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Research Paper

ANATOMICAL STUDIES OF *Crotalaria juncea* L.

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Abstract

The parts of *Crotalaria juncea* L. (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 juncea*, maceration.

INTRODUCTION

Crotalaria is an economically and medicinally important genus of the family fabaceae (Leguminoseae). 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. juncea is basically used as green manure. Fiber has greater tensile strength and is more durable under exposure than jute and used in manufacture of twine and cord, marine cordage, fishing nets, matting, sacking, rope soles for shoes and sandals, etc. In many parts of India the twine and cord is used for netting cot. Species is locally used for medicinal purpose i.e. used to cure tuberculosis (Tirkey, Amia, 2006).

Morphologically the species can be identified by following diagnostic characters: erect, simple or branched, appressed hairy, annual herb, stem conspicuously striated, leaves oblonceolate to linear,stipules linear. Flowers in terminal recemes, lax; bracts and bracteoles linear, corolla golden yellow, pods cylindric, brown silky or velvety, 10-15 seeded.

Anatomical standardization also helps taxonomically exact demarcation of the species.

MATERIAL AND METHODS

During present investigation the specimen of *Crotalaria juncea* 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, for anatomical studies free hand

sections of the stem and root were taken, double stained and mounted permanently by following standard methods (Esau, 1965), and observed under microscope. Samples of stem were macerated with Jeffery's Macereting Fluid (Khandelwal, 1991) and dimensions of the cells were measured and microphotographs were taken.

RESULTS AND DISCUSSIONS

Dermatology:

Trichomes: Leaves and stem shows presence of non-glandular, uniseriate and unicellular trichome and average length of trichome is 150-800 µ. 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. 10-12.5 × 2-2.5 µ, average size of guard cells ca. 20-25 × 2.5-5 µ which is surrounded by 3 unequal subsidiary cells which are irregular in shape; straight and curved in outline.(Plate-B)

Stomatal Number and Stomatal Index: Stomatal number for upper epidermis in average 13 and range 9-21.Stomatal index for upper epidermis in average 20.9 and range 17.6-22.4. Stomatal number for lower epidermis in average 19 and range 14-26. Stomatal index for lower epidermis in average 25.6 and range 19.8-28.2. (Dinakaran, S. K., *et. al.,* 2011)

Anatomy of root: The transverse section of root of C.*juncea* shows that the epiblema is the outermost layer which is composed of 2-3 layers, irregular, interrupted at certain distances. Cells are rectangular or irregular which measures 15-20 x 20-25µ. Epiblema is followed by Cortex which is composed of 5-8 layers of parenchymatous cells which are medium, somewhat rectangular, oval, irregular which measures 30-35 x 40-45 µ. Endodermis is continuous circular ring of single layer barrel shaped, compactly arranged and have casperian thickening on the radial walls which measures 10-15 x 15-25 µ. Pericycle is single layered, not prominent composed of thin walled parenchyma.

Vascular bundles are radially arranged. Phloem composed 5-7 layers of oval and somewhat rectangular smaller and compactly arranged. It measures 10-15 x 12-25 µ. In xylem, vessels are single or in patches of 2-3, circular or oval in shape which measures 30-50 x 50-70 µ 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 uni, bi or triseriate prominent and radially elongated. Large part of root occupy by vascular bundle. Rest of the space is filled by parenchyma at the center some cells are impregnated with black and brown impregnations and pith is absent. (Plate-D)

Anatomy of Stem: Transverse section of *C. juncea* stem shows wavy in outline with an outer layer is cuticualarised 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 8-12 x10-20 µ. Epidermis followed by cortex, which constituted hypodermis with single layer of collenchymatous cells, and also patches of sclerenchymatous cells at the grooved. Rest of the cortex is made up of parenchymatous cells which are 5-7 layers, the cells are thin walled undifferentiated medium in size, irregular in shape. It measures 10-15 x 10-25 µ. Cortical vascular bundles are present.

Endodermis is prominently single layered composed of tangentially elongated irregular cells which measures 10 - 15 x 20-35 µ. Pericycle is single layered shows

presence of stone cells and contains isolated strands of fibers. The cells are tangentially elongated, squarish, and oval thick walled; it measures 10-15 x 12-25 µ.

In the vascular bundle phloem is 3-5 layered, the cells are rectangular, tangentially elongated, and it measures 10-15 x 15-25 µ. In the xylem, vessels are mostly single or rarely group of 2-3, 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 20- 40 x 20-50 µ. Fibers thick walled radially arranged. Radial rays are uni, biseriate. 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 30-80 x 40-150 µ. (Plate -C)

Maceration: The maceration of the plant showed as:

Fibers :-Simple fibers, short to long, slender,tapering and sharply pointed, rarely branched at one end, outline entire or irregular and average size ca.240-830x 10-15 µ.(Plate-E-a)

Tracheid :- Tracheids slender, ends blunt or pointed at one or both, pits many elongate, in one-many rows, alternate, average size ca. 270-560 x 15-30 µ.(Plate-E-b)

Vessel :-Vessel elements are of two types:

a) Vessel elements long, spiral, average size ca 250-1220 x 10-20 µ.(Plate-E-c)

b) Vessel elements long, slender, beaked at one or both ends, end walls oblique, perforation simple, lateral wall simple pitted, alternate, circular or oval, average size ca 180-550 x 20-50 µ.(Plate-E-d) (Sonje and Bhuktar, 2013)

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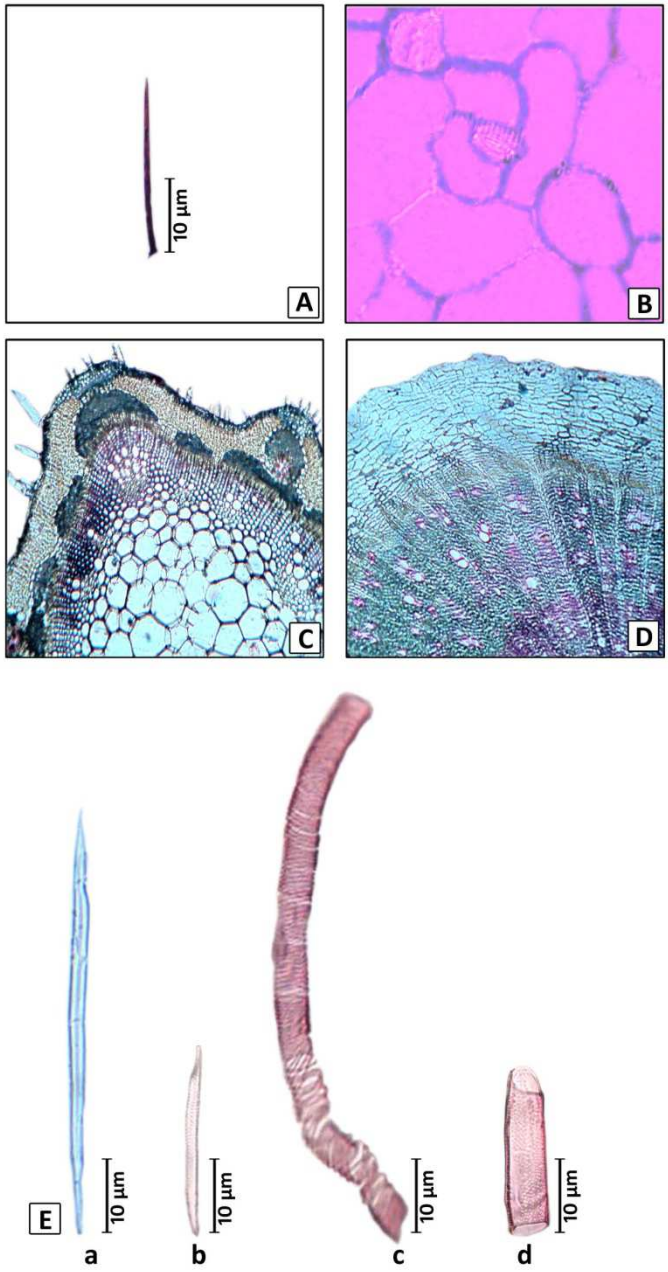
***Crotalaria juncea* L.**



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