

Pharmacognostic studies on the leaf of *Elytraria acaulis* (L.f.) Lindau

P. Sudhakar¹, D. Kavitha¹, P. Ramachandra Reddy^{1*} and P. Padma Rao².

¹Department of Botany, Osmania University, Hyderabad-500007, India

²Drug Standardisation Unit, O.U.B., 32 Habsiguda, Hyderabad-500007, India

E-mail: sudhakarpenhala@gmail.com; kavitha.duggi@gmail.com;

prreddybotany7@gmail.com; drpprdsu@gmail.com

*Corresponding author

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ABSTRACT

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Elytraria acaulis (L.f.) Lindau is a scapigerous herb belonging to the family Acanthaceae. The leaves are used in treatment of fever, venereal diseases, kidney stones, abscess and bronchitis. The leaf is amphistomatic with diacytic and anisocytic stomata. The trichomes are uniseriate, filiform capitate, uniseriate glandular, uniseriate peltate and uniseriate conical types. Epidermis is 1 layered, interrupted by stomata. Mesophyll is interspersed with needle shaped calcium oxalate crystals. The midvein consists of a single, large, oval vascular bundle and two small adaxial bundles. The microscopic and organoleptic characters of the powder are provided.

Key-words: *Elytraria acaulis*, pharmacognosy, calcium oxalate crystals, organoleptic characters.

INTRODUCTION

Elytraria acaulis (Syn: *Elytraria crenata* Vahl., *Tubiflora acaulis*), commonly known as 'Nelamarri' in Telugu, 'Pharchatta' in Hindi and 'Pumikatampam' in Tamil, belongs to the family Acanthaceae. It is a small scapigerous herb, found in West and East tropical Africa (Mathew 1983). It grows in grassy lands and open forest undergrowth in India (Gamble 1921). Leaves are used in treatment of fever, kidney stones, asthma, earache, wounds (Jain 2012), bronchitis and abscess (Hemadri 1992). The leaves are sub-radical, in close spirals, obovate-oblongate, villous along the nerves below, base cuneate, margin crenate, apex obtuse, spikes 10-24 cm long, branched or unbranched, lower bracts sterile, spirally imbricate, ovate, glabrous, corolla white,

when fully developed with tube 5-7 mm long and lobes 2-3 mm long; fruit is a capsule, oblong; seeds many, flattened (Mathew 1983). Chemically, the plant is reported to contain two pyrazole alkaloids Withasomnine and 4' - hydroxyl withasomnine (Ravikanth et al. 2001).

MATERIAL AND METHODS

Elytraria acaulis was collected from various locations of Warangal district, Telangana. Collected material was poisoned and mounted on herbarium sheets and deposited in Herbarium Hyderabadense, Department of Botany, Osmania University, Hyderabad. The leaves were boiled and fixed in F.A.A. (Formaldehyde: Acetic acid: Alcohol) and processed for microtomy (Paraffin method), sectioned, stained and permanent slides

prepared following Johansen (1940). The epidermal peels of leaf were obtained by gently scraping and peeling with razor blade. The microtome sections of 8-10 μm thickness were obtained on Leica RM 2155 microtome. The powder microscopy characters were studied by boiling the powder drug in distilled water, stained in safranin and mounted with glycerin. Photomicrography was done with Olympus BX 53 Research trinocular microscope.

OBSERVATION AND RESULTS

Macroscopic characters: Leaves are sub-radical, in close spirals, obovate-oblongate, 8-18 x 3-6 cm, villous along the nerves below, base cuneate, margin crenate, apex obtuse (Plate 1, figure 1)

Microscopic characters: Adaxial epidermal cells 5-7 sided, polygonal anisodiametric and isodiametric, sides thick, mostly wavy to sinuate, few curved to wavy, surface granulated, contents slightly dense with starch grains in few. E.C.F. 2066 per mm^2 . Abaxially, cells are 4-6 sided, few up to 8 sided, polygonal anisodiametric to isodiametric, few linear, sides thin, wavy to sinuate, sinuses 'U' shaped, contents slightly dense in few. E.C.F. 1173 per mm^2 . Stomata on both surfaces, diacytic and anisocytic, subsidiaries 2 or 3, distinct, monocyclic, S.F. 53 mm^2 , S.I. 2.51, S.S. 16-27 (22) μm long and 8-16 (10) μm wide on adaxial surface. Abaxially S.F. 466 per mm^2 , S.I. 28.45, stomatal size 16-27 (21) μm long and 8-16 (12) μm wide. Trichomes are of 4 types: 1. Uniseriate glandular hair, 2. Uniseriate filiform capitate hair, occur all over on adaxial surface, 3. Uniseriate conical hair: few, only on veins of abaxial surface, and 4. Uniseriate peltate hair, all over on abaxial surface (Plate 2). In leaf transection, the midvein is ribbed adaxially, prominently ribbed on abaxial side; 1019-1245 (1138) μm thick. Lamina is dorsiventral, flat adaxially and slightly undulated abaxially. Epidermis is 1-layered, cells adaxially larger on lamina, barrel shaped, rectangular and oval to circular; abaxially narrower, interspersed with stomata, contents scanty. Cells over midvein

oval to spherical and tabular, cuticle slightly thick over the surface. Lamina is dorsiventral, palisade 2-3 layered, closely packed, throughout, interrupted at midvein, secondary veins and margins; cells cylindrical, columnar, 20-41 (30) μm long and 5-11 (8) μm wide, perpendicular to the epidermis, occupying 1/3 area of the mesophyll, contents dense with chloroplasts and interspersed with needle like calcium oxalate crystals. Spongy parenchyma much reduced, 1-2 layered with large intercellular spaces; cells circular and oblong, elongated cells 8-35 (26) μm long, 6-18 (12) μm wide and isodiametric cells 8-21 (15) μm in diameter and often interspersed with needle shaped crystals. Ground tissue of midvein consists of collenchyma and parenchyma tissues. Collenchyma 2-3 layered adaxially and 1-2 layered on abaxial surface, lamellar; cells polygonal, oval to spherical and oblong, dense with dark contents in few. Parenchyma 8-14 celled thick adaxially; 7-10 celled thick abaxially; polygonal, oval to spherical, walls thin, intercellular spaces narrow, contents dense with plastids in few; cells about 20-60 (42) μm in diameter. Vascular tissue of midvein consists of a large oval shaped vascular bundle at centre with 2 small spherical bundles one each towards adaxial on either sides. Midvein vascular bundle 292-367 (329) μm in diameter. Vascular bundles conjoint, collateral and endarch, with a 2-3 layered pericycle enclosed by endodermis. Xylem in the form of a continuous cylinder with the union of tracheary elements. Vessels / tracheids are arranged in radial rows, 120-150 in number, often interrupted with xylem parenchyma. Xylem is surrounded by phloem which is scanty. Phloem consists of phloem parenchyma, sieve cells accompanied with companion cells and phloem fibres. The phloem is enclosed by 2-3 layered pericycle and a layer of endodermis over it. Centrally, few xylary cells are present as a cluster and surrounded by internal phloem in patches. The internal phloem is present in central parenchyma inside the vascular ring. In L.S., the vessels/tracheids possess mostly helical, annular and scalariform thickenings (Plate 1).

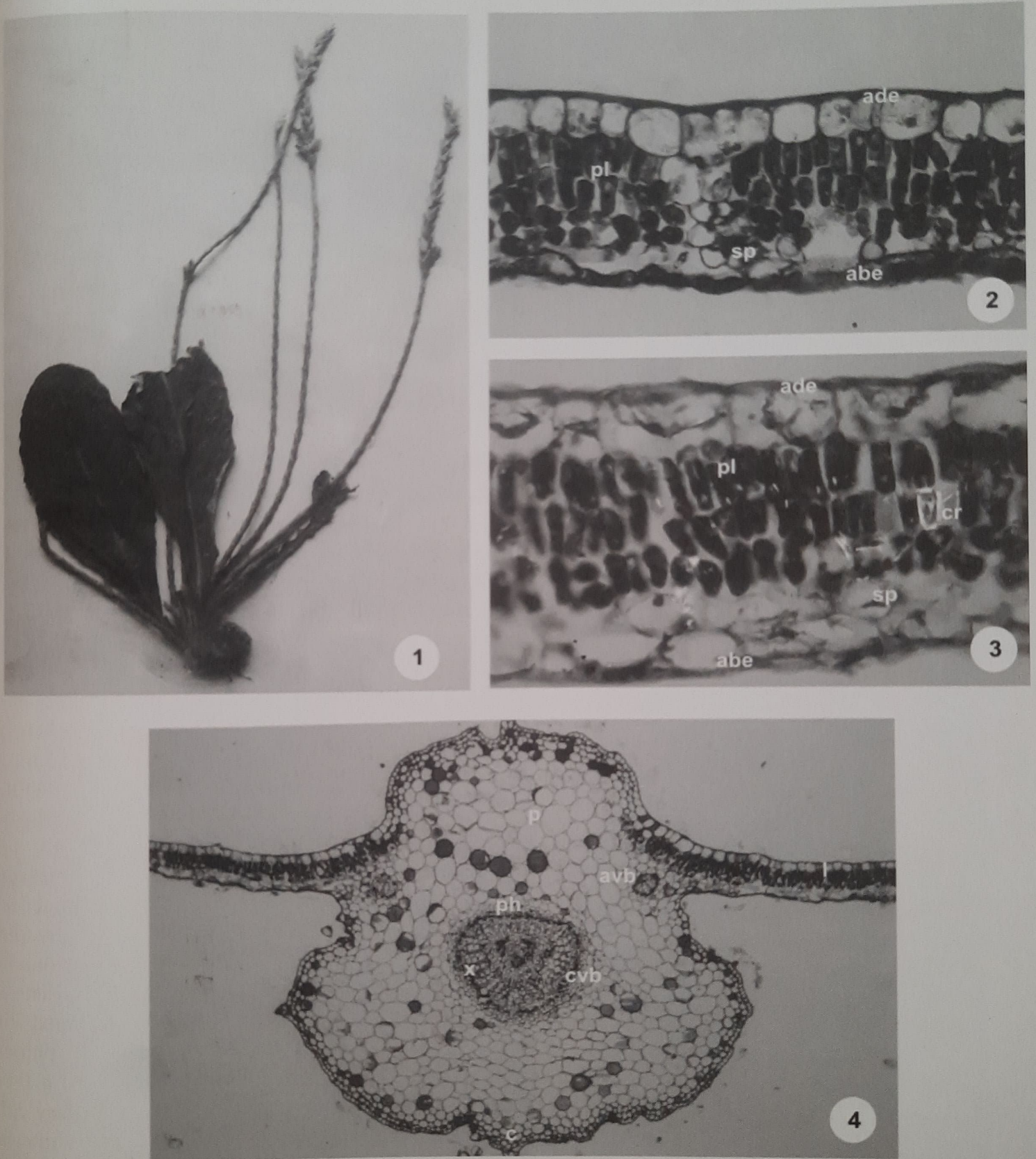


Plate 1

1. Herbarium specimen of *Elytraria acaulis*. 2. T.S. of leaf lamina. 3. T.S. of leaf lamina with crystals. 4. T.S. of leaf at midvein. ade: adaxial epidermis, abe: abaxial epidermis, pl: palisade, sp: spongy tissue, l: lamina, cr: crystals, c: collenchyma, p: parenchyma, cvb: central vascular bundle, avb: adaxial vascular bundle, ph: phloem, x: xylem.

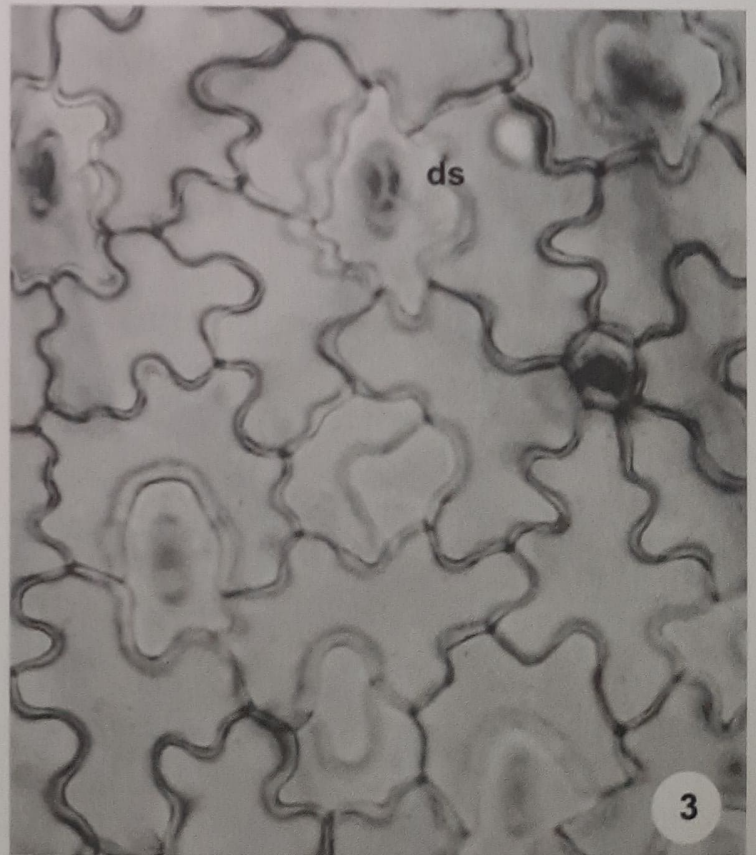
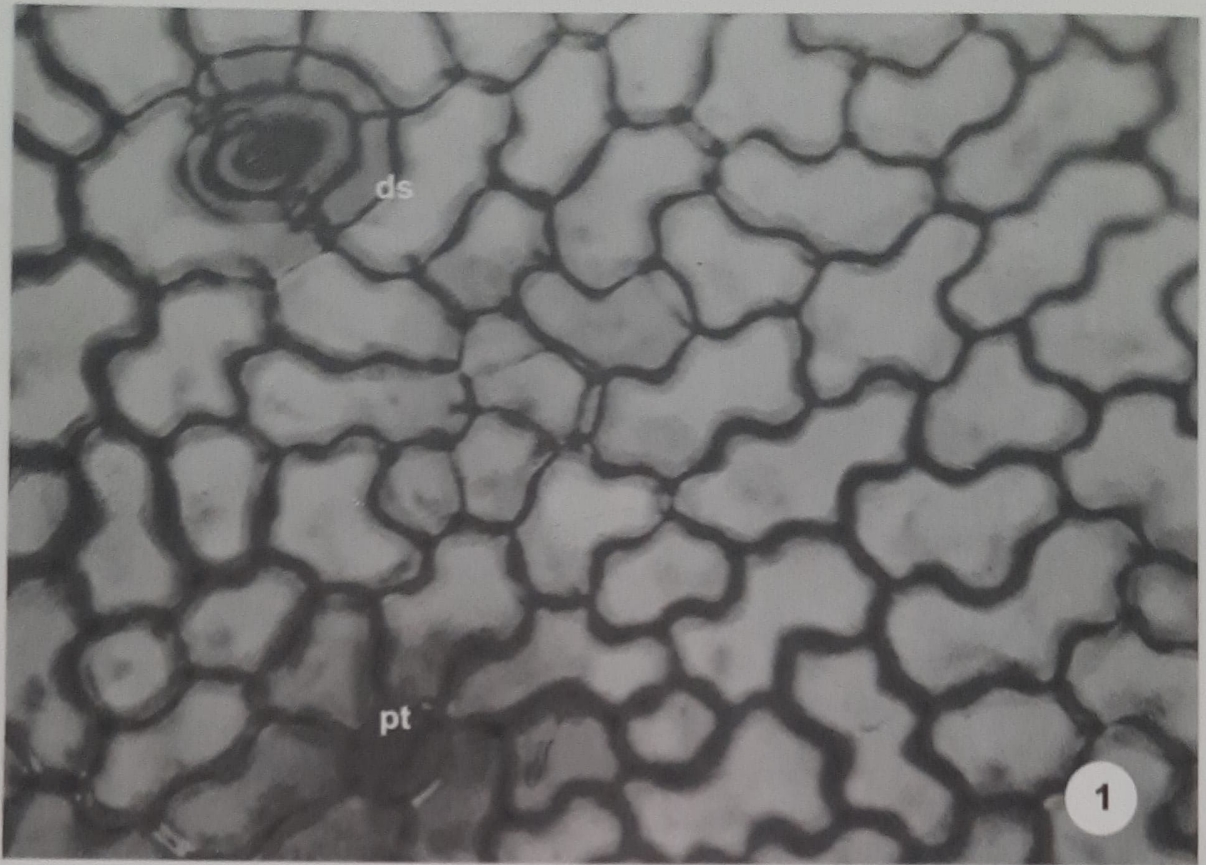


Plate 2

1. Adaxial epidermis. 2. Abaxial epidermis with conical hair. 3. Abaxial epidermis. ds: diacytic stomata, pt: peltate hair, us: uniseriate conical hair.

Powder Microscopy: Fragments of epidermis with diacytic stomata and uniseriate conical hairs; crystals of calcium oxalate few; pieces of cortical parenchyma; pieces of tracheary elements.

Organoleptic Characters: Colour: Light green; Touch: Smooth; Odour: No characteristic odour; Taste: No characteristic taste.

DISCUSSION

Singh et al. (2013) reported that the leaves of *Elytraria acaulis* are amphistomatic with diacytic stomata. The present study confirms the same besides the occurrence of anisocytic stomata on abaxial side. In surface view, the epidermal cells are polygonal anisodiametric and isodiametric, sides mostly wavy to sinuate, few curved to wavy on adaxial surface and wavy to deeply sinuate on abaxial surface. In leaf transection, the midvein is ribbed adaxially, prominently ribbed on abaxial side. Lamina is dorsiventral, palisade is 2-3 and spongy tissue 1-2 layered, interrupted with needle shaped calcium oxalate crystals (Metcalf & Chalk 1950). Ground tissue of midvein consists of collenchyma and parenchyma tissues. Collenchyma is 2-3 layered adaxially, 1-2 layered on abaxial side as reported earlier (Singh et al. 2013) which is presently confirmed. Parenchyma is abundant beneath the collenchyma, with narrow intercellular spaces, contents dense with plastids in few. The midvein consists of large, oval vascular bundle at centre and with 2 small adaxial spherical bundles. Vascular bundles conjoint, collateral,

endarch, 2-3 layered pericycle is enclosed by endodermis.

CONCLUSION

The powder microscopic features and organoleptic characters along with the anatomical studies are diagnostic and establish in the standards for the drug.

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