. Pandey and A. Mishra, Antibacterial activities of crude extract of *Aloe barbadensis* to clinically isolated bacterial pathogens (2010). *Appl Biochem Biotechnol.*, 160, 1356-1361.
- [15] Bandaru Narasinga Rao, D. Lalitha Devi and B. Srinivas, (2013). An evaluation Antimicrobial Activity of *Aloe barbadensis* Miller (*Aloe vera*) Gel Extract, *Journal of Pharmaceutical and Biomedical Sciences*, 21 (3), 1-4.