

RESEARCH ARTICLE

**PHARMACOGNOSTICAL EVALUATION
OF *CROTON ROXBURGHII* BALAK (EUPHORBIACEAE) ROOT**

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ABSTRACT

Traditional medicinal practitioners use roots of *Croton roxburghii* Balak. (Euphorbiaceae) for the treatment of snake bite, swellings, digestive disorders etc. However, no conclusive pharmacognostical study of *Croton roxburghii* Balak. root has been studied yet for its pharmacognostical characters. In the present paper, the detailed morphological and microscopical characters have been studied following standard parameters. Chief diagnostic characters are presence of tylosis, false annual ring, laticiferous vessels, cluster crystals of calcium oxalate etc. The observed data could be used to standardize the plant.

Keywords: *Croton roxburghii* Balak., morphological and microscopical characters pharmacognostical characters, root.

INTRODUCTION

Croton roxburghii Balak. (Euphorbiaceae) is a medium size deciduous tree, having greenish colored crenate or serrate big leaves; pale yellowish green inflorescence and grayish brown colored hard bark. It is found almost all over India [1-7]. Roots are traditionally used against snakebite, to avoid conception and terminate pregnancy, to cause vomiting and clean the stomach, in chest and stomach pain, digestive disorders, swellings etc [7-11]. Previously we have reported DNA RAPD study [12], pharmacognostical evaluation of stem bark [13] and antimicrobial study of methanol extract regarding stem bark, root and leaves of the plant *Croton roxburghii* Balak. [14-16]. Detailed macroscopic and microscopic characters of the root are not documented up till now. Hence, it was thought worth to study the root of the plant for its detailed pharmacognostical evaluation.

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MATERIALS AND METHODS

Collection and authentication

The plant growing in Gandhamardana hill ranges, Balangir of Odisha in India, was collected with the help of local traditional healers and was identified as *Croton roxburghii* Balak. (Euphorbiaceae) by studying the morphological characters of plant parts and comparing them with various characters mentioned in various floras [1-6]. The roots were collected, shaken to remove adherent soil, dirt etc. and washed with water and herbarium specimen was prepared (Herbarium No. 6047) and was stored in Pharmacognosy department, of the institute for future reference. The roots were separated, washed with running fresh water and few pieces of root were stored in solution of AAF (70% Ethyl alcohol: Glacial acetic acid: Formalin) in the ratio of (90:5:5) to utilize them for microscopic studies whenever needed [17]. The remaining parts were dried under the shade and then were subjected for 60# powdering.

Pharmacognostical studies

Morphological characters were studied by observing the root as such and also with the help of the dissecting microscope. For detailed microscopical observation, thin transverse sections were taken and cleared with chloral hydrate and observed as such for the presence of any crystals, then were stained with Phloroglucinol and Hydrochloric acid to notice the lignified element like fibres, vessels and other parts. Photographs of the sections were also taken with the help of canon Ixus 130 camera. The sections were stained with various reagents like Iodine for starch grains, Sudan - III for fixed oil etc [18].

RESULTS

Macroscopic characters

Root is cylindrical and tortuous in shape, varying in length, 5 to 15 cm in diameter, may reach more in very old species also. Surface is rough, longitudinally irregularly ridged and furrowed, at many places transversely cracked, exposing the inner yellow wood, at places shows transverse lenticels and lateral branches or the scar left. Fracture is fibrous in the bark and splintery in the wood. Fractured surface shows wide central wood encircled by outer narrow bark. Odour - characteristic; taste - astringent and slightly bitter.

Microscopic characters

Diagrammatic T.S. of the root is irregularly circular in the outline with sinuously running margin of the cork; shows central wide lignified zone of the xylem, occupying $2/3^{rd}$ the area of the section, encircled by parenchymatous phloem and the cortex, traversed with fibres, pigment, tannin, laticiferous vessels and cluster crystals of calcium oxalate.

Detailed TS of the dried matured root shows outer well developed stratified cork consisting of alternate band is compressed of 6 to 8 rows of squarish to rectangular, tangentially running wide lumened cells while the later band is mostly occupied by lignified narrow cells embedded with thick walled spherical stone cells, the cells lying under the elevated ridges usually being occupied by many more rows of cells.

Cortex lying underneath this is a wider zone, consisting of 15 to 20 rows of tangentially running parenchymatous cells. Isolated and rows of tannin cells running vertically and tangentially, pigment cells, fibres, cluster and rosette crystals of calcium oxalate also traversed throughout this cortex and phloem regions. Pigment cells are similar in size, shape and colour with those of tannin cells but they contain dark orange colour and do not take stain with iodine like tannin cells. Laticiferous cells and vessels are circular to oval in shape, embedded with granular yellowish contents and becoming dark yellow in colour after staining with iodine. Rosette and cluster crystals containing cells occasionally are different in size and shape and may be designated as idioblasts; fibres are small usually in groups and are lignified; they being plenty and in bigger sized groups towards the peripheral region of the phloem. Phloem tissue consists of parenchyma, sieve tissue, uni to multiseriate medullary rays and fibres, their distribution and nature being just like that of cortical fibres but usually they are few in number.

Central xylem tissue consists of isolated or small groups of vessels, occasionally arranged in radial rows and associated with tracheids, parenchyma and thin walled fibres, at places they show tylosis studded with tannin. Medullary rays are uni to multiseriate, almost running parallel to each other, occasionally the parenchyma run in tangential rows giving an appearance of the false annual rings. (Photo plate – 1)

Powder characters

Root powder is having creamish white colour, characteristic odour; and astringent and slightly bitter taste. The diagnostic characters of powder are: (Photo plate - 2)

- Cork cells in surface view (Fig 3.1.4 f)
- Fragments of fibres, isolated and in groups (Fig 3.1.4 a, b)
- Fragments of xylem fibres in surface view (Fig 3.1.4 e)
- Cork cells in section view (Fig 3.1.4 h)
- Parenchymatous cells with tannin cell (Fig 3.1.4 g)
- Abundant cluster and rosette crystals of calcium oxalate scattered as such throughout (Fig 3.1.4 i, k)
- Fragments of longitudinally cut border pitted vessel and trachied (Fig 3.1.4 c, d)
- Fragments of spiral vessels (Fig 3.1.4 j)

DISCUSSION

The root shows presence of well developed stratified cork embedded with thick walled spherical stone cells at places; cortex embedded with tannin cells, pigment cells, fibres and cluster and rosette crystals of calcium oxalate, laticiferous cells and tylosis; medullary rays are uni to multiseriate, almost running parallel to each other, occasionally the parenchyma run in tangential rows giving an appearance of the false annual ring. The results are being reported for the first time, could be useful in the identification and standardization of *Croton roxburghii* Balak. (Euphorbiaceae) root. The data produced in the present investigation is also helpful in the preparation of the crude drug's monograph and inclusion in various pharmacopoeias.

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Photo plate - 1
T.S. of *Croton roxburghii* Balak. root



Fig - 1a

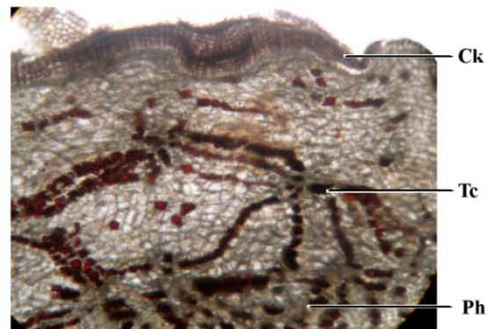


Fig - 1b

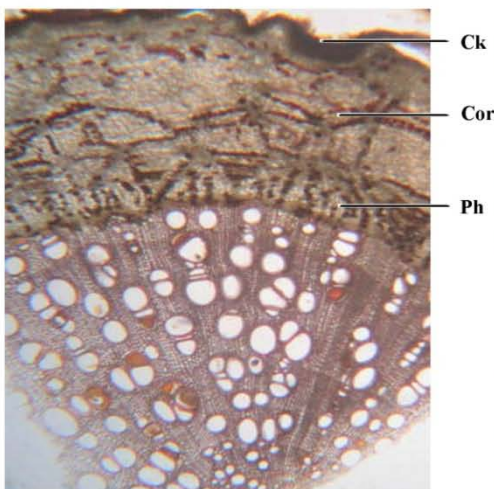


Fig - 1c

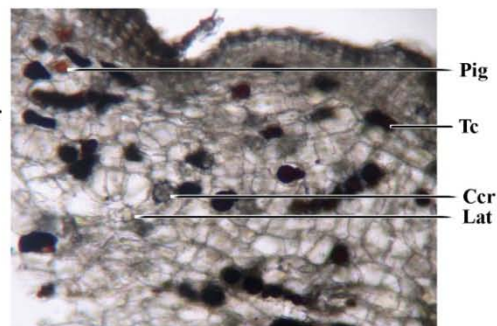


Fig - 1d

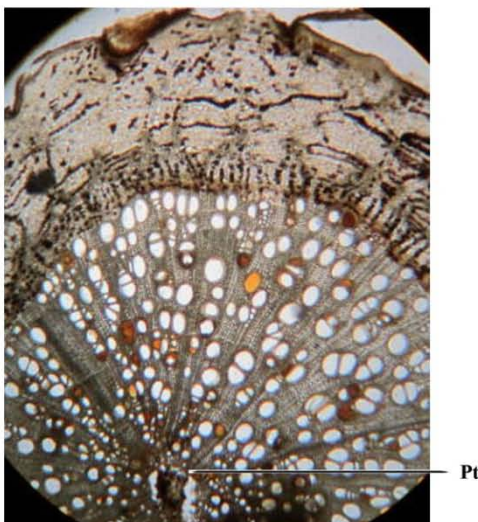


Fig - 1f

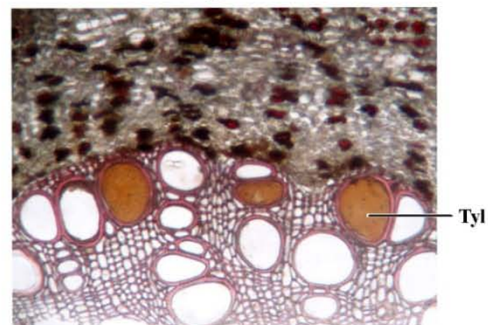


Fig - 1e

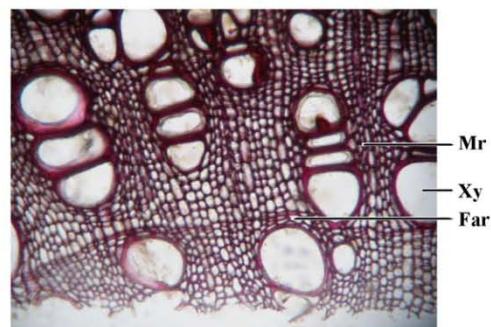


Fig - 1g

Ccr-Cluster crystal, Ck-Cork, Cor-Cortex, Far-False annual ring, Lat-Laticiferous cell, Mr-Medullary rays, Ph-Phloem, Pig-Pigment cell, Pt-Pith, Tc-Tannin cell, Tyl-Tylosis, Xy-Xylem Vessel

Photo plate - 2
Powder characters of *Croton roxburghii* Balak. root



Fig - 2a



Fig - 2b



Fig - 2c



Fig - 2d

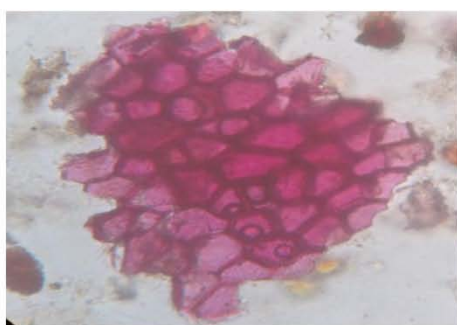


Fig - 2e

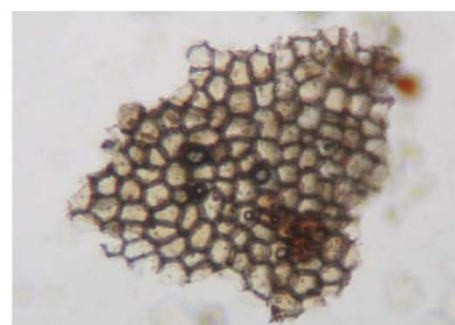


Fig - 2f



Fig - 2g

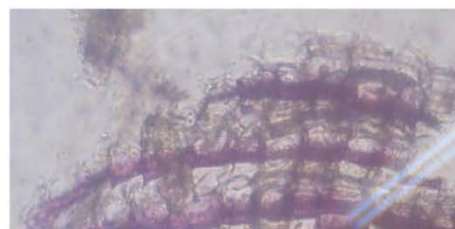


Fig - 2h

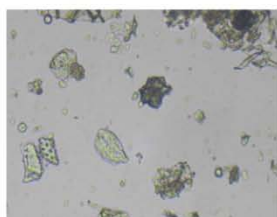


Fig - 2i



Fig - 2j

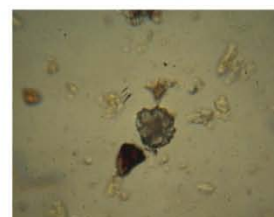


Fig - 2k

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