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Anatomical features and histological studies on *Cressa cretica* Linn.

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Abstract

The major diagnostic characters and histological studies on the leaf, root and stem of *Cressa cretica L.* has been reported in this paper. Literature survey showed the absence of any systematic authentication of this plant.

Introduction

Plants have been used as medicine due to the presence of various secondary metabolites for millenia. Traditional medicine, a summation of several thousands of years of human experience, plays a crucial role in the selection of plants and other natural products for preventive and curative purposes in health care. These medicinal plants used as sources of extracts of pure products for therapeutic use. Pure substances or purified and standardised extracts permit better analytical characterisation and also the quality. Efficacy and safety are the two major factors of modern drugs whether natural or synthetic must comply. To fulfill this quality and standard, authenticated medicinal plant are to be utilised for the preparation of extracts or for extraction of pure compounds.

The authentication of species by preparation of herbarium photograph as well as histological analysis is the prerequisite to exploit the valuable products of medicinal importance. The experimental material used in this

study is *Cressa cretica L.* The herbarium specimen is as that of microfiche number IDC 111.7 in the Linnean herbarium. The photograph of this plant is given in Fig. 1. The histological way of authentication is furnished along with the habitat and geographical distribution. The salient anatomical features of this species is identified to select the correct species of plant for preparation of solvent extracts and isolation of biomolecules.

Previous treatments of the genus '*Cressa*' have ranged from splitting it into 19 species or lumping all the variation into *C.'cretica'* L. Morphological study reveals that there are four species, two in America and two in the old world. The American species are *C. truxillensis* Humb Bonpl and Kunth and *C. nudicaulis* Grioseb. Africa and Eurasia have *C. cretica*. Australia and Timor have *C. australis* R. Br. although since 1860s it has largely been misidentified and reported as *C. cretica*. Differences occur in several organs, but leaf shapes are distinctive in two species. *C. nudicaulis* has scale like leaves, while *C. cretica* leaves are usually lanceolate. Peduncle length, stamen length and filament pubescence distinguish *C.truxillensis* from *C. australis*.

The experimental material *Cressa cretica* L. belongs to the scientific family *Convolvulaceae*.

Regional Names :	Hindi and Bengali	-	Rudravanti
	Sanskrit	-	Rudanti
	Telugu	-	Uppusanaga
	Tamil	-	Uppu Marikkozhundu

Habitat

This species are distributed in the tropical seashore.

Materials And Methods For Anatomical Studies

Collection of specimens

The specimen was collected from the marshy saline soil near seashore of Tarangapadi, Nagapattinam district in the month of May. During collection care was taken to select healthy plants with normal organs. The required samples of different organs were cut and removed from the plant and fixed in FAA (Formalin – 5 ml + Acetic acid – 5 ml + 70 per cent Ethyl alcohol – 90 ml). After 24 hrs of fixation, the specimens were dehydrated with graded series of tertiary butyl alcohol (TBA) as per the schedule given by Sass (1940). Infiltration of the specimens was carried out by gradual addition of paraffin wax (melting point 58 - 60°C) until TBA solution attained super saturation. The specimens were cast into paraffin blocks.

Sectioning

The paraffin embedded specimens were sectioned with the help of Rotary

Microtome. The thickness of the sections was 10 – 12 µm. Dewaxing of the sections was by customery procedure (Johanson, 1940). The sections were stained with toluidine blue as per the method published by O'Brien et al. (1964). Since toluidine blue is a polychromatic stain, the staining results were remarkably good, and some cytochemical reactions were also obtained. The dye rendered pink colour to the cellulose walls, blue to the lignified cells, dark green to suberin, violet to the mucilage and blue to the protein bodies. Where ever necessary sections were also stained with safranin and fast green, KI (for starch).

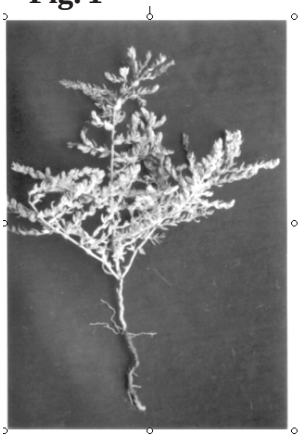
For studying the stomatal morphology, venatin pattern and trichrome distribution, paradermal sections (sections taken parallel to the surface of leaf), as well as clearing of leaf with five per cent sodium hydroxide or epidermal peeling by partial maceration employing Jeffrey's maceration fluid (Sass, 1940) were prepared. Glycerine mounted temporary preparations were made for macerated / cleared materials.

Photomicrographs

Microscopic descriptions of tissues were supplemented with micrographs wherever necessary. Photographs of different magnifications were taken with Nikon Labphot 2 microscopic unit. For normal observation bright field was used. For the study of crystals, starch grains and lignified cells, polarized light was employed. Since these structures have birefringent property, under polarized light they appear bright against dark background. Magnifications of the figures are indicated by the scale-bars.

Descriptive terms of the anatomical features are given in the standard anatomy book (Esau, 1964).

Fig. 1



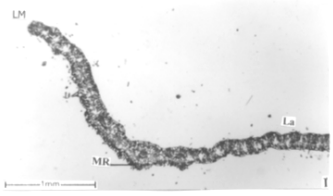


Fig. 2.1

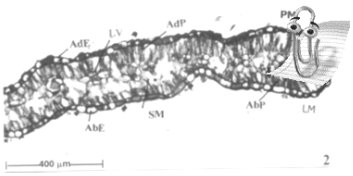


Fig. 2.2

Fig. 1.

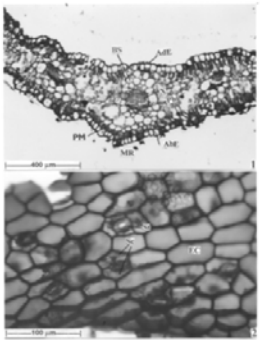
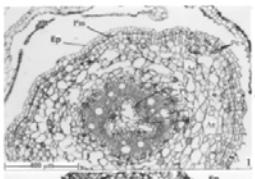
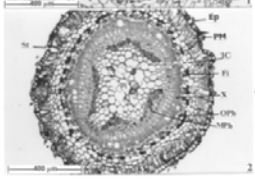


Fig. 3.1

Fig.3.2



4.1



4.2

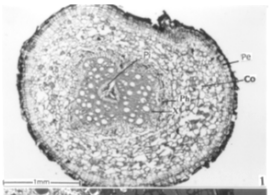


Fig. 5.1

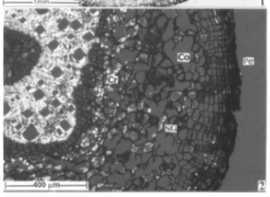


Fig. 5.2

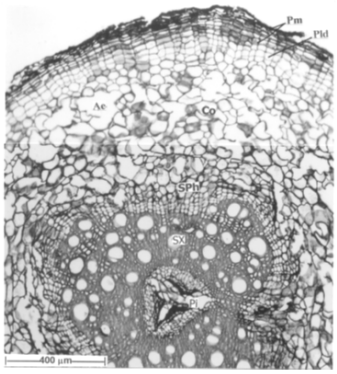


Fig. 6.

External Features of the Plant (Fig. 1)

The plant is an erect herb, growing 15 – 30 cm in height. The leaves are alternate and closely spiral, lamina is ovate. Flowers in clusters in the axils of upper leaves. Calyx five unequal lobes. Corolla white, companulate. Ovary bilocular, two ovules in each locule. Seeds glabrous.

Histological characterisation

Leaf

The leaf is thin with undulated surfaces. The midrib and lateral veins are not prominantly projecting beyond the epidermal level (Fig. 2.1). The lamina is 200 – 250 µm thick. The leaf margin is blunt and semi circular (Fig. 2.2). The adaxial epidermis is distinct consisting of circular, thick walled cells. The abaxial epidermis is similar to adaxial layers but the epidermis has shallow cavities (Fig. 2.2).

Midrib (Fig. 3.1)

The midrib is 450 µm thick in vertical plane. It is not much distinct from the lamina. The ground tissue consists of a narrow band of palisade cells which runs across the abaxial side of the midrib, just inner to the epidermis. A single top shaped fairly large, collateral vascular bundle occurs in the centre of the midrib. It consists of a few

parallel rows of narrow xylem elements and a narrow band of phloem.

Stem

The young stem (axis of the lateral branch) is circular in cross sectional outline. It is 1 mm in diameter. It consists of a distinct undulate epidermal layer, the epidermal cells are squarish, stomata are frequent on the epidermis (Fig. 4.2). The cortex is fairly wide and consists of an outer zone of palisade cells measuring 50 µm in width and an inner zone of about 5 layers of compact parenchyma cells. The vascular cylinder is continuous and hollow. The pith is fairly wide and parenchymatous.

Root (Figs. 5 and 6)

Tap root measuring about 2.8 mm in diameter was studied (Fig. 5.1). The root has fairly wide distinct periderm, broad, aerenchymatous cortex and thick vascular cylinder. The phellem cells have thicker tangential walls while the phelloderm cells are thin walled. The vascular cylinder is dense with narrow pith.

Cell inclusions

Crystals and starch grains are fairly abundant, especially in the inner cortex (Fig. 5.2). The crystals are calcium oxalate and they are diffuse in distribution. Starch grains are more abundant in the cortical cells.

The histological studies of this species revealed that the following features are identified as anatomical markers for authentication of this species.

- The leaf has undulate epidermal layers, thin lamina and less distinct midrib.
- The mesophyll tissue is differentiated into slightly wider adaxial zone of palisade cells, narrow abaxial palisade zone and spongy parenchyma in between.
- The epidermal cells are wide and form prominent stomatiferous layers, the stomata are paracytic, the epidermal cells have thick straight anticlinal walls.
- The mid rib slightly projects abaxially and has abaxial narrow zone of pallisade cells, parenchymatous ground tissue and single to p-shaped collateral vascular bundles surrounded by large hyaline sheath cells.
- Young stem has sub epidermal layers of palisade cells compact parenchymatous cortex, thick hollow cylinder of phloem and xylem and tangential bands of medullary phloem.
- Old stem has well defined bent narrow periderms aerenchymatous cortex and thick continuous vascular cylinder with medullary phloem.
- Root has thick periderm comprising of phellem and phelloderm. Wide aerenchymatous cortex, thick and dense vascular cylinder with narrow parenchymatous pith. Calcium oxalate crystals and starch grains

are fairly abundant in the cortical cells of the root.

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