

**Anatomical studies of *Crotalaria albida* Heyne Ex Roth.**Sangram B Sonje<sup>1</sup> and A S BhuktarDept. of Botany, Vivekanand Arts, Sardar Dalipsing Commerce and Science College, Samarth Nagar,  
Aurangabad (MS), India.<sup>1</sup>sbsonje@gmail.com**ABSTRACT**

The parts of *Crotalaria albida* Heyne ex Roth. (Fabaceae) is used in various Ayurvedic preparations. Attempts were made to standardize the specimen on the basis of dermatology, anatomy and maceration.

**Key words:** Anatomy, *Crotalaria albida*, maceration.

**INTRODUCTION**

*Crotalaria* is an economically and medicinally important genus of the family Fabaceae (Leguminosae). Most of them are source of alkaloids, paper pulp and fibers, ornamentals, green manure (Ansari, 2008) etc. Most of the species have been widely tried as green manure and cover plants on experimental stations and larger estates but none seem to have entered into general farming practice (Polhill, 1982). On the whole, the genus provides a wide range of species suitable for different conditions and purposes, vigorous early growth, good nodulation, reasonable pest resistance and seed set. *C. albida* Heyne ex Roth. is used for medicinal purpose (human as well veterinary) from a sample site Andhra Pradesh, India (Shankar, 2002). It is recorded as treatment for warts, especially on the sole of the foot and a juice obtained from the roots is given for indigestion in Nepal (Manandhar & Manandhar, 2002). Disadvantages include potential toxicity to livestock rank growth and liability to persist as weed unless ploughed in early.

Morphologically the species can be identified by following diagnostic characters: erect or procumbent, silky pubescent herbs or undershrubs, leaves oblongolate, silky pubescent with yellow glands beneath. Flowers in terminal racemes; bracts and bracteoles linear, corolla yellow, pods sessile, glabrous, 10-25 seeded.

Anatomical standardization also helps taxonomically exact demarcation of the species.

**MATERIALS AND METHODS**

During present investigation the specimens of *C. albida* Heyne ex Roth were collected from various localities of Marathwada region and their morphological, dermatological, anatomical and maceration characters were studied. For dermatological studies i.e. trichomes and stomata, peeling method was used. Free hand sections of the stem and root were taken for anatomical studies, double stained and mounted permanently by following standard methods (Esau, 1965), and observed under microscope. Samples of stem were macerated with Jeffery's Macerating Fluid (Khandelwal, 1991) and dimensions of the cells were measured and microphotographs were taken.

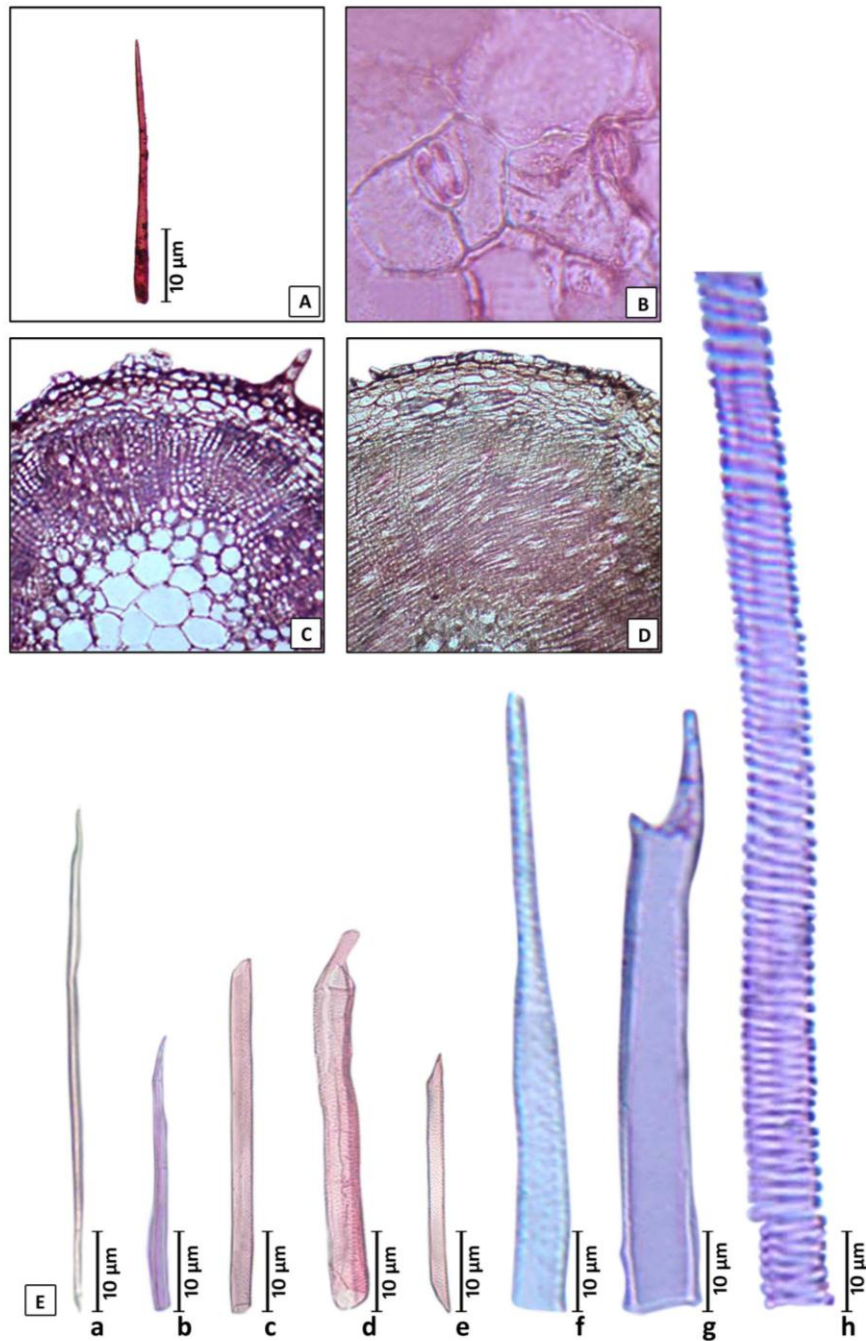
**RESULTS AND DISCUSSION****Dermatology:**

**Trichomes:** Leaves and stem shows presence of non-glandular, uniseriate and unicellular trichomes and average length of trichomes is 350-1000  $\mu$ . Trichomes occur on abaxial and adaxial surface of leaf, petiole, sepals and stem. (Plate-A)

**Stomata:** The stomata is anisocytic, amphistomatic, average size of stomatal pore ca. 10-17.5  $\times$  2.5-5  $\mu$ , average size of guard cells ca. 22.5-25  $\times$  2.5-5  $\mu$  which is surrounded by 3 unequal subsidiary cells which are irregular in shape and straight in outline. (Plate-B)

**Stomatal Number and Stomatal Index:** Stomatal number for upper epidermis in average **12** and range **7-19**. Stomatal index for upper epidermis in average 20.4 and range 17.8-23.4.

*Crotalaria albida* Heyne Ex Roth.



A. Trichome, B. Stomata, C. Anatomy of Stem, D. Anatomy of Root, E. Macerated elements (a-h)

Stomatal number for lower epidermis in average 18 and range 13-24. Stomatal index for lower epidermis in average 29.7 and range 26.5-34.7 (Sonje & Bhuktar, 2013).

**Anatomy of root:** The transverse section of root of *C. albida* Heyne ex Roth reveals that the epiblema is the outermost layer which is composed of 2 - 3

layers, irregular, interrupted at certain distances. Cells are squarish, rectangular or irregular which measures 20-30 x 30-50µ. Epiblema is followed by Cortex which is composed of 5-7 layers of parenchymatous cells which are medium, somewhat oval, and irregular and measures 15-30 x 30-60 µ.

Endodermis is continuous circular ring of single layer barrel shaped, compactly arranged and have casperian thickening on the radial walls. Pericycle is single layer composed of thin walled parenchyma cells which measures 10-20 x 15-30  $\mu$ .

Vascular bundles are conjoint, collateral, open and radially arranged. The xylem and phloem are separate and occur at alternate radii. Phloem composed 6-8 layers of oval and somewhat rectangular cells. It measures 10-15 x 15-25  $\mu$ . In xylem vessels are single or in patches of 1-4, circular or oval in shape which measures 15-25 x 40-60  $\mu$  in diameter. Protoxylem and metaxylem vessels occur towards the periphery and centre respectively, i.e. exarch xylem and arrangement is polyarch. Vessels are surrounded by fibers, Ray parenchyma uniseriate, bi or multiseriate and rest of the space is filled by parenchyma. At the center some cells are impregnated with black and brown impregnations and thick walled treacherly element are arranged like small pith. (Plate-C)

**Anatomy of Stem:** Transverse section of *C. albida* Heyne ex Roth stem reveals circular in outline with an outer layer is cuticularised epidermis which is compactly arranged single row of medium sized squarish, rectangular cells and some cells provide unicellular, uniseriate non glandular trichomes. Epidermal cells measures 8-15 x 15-30  $\mu$ . Epidermis followed by cortex, which constituted hypodermis with single layer of collenchymatous cells. Rest of the cortex is made up of parenchymatous cells which are 2 to 3 layers, the cells are thin walled undifferentiated medium in size, irregular in shape. It measures 8-15 x 10-20  $\mu$ . Endodermis is prominently single layered composed of tangentially elongated cells which measures 10-15 x 20-35  $\mu$ . Pericycle is single layered shows presence of stone cells and contains isolated strands of fibers. The cells are tangentially elongated, oblong and it measures 10-15 x 15-25  $\mu$ .

Vascular bundles are conjoint, collateral, open and radially arranged with an endarch xylem. In the vascular bundle phloem is 4-6 layered, the cells are rectangular, tangentially elongated, and it measures 10-15 x 15-20  $\mu$ . In the xylem vessels are

single or rarely two in patches, the smaller one constituting protoxylem lie towards center and bigger one constituting the metaxylem lie away from the center with thick lignified wall and it measures about 15-30 x 20-45  $\mu$ . Fibers thick walled radially arranged. Radial rays are uniseriate. Below the xylem 2-3 layers of thin walled impregnated parenchymatous cells are present, it is compactly arranged, tangentially elongated or polygonal. In the centre, pith is large, occupying central part of the stem. It is composed of compactly arranged parenchymatous cells, cells measures 30-70 x 35-85  $\mu$ . (Plate-D)

**Maceration:** The maceration of the plant showed as:

**Fibers:-**Fibers are of three types:

a) Simple fibers, short to long, slender, tapering and sharply pointed at both ends, rarely forked or branched at one end, outline entire and average size ca 220-900 x 5-20  $\mu$ .

b) Septate fibers very long, tapering and sharply pointed, outline irregular and average size ca 350-900 x 10-20  $\mu$ .

c) Pitted fibers long, tapering and pointed at both end, outline entire and average size ca 350-900 x 5-15  $\mu$ . (Plate-E)

**Tracheid :-** Tracheids slender, ends blunt or pointed at one or both, simple pits, pits numerous, elongate, in one-many rows, alternate and average size ca 250 - 500 x 5-20  $\mu$ . (Plate-F)

**Vessel:-**Vessel elements are of two types:

a) Vessel elements long, spiral and average size ca 250-1100 x 10-25  $\mu$ .

b) Vessel elements long, slender, beaked at one or both ends, end walls oblique, perforation simple, lateral wall simple pitted, pits alternate, circular or oval and average size ca 200-500 x 25-50  $\mu$  (Sonje & Bhuktar, 2013).(Plate-G)

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