

Pharmacognostical studies on *Oxystelma esculentum* (L.F) R. Br. ex Schltes, a medicinal plant

G. Savitha, S. Balamurugan*

Department of Botany, Annamalai University, Annamalai Nagar, India

*E-mail address: drbalu2011@gmail.com

ABSTRACT

The present investigation has been carried out to study the anatomical features of root, rhizome, stem, leaf and petiole for evaluating the *Oxystelma esculentum*, an important medicinal plant used in the traditional systems of medicine. This study provides referential pharmaco-botanical information for correct identification of this plant.

Keywords: Pharmacognosy; physico-chemical; *Oxystelma esculentum*

1. INTRODUCTION

Oxystelma esculentum (L.F) R.Br. ex Schltes is an important medicinal plant belonging to the family Asclepiadaceae used in the traditional systems of medicine for various ailments. The plant is hot, bitter, tonic, expectorant, pungent, dry and indigestible; causes flatulence, diuretic, laxative, aphrodisiac, anthelmintic, useful in leucoderma and bronchitis. The juice is used in gleet, gonorrhoea, pain in the muscles, cough and given to children as an astringent. The milky sap forms a wash for ulcers. In combination with turpentine it is prescribed for itch [1]. *Oxystelma esculentum* is reported to possess antiseptic, depurative and galactagogue properties. A decoction of the plant is useful as a gargle in infections of throat and mouth. [2-3]. The present study has been carried out to study the anatomical features of leaf, stem, petiole, roots and rhizome to serve as a possible tool for proper identification of *Oxystelma esculentum*.

2. MATERIAL AND METHODS

2. 1. Collection and authentication of the plant

Oxystelma esculentum (L.F) R.br. Ex Schltes was collected in the flowering and fruiting stage from Annamalai University campus, Annamalainagar during the month of July 2013. Herbarium of the collected sample was prepared and deposited in the Department of Botany, Annamalai University. Authentication was done by Dr. V. Venkatesalu, Head of the Department of Botany (DDE), Annamalai University.

2. 2. Pharmacognostical studies

Fresh samples of leaf, petiole, stem, root and rhizome were used for pharmacognostical studies and quantitative microscopy. The plant samples were fixed in FAA (95 % Formalin- 5 ml + 95 % Acetic acid- 5ml + 70 % Ethyl alcohol 90 ml). After 24hrs the materials was washed thoroughly (Weswox TM Optik, Model MT- 1090A) section was taken, and stained with safranin according to the prescribed methods [4]. Photographs were taken by Phase contrast microscope (Olympus SP-350, digital compact camera, 8.0 mega pixels).

Physicochemical studies like determination of ash values [5], PH of aqueous solution, extractive values [6]. Phytochemical studies like Cardenolides [7], Phenolics [8], Flavonoids [9] and Sugars [10].

3. RESULTS AND DISCUSSION

Fig. 1. Transverse section of root.

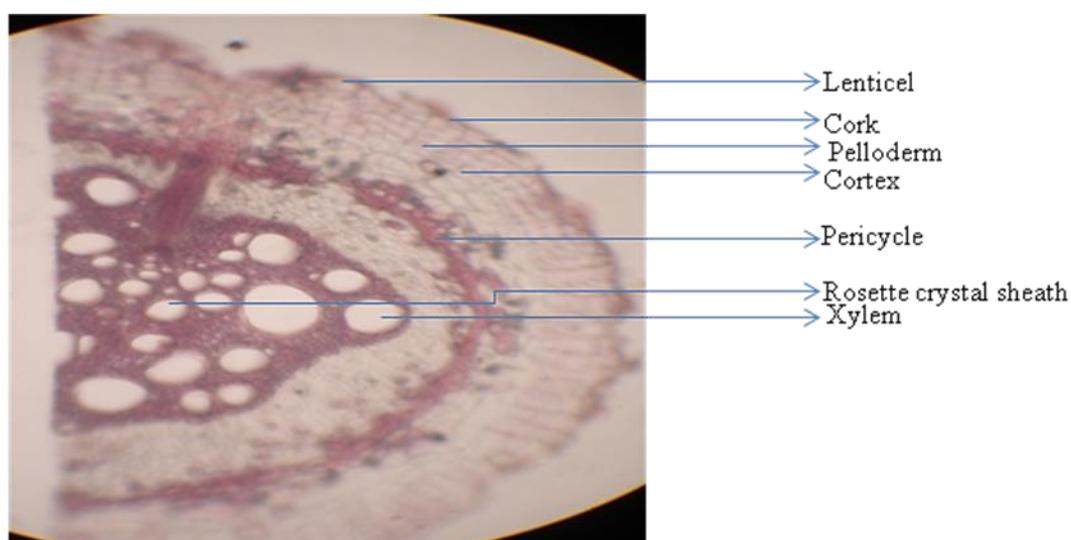


Figure showing calcium oxalate crystals

Oxystelma esculentum has tremendous medicinal potential owing to its multifaceted biological functions. However, there are no detailed pharmacognostic studies to help in the proper identification. Hence the present study carried out to provide key diagnostic tools of identification. The following anatomical features can be used to diagnose this plant.

Druses type of calcium oxalate crystals are present and starch grains are absent in the cortex region. Vessel elements circular in outline, wide, tailed with simple pits, simple perforation plates, arranged in diffuse porous with pores solitary (Fig. 1).

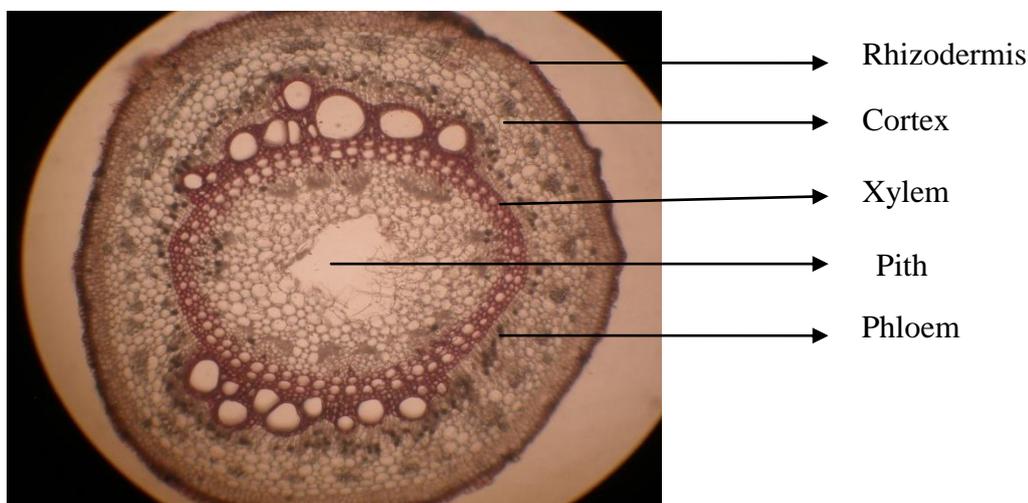


Fig. 2. Transverse section of rhizome.

Epidermal cells large in size and radially elongated. Cortex with abundant starch grains and druses type of calcium oxalate crystals. Xylem elements mostly with fibers and tracheids (Fig. 2).

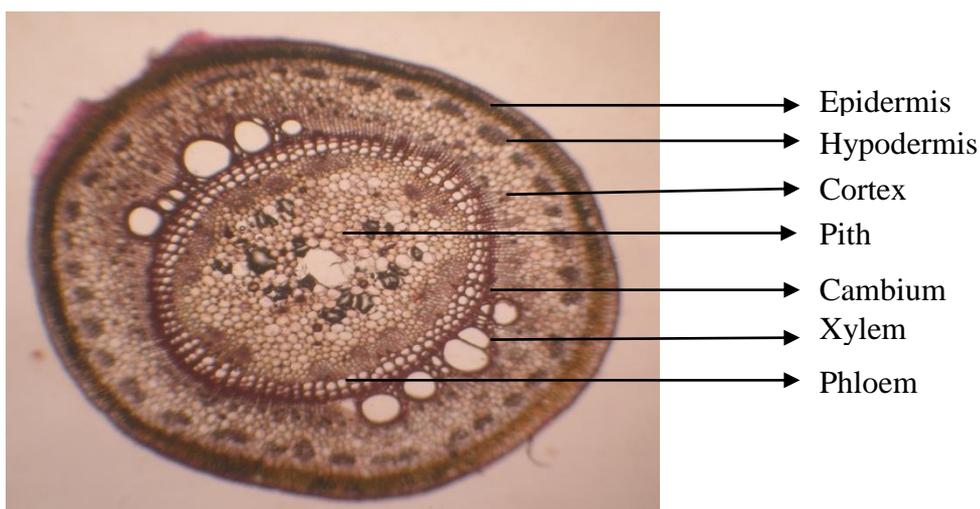


Fig. 3. Transverse section of stem.

Abundant druses type of calcium oxalate crystals and phloem and fibres in the cortex or pentagonal shape of secondary xylem. Vessels are solitary, wide short, circular or oval outline, barrel, shaped, with simple pits, simple perforation plate and without tail (Fig. 3).

Fig. 4. Transverse section of leaf.

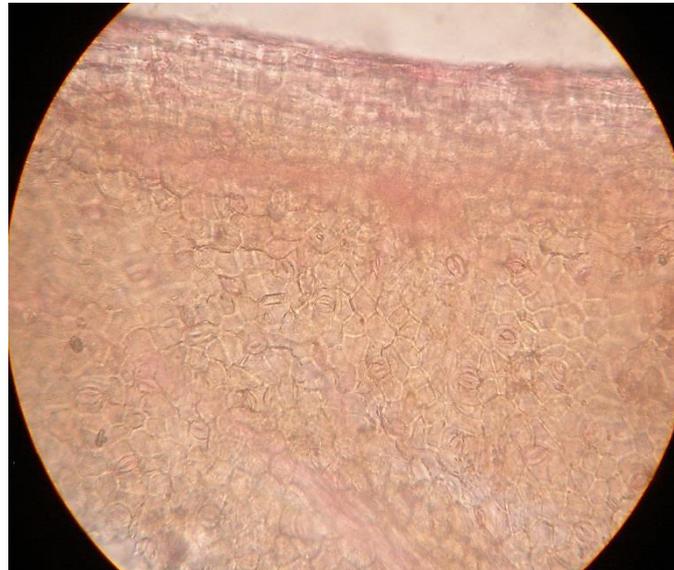
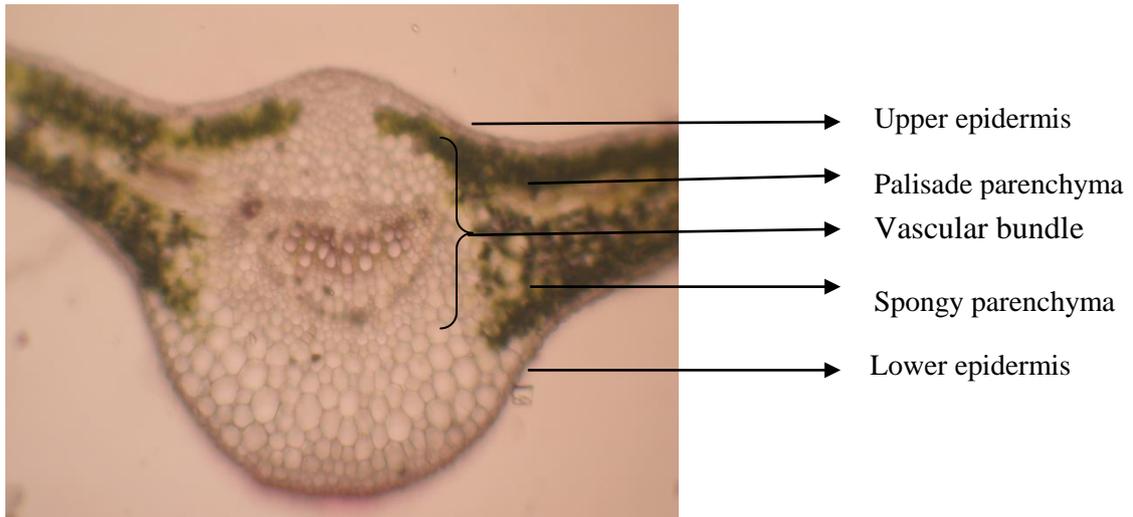


Figure showing anomocytic stomata

Stomata are amphistomatic and anomocytic type. Druses type of calcium oxalate crystals in mesophyll (Fig. 4).

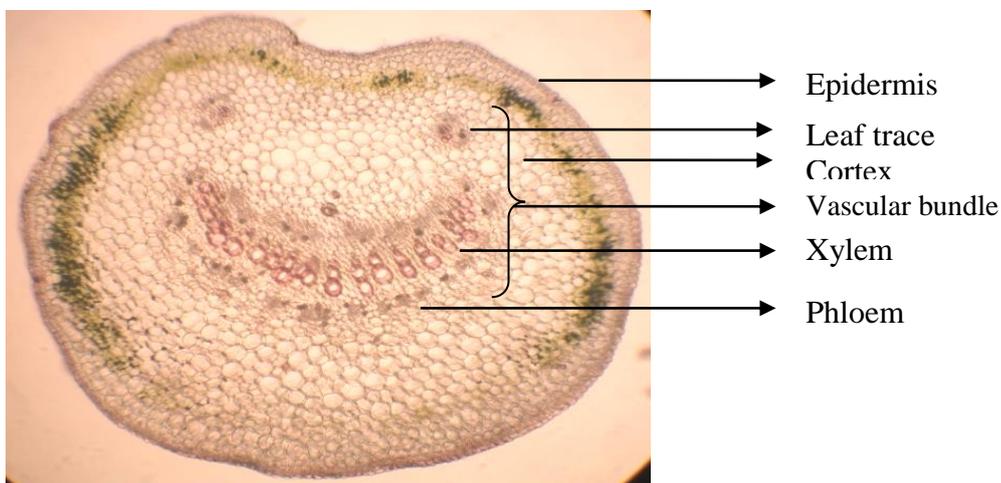


Fig. 5. Transverse section of petiole.

Circular in outline, vascular bundle open type; three vascular bundles, arrangement is 1+ 2; dorsal bundle large bowl shaped and laterals small circular. Vascular bundle surrounded by druses type of calcium oxalate crystals.

Table 1. Physico-chemical analyses.

Parameters	% w/w \pm SD
Loss of drying	70.21 \pm 0.50
Ash values	
Total ash value	10.21 \pm 0.24
Acid insoluble ash	0.76 \pm 0.20
Water soluble ash	6.15 \pm 0.21
Extractive values	
Water soluble extractive	4.2 \pm 0.17
Alcohol soluble extractive	2.2 \pm 0.15

Physico-chemical determination of water soluble extractives were greater than those of alcohol soluble extractives, indicating the presence of water soluble phytoconstituents in higher amounts in this plant (Table 1).

3. 1. Phytochemical studies

Phytochemical screening was performed (Table 2 & 3) estimation of phytoconstituents included that of cardenolides, phenolics, flavonoids and sugars are present.

Table 2. Phytochemical screening.

Phytoconstituent	Test	Result
Alkaloids	Dragendorff's test	-ve
	Wagner's test	-ve
	Mayer's test	-ve
	Hager's test	-ve
Flavonoids	Shinoda test	+ve
	Lead acetate test	+ve
Sterols	Salkowski test	+ve
	Liebermann buchart test	+ve
Cardiac glycosides	Legal's test	+ve
	Bajlet test	+ve
	Keller killiani test	+ve
	Kedde's test	+ve
Saponin glycosides	Foam test	-ve
	Lead acetate test	-ve
Phenolics	Ferric chloride test	+ve
	Folin cioaltea test	+ve
Sugars	Fehling's test	+ve
	Molisch test	+ve
Gums	Ruthenium red test	-ve

Table 3. Estimation of phytoconstituents.

Phytoconstituents	% w/w \pm SD
Cardenolides	0.94 \pm 0.12
Phenolics	1.23 \pm 0.14
Flavonoids	0.42 \pm 0.12
Sugars	2.14 \pm 0.13

4. CONCLUSIONS

A detailed study of roots, rhizome, stem, leaf and petiole of *Oxystelma esculentum* was performed. Microscopic study revealed the presence of diagnostic features like cork in surface view, parenchymatous tissue having large number of calcium oxalate rosette crystals and xylem vessels with different types of thickening. Various quantitative microscopic parameters and physico-chemical parameters were established. Values of water soluble extractives were greater than those of alcohol soluble extractives, indicating the presence of water soluble phytoconstituents in higher amounts. Cardenolides, phenolics, flavonoids and sugars were detected by a thorough phytochemical screening procedure and they were estimated by their respective methods. This indicates that the plant can be useful for treating different diseases, especially those related to the cardiovascular system, as the therapeutic activity of a plant is always due to the presence of particular class of phytochemicals. The present study can serve as a useful gauge in the identification, authentication and standardization of the plant material as well as investigating its phytochemical composition, which would help in investigation of its possible pharmacological actions.

References

- [1] Kirtikar K.R., B.D. Basu, (1976). Indian medicinal plants. International book Distributors, Dehradun, India.
- [2] Chopra R.N., I.C. Chopra, K.L. Handa, L.D. Kapoor, (1958). Indigenous Drugs of India. Academic publishers, Calcutta, India.
- [3] Nadkarni A.K. (1982). Indian Materia Medica, Popular Parkashan Pvt. Ltd., Mumbai.
- [4] Sass J. E. (1940). Elements of Botanical Microtechnique. New York: McGraw-Hill Book Co.
- [5] Anonymous (1980). AOAC, Official Methods, of Analysis, 14 th Edition Washington D.C.
- [6] Anonymous. *British Pharmacopoeia*. London: *General Medical Council Pharmaceutical Press* 17 (1968) 1209, 1227, 1267, 1268, 1276.
- [7] Department of Health. *British Pharmacopoeia*. Vol. I. London (United Kingdom): HMSO; 1993.
- [8] World Health Organization. *Quality Control Methods for Medicinal Plant Materials*. Geneva (Switzerland): WHO; 2002.
- [9] Baharam T, Gressier B, Troitin F, Brunet C, Dine T, Pinkash M., *Drug Res.* 46(6) (1996) 1086-1089.
- [10] Hodge J.E., Hofreiter B.T., Determinations of reducing sugars and carbohydrates analysis. In: Roy LW, Wolfrom ML, Editors. *Methods in carbohydrate chemistry*. Vol. I. London: Academic Press, p. 388-405; 1962.

(Received 26 July 2014; accepted 05 August 2014)