



FLORAL AND ANATOMICAL STUDIES OF *PLECTRANTHUS SCUTELLARIOIDES* (L.) R. BR. (LAMIACEAE) FROM UDALGURI, ASSAM, INDIA

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Abstract

The floral morphology and anatomy of *Plectranthus scutellarioides* from Udalguri district of Assam were studied in order to understand the significance of these features in systematic. Based on the various literature surveys, it was found that the detail taxonomic works on the species were not studied and recorded from the study area earlier. The present comprehensive work on *Plectranthus scutellarioides* thus provides an empirical basis for the identification of the species. Anatomical characters of stem, root and pedicel were studied results were provided.

Key words: *Plectranthus scutellarioides*, morphology, herbarium, anatomy.

Introduction

Lamiaceae is the sixth largest Angiospermic plant family (Li *et al.*, 2017). This family was earlier known as “Labiata” which is still used as an alternative name authorised by the ICBN, Articles 18.5-18.6 (Mc Neill *et al.*, 2006; 18-19). The plants belonging to this family occur all over the world in a wide variety of habitats from Alpine regions through grasslands, woodlands, forests, to temperate as well as tropical regions.

Being the member of the family Lamiaceae, *Plectranthus scutellarioides* is a woody, evergreen perennial, bushy plant usually cultivated and grown for its ornamental values. The leaves are very showy and variegated, and the flowers are very small and beautiful. The species is considered as a medicinal plant in much culture but has also been classed as a narcotic hallucinogen (Duke, 2002).

The species *Plectranthus scutellarioides* was first described by Carolus Linnaeus (1763) in his book “*Species Plantarum*” for the first time as ‘*Ocimum scutellarioides*’. It was later on transferred to the genus *Plectranthus* by Robert Brown in 1810. However, George Bentham transferred it to the genus *Coleus* as *Coleus Scutellarioides* in 1830.

This plant could be cultivated in tropical and temperate region around the world (Hanelt *et al.*, 2001, Acevedo Rodriguez and Strong, 2012). Many cultivars are grown

around the world as ornamentals, due to the showy, variegated leaves of the species. In Papua New Guinea, it is used as a food additive while in Southeast Asia it is considered a medicinal plant and used to treat a variety of ailments including dyspepsia, ophthalmia, and wound infections (Hanelt *et al.*, 2001; Duke, 2002). This species has been classed as a narcotic hallucinogen (Duke, 2002).

Materials and Methods

Collection and preservations: An extensive survey was carried out in the study area in order to locate the specimen. Repeated field trips were made in order to study the natural habitat, collection of the specimen and required data along with GPS location were recorded. The species was collected from Udalguri district of Assam in North-Eastern India with latitudes of N26° 44' 35.15172" and longitude of E 92° 5' 21.04584", Sundari Hati, Udalguri, Assam, India. The specimen was firstly photographed in its natural habitat and measured from the base and above the ground till the tip of the plant. The specimen was then collected and then measured from the root to tip. A twig of the specimen was also collected, measured and dried for herbarium using hard pressing herbarium technique (Luca Ghini, 1544) and numbered serially with date of collection. For further detailed study, additional roots, inflorescence, stem and pedicel were collected and preserved in the solution of

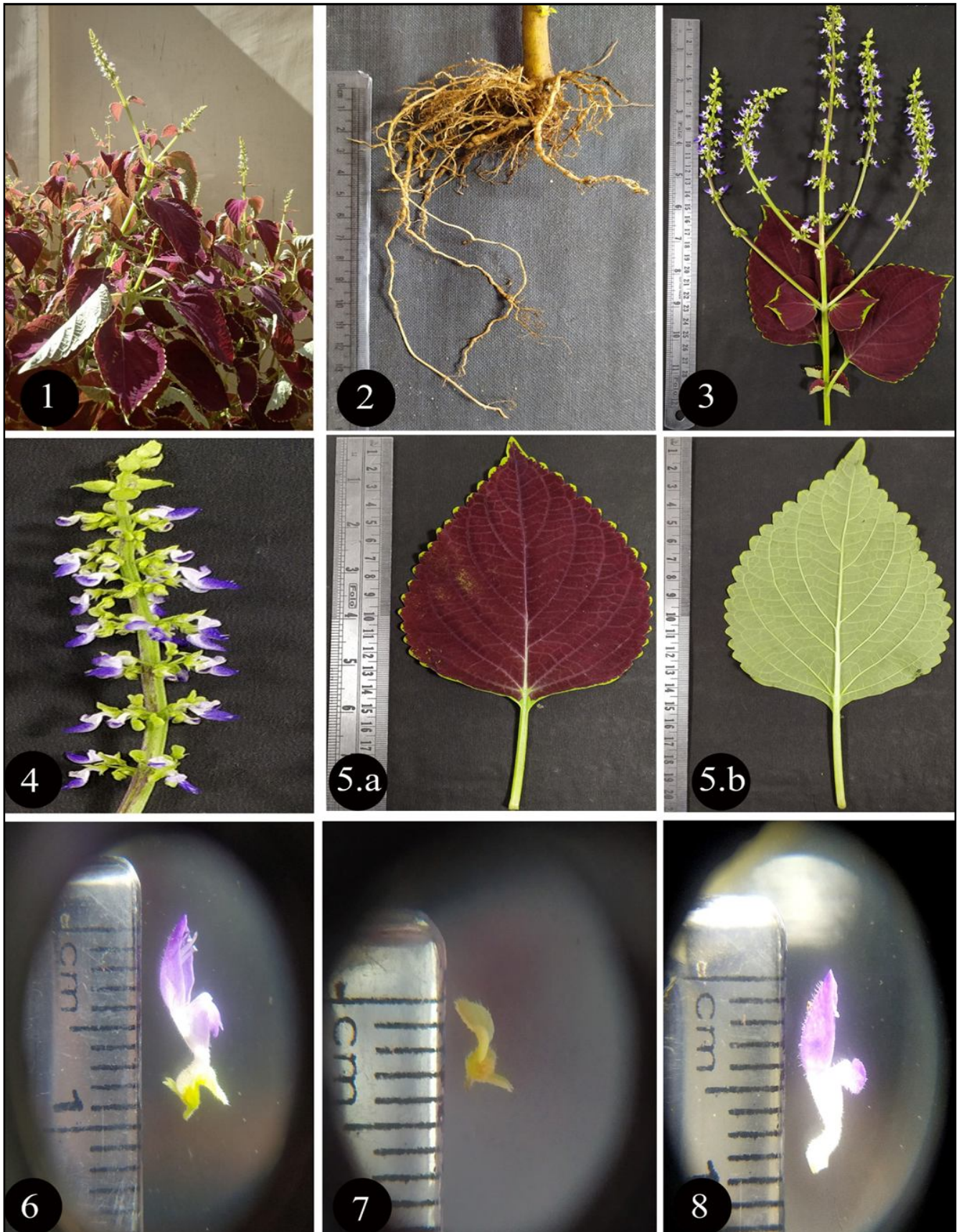


Plate I (Fig. 1-8): *Plectranthus scutellarioides* (L.) R. Br. 1. Plant in habitat; 2. Root; 3. Flowering twig; 4. Inflorescence; 5. Leaf- 5(a)-adaxial, 5(b)- abaxial; 6. Flower; 7. Calyx; 8. Corolla.

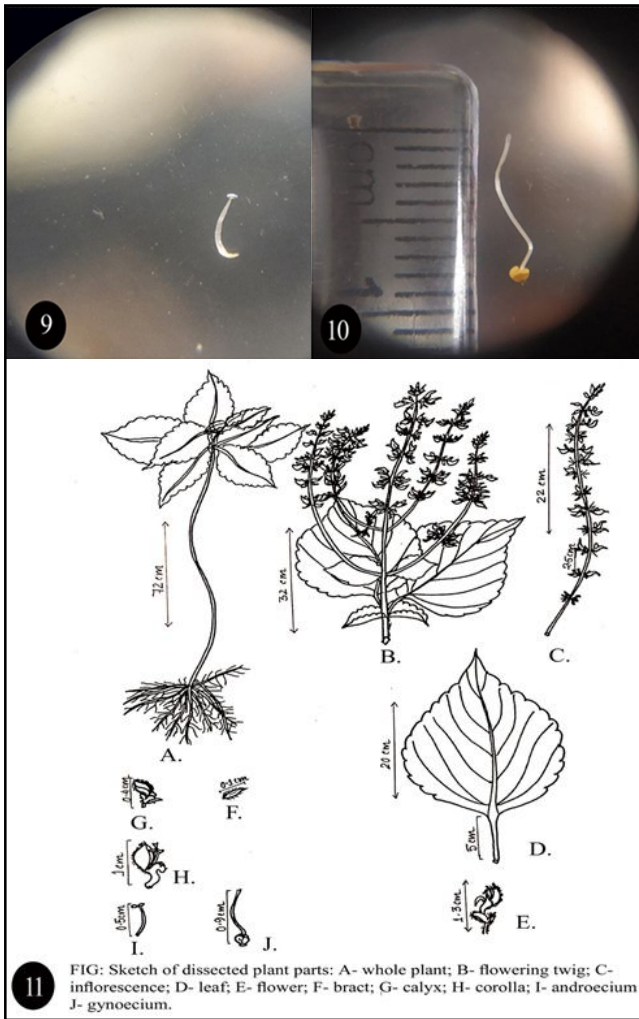


Plate II (Fig. 9-11): *Plectranthus scutellarioides*. 9. Androecium; 10. Gynoecium; 11. Sketch of dissected plant parts.

4% Formalin Acetic Acid (FAA) in glass bottles. After proper mounting and poisoning the collected specimen was mounted on standard herbarium sheets and labelled following standard herbarium techniques (Jain and Rao, 1977).

The detailed morphological study (both quantitative and qualitative) regarding - height of the plant, length of the twig, measurement of the leaf (both dorsal and ventral), length of the inflorescence, distance between the flowers in the inflorescence (only when dried) and the measurement of the different parts of the flower were taken and recorded.

The preserved specimens (stem, pedicel and root) were washed with water and thin sectioning of each were sliced out and stained with safranin. Double staining process was also adopted in order to get a clear view of the cells and observed under the light microscope model Magnus Olympus MLXi plus.

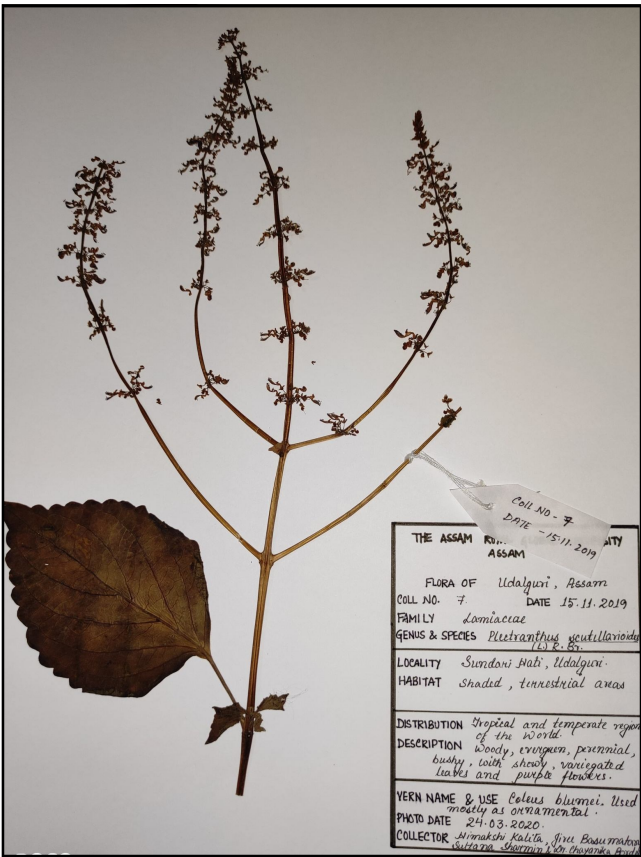


Plate III: *Plectranthus scutellarioides*. Herbarium of the flowering twig.

Results

Plectranthus scutellarioides (L.) R. Br., Prodr. 506. 1810. *Ocimum scutellarioides* L., Sp. Pl. 2: 834. 1763. *Coleus scutellarioides* (L.) Benth.in Wall., Pl. Asiat. Rar. 2: 16. 1830 & in DC., Prodr. 12: 73.1848; Hook. f., Fl. Brit. India 4: 626. 1885; Babu, Fl. Malappuram Dist. 638. 1990. *Coleus blumei* Benth.,Labiata. Gen. Spec. 56. 1833 & in DC., Prodr. 12: 75. 1848; Sunil & Sivadasan, Fl. Alappuzha Dist. 585. 2009; Mukherjee- in Rec. Bot. Surv. India. 1940: 56.

Small subshrub, 70-150 cm high, erect, often ascending, nodes and internodes are recorded. Stems quadrangular, green and thick, becomes woody when matured, simple and branched. Leaves bicoloured with maroon colour in the mid region and green at the boundary of the leaf blade; 4-6 in each whorl; lamina highly variegated, ovate, wide and rounded at the base, acute at the apex, 6-12 cm long, 5-8cm broad, midrib strong; petioles 4-9cm long, presence of hairs gives velvety appearance . Inflorescence verticillaster, 3 in number in each node, 13-18cm long, sessile cyme, rachis finely covered in hairs. Flowers small, white and purple in colour, terminal, ±1.3cm long; bracts green, ovate ±0.4cm long and ±0.2cm wide; pedicel green, ±0.4cm; calyx

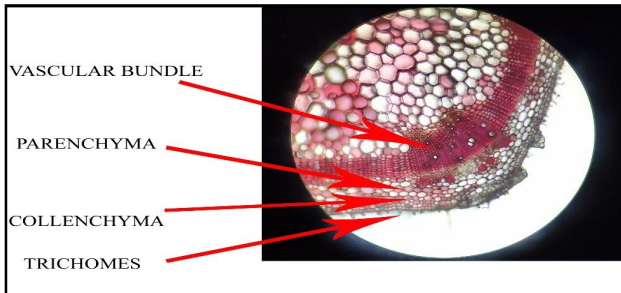


Figure 12: *P. scutellarioides*. corner. 10X objective

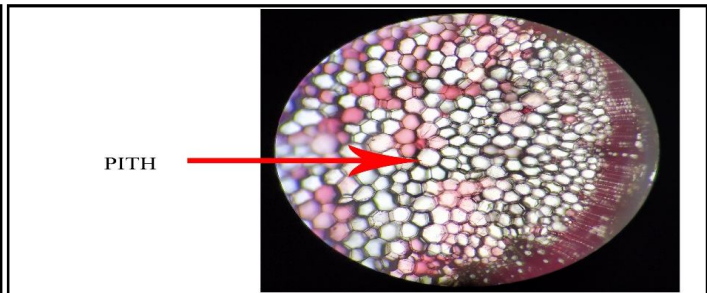


Figure 13: *P. scutellarioides* pith portion. 10X objective



Figure 14 : Corner view of the stem. 10X objective.

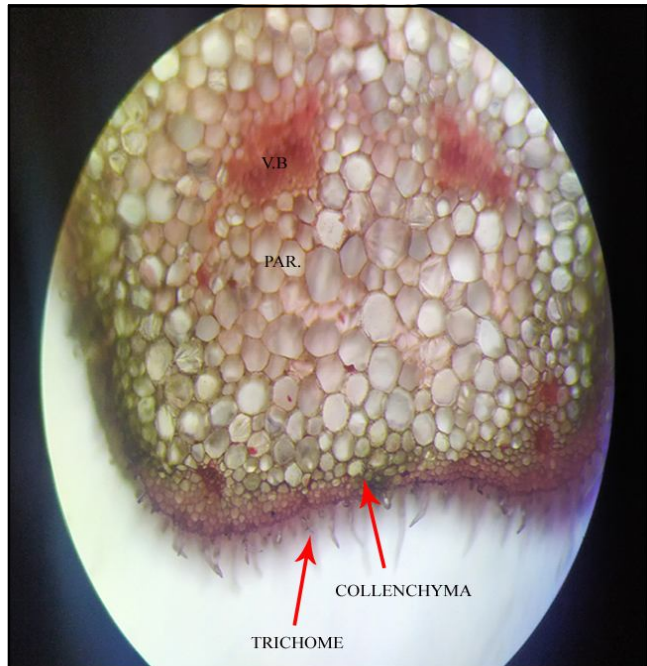


Figure 16: Pedicle. 10X objective



Figure 15 : Entire view of the stem. 4X objective.

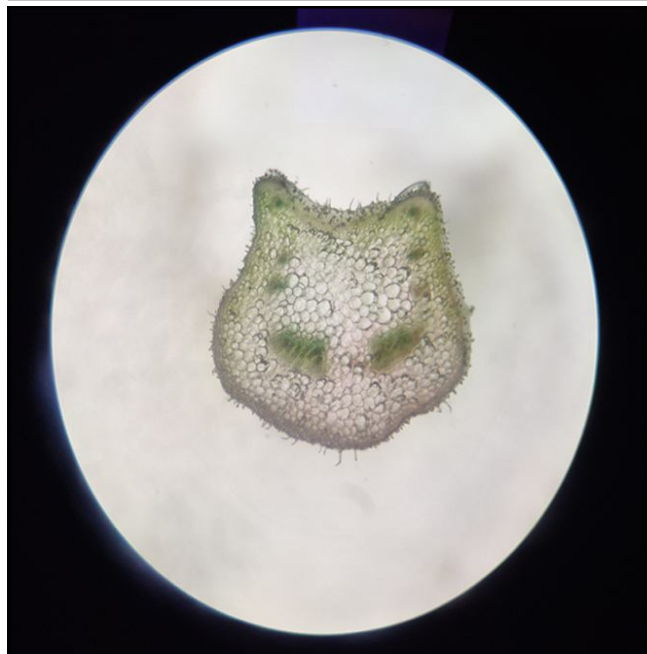


Figure 17: Pedicle. 4X objective

Plate IV : *Plectranthus scutellarioides*. (Fig. 12-15) Transverse section of stem under 4x and 10x objective; (Fig. 16-17) Transverse section of petiole under 4x and 10x objective.

green, obliquely campanulate, trichomous ± 0.3 cm long; corolla fused into upper and lower lip, ± 0.9 cm, upper lip erect, ovate, rounded at apex, lower lip concave ± 0.6 cm long; stamens ± 0.7 cm, filaments united at the base, gynoecium long and slender, ± 0.9 cm long. Ovary not recorded. Fruits not recorded.

Flowering: Throughout the year. But in this region of North-East India, the flowering is mostly observed from the month of August till the month of January.

Habitat: Naturally found in shaded, terrestrial areas in dense patches and as garden cultivation.

According to NCBI with Taxonomic ID- 4142,

Binomial name - *Plectranthus scutellarioides* L. R. Br., 1810

Basionym - *Ocimum scutellarioides* L., 1763

Homotypic synonym - *Solenostemon scutellarioides* L. Codd, 1975

Anatomical Characteristics

Lamiaceae species stems are quadrangular and include well- developed collenchymatous cells at the corner (Metcalf and Chalk, 1972).

The T.S of the stem of *Plectranthus scutellarioides* showed that the corners are well defined and rounded and have straight faces. The epidermis is covered by a large number of small, unicellular, glandular and non-glandular trichomes. The epidermal layer is followed by

a large number of collenchymatous cells, in the corners as well as the perimeter. The collenchyma cells along the perimeter are thinner as compared to the collenchymatous cells present at the corners. Many layers of compact parenchymatous cells are found next to the collenchyma cells with no air spaces thus forming the cortex. Inner to the corner cortex are the long, curving vascular bundles consisting of imperfect, long rows of vessel elements and active phloem. The vascular bundle is followed by solid pith with large pith cells. Whereas inner to the face cortex, forms the vascular cambium with few vascular bundles in each face. The vascular cambium is followed by solid pith.

Petiole is with acute margins. Epidermis formed of single epidermal layers, followed by collenchymatous cells, 3-4 layered in the corners and 1-3 layered in the faces. Petiole of this species consists of two big vascular bundles in the middle and a small single bundle in each corner. Middle and small vascular bundles are surrounded by parenchyma cells. Petioles are covered with trichomes. Both glandular and eglandular types of trichomes are recorded.

The transverse section of root of *Plectranthus scutellarioides* L. R. Br. shows presence of various layers of cells as found in any dicot roots. Presence of root hairs is recorded. Two to three layers of exodermis is followed by few layers of cortex. This cortex is followed by two to three layers of endodermis. The endodermis surrounds the vascular bundles which occur in many layers. The core of the t.s. of the root shows the pith with few layers of pith cells.

Discussion

The present paper investigates the detailed morphology and anatomy of the plant *Plectranthus scutellarioides* of the family Lamiaceae in Udalguri district of Assam. The morphological study of the plant helps in the identification of the species. The anatomical properties of stem, petiole and roots of *Plectranthus scutellarioides* are considered as the taxonomically significant character that also helps in identification. The stems are quadrangular and consist of well-defined groups of collenchymatous tissues occupying a broad area of the corners. The epidermis is covered by a large number of small, unicellular, glandular and non-glandular trichomes that shows a character of the family Lamiaceae (Metcalf and Chalk, 1972). By reviewing various literature, it is evident that no such works on this plant species have been reported earlier from this region of North East India. This is the first report on the examined characteristics of the species.

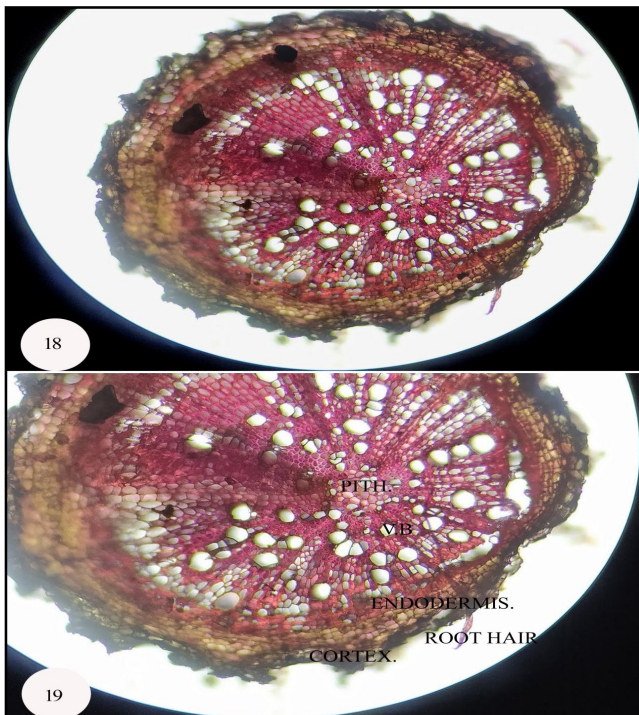


Plate V: *Plectranthus scutellarioides*. (Fig 18-19). Transverse section of roots in 10X objective.

Acknowledgement

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Links to websites

Kew World Checklist of Selected Plant Families - <http://apps.kew.org/wcsp/>.