

## PHARMACOGNOSTICAL EVALUATION OF *Croton roxburghii* Balak. (EUPHORBIACEAE) BARK

Patel Esha<sup>1\*</sup>, Padiya RH<sup>2</sup>, Acharya RN<sup>3</sup>, Chauhan MG<sup>4</sup>

1. Ph.D. Scholar, Dept. of Dravyaguna, I.P.G.T. & R.A., Gujarat Ayurved University, Jamnagar, Gujarat, India.
2. Ph.D. Scholar, Dept. of Dravyaguna, I.P.G.T. & R.A., Gujarat Ayurved University, Jamnagar, Gujarat, India.
3. Associate Professor, Dept. of Dravyaguna, I.P.G.T. & R.A., Gujarat Ayurved University, Jamnagar, Gujarat, India.
4. Visiting Professor, PGT-SFC-CELL, I.P.G.T. & R.A., Gujarat Ayurved University, Jamnagar, Gujarat, India.

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### Abstract

*Croton roxburghii* Balak. (Euphorbiaceae), a well known plant in traditional systems of medicine is used for snake bite and bites of poisonous insects and other arthropods. The plant is not investigated for its pharmacognostical characters still yet. Considering the importance of the quality control and assurance of *Croton roxburghii* Balak., stem bark was studied for its pharmacognostical characters including powder microscopy, following standard parameters. The present paper reveals detailed morphological and microscopical characters and powder microscopy of the bark. Cluster and rosette crystals of calcium oxalate embedded in the parenchymatous cells of cortex and phloem, plenty of different types of fibre are the diagnostic characters of the stem bark.

**Key words:** *Croton roxburghii* Balak., Pharmacognostical characters, powder microscopy, snake bite.

### \*Address for correspondence:

Esha D. Patel  
Ph.D. Scholar, Dept. of Dravyaguna,  
I.P.G.T. & R.A., Gujarat Ayurved University,  
Jamnagar, Gujarat, India – 361 008.  
E-mail: [esha.ayupharma@gmail.com](mailto:esha.ayupharma@gmail.com)

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## INTRODUCTION

The tribal people of India have knowledge of therapeutic properties of various plant drugs. In Indian systems of medicine, various plant parts are used as a source drug to combat different disease conditions. Due to similarity morphologically, it is not easy to identify the adulterant in bark drugs. 'Devanashan', a plant used by tribal people of Odisha in various diseases,<sup>[1][2][3][4][5]</sup> is correlated with classical drug 'Nagadanti' and is botanically identified as *Croton roxburghii* Balak. (Euphorbiaceae).<sup>[2][3][4][6][7]</sup> Its stem bark is claimed to be useful in snake bite, pain and inflammation, rheumatic pain, jaundice, indigestion, stomach trouble, liver disorders; as anti cancer, anti poisonous, cardio tonic, purgative etc.<sup>[1][2][4][5][6]</sup>

The plant is a medium sized deciduous tree. Leaves are greenish in color, crenate or serrate, bark is hard and grayish brown in color.<sup>[3][4][5][6][8][9][10]</sup> Survey of the literature did not show any such investigation carried out yet on this drug. Hence, this plant was selected for detailed morphological and microscopical evaluations of the bark for its correct identity.

## MATERIALS AND METHODS

### Collection and authentication

*Croton roxburghii* Balak. is a medium sized deciduous tree, found in Bengal, Bihar, South India, Odisha and Deccan. The plant commonly known as Devanashan,<sup>[1][2][3][4][6]</sup> growing in Gandhamardana hill ranges, Bolangir 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 various parts of the plant and comparing with the various characters mentioned in various floras.<sup>[3][8][9][11]</sup> The plant parts were collected,

shaken to remove adherent soil, dirt etc. washed with water if required. Herbarium specimen was prepared (Herbarium No. 6047) and was stored in Pharmacognosy department, of the institute for future reference. The bark were separated, washed with running fresh water and few pieces of bark 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.<sup>[12]</sup> The remaining parts were dried under the shade and then were subjected for #60 powdering.

### Pharmacognostic studies

Morphological characters were studied by observing the bark as such and also with the help of the dissecting microscope. For showing the arrangements of tissues of the whole section of the bark was taken and cleared with chloral hydrate. 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.<sup>[13]</sup>

## RESULTS AND DISCUSSION

### Macroscopic characters

Bark is flat, varies in size, 8-15cm × 3-7cm × 0.7-1.5cm. Outer surface rough, uneven, grayish brown in color, shows circular lenticels at places. Inner surface varies pinkish to brownish in color. Major area of surface being pinkish and the innermost is very rough, brownish irregularly longitudinally ridged. Texture hard, fracture short, shows transversely running fibrous rows at places and taste astringent. (fig. b)

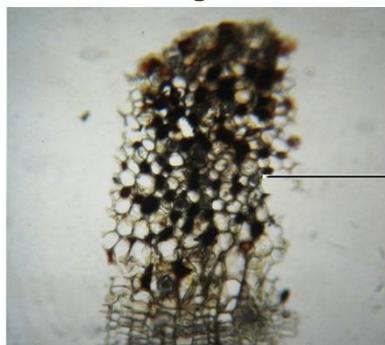
**Figure 1: Plate of *Croton roxburghii***



**Fig a**

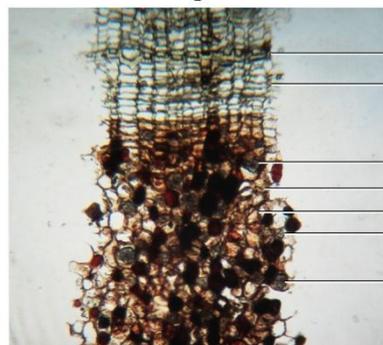


**Fig b**



**Rh**

**Fig c**



**St**

**Ck**

**Rst**

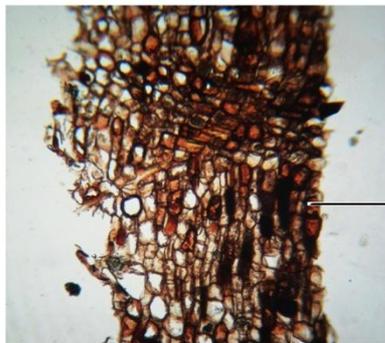
**Sg**

**Cor**

**Prc**

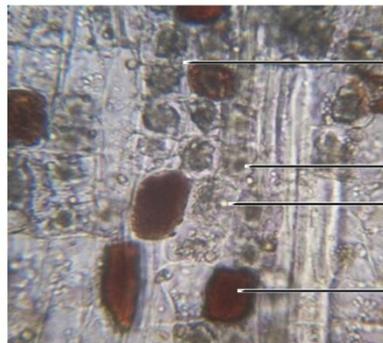
**Ccr**

**Fig d**



**Par**

**Fig e**



**Mr**

**Rst**

**Sg**

**Pig**

**Fig f**



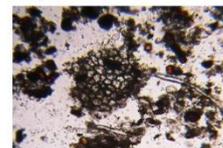
**Fig g**



**Fig h**



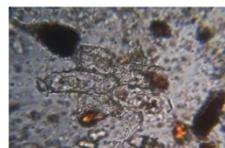
**Fig i**



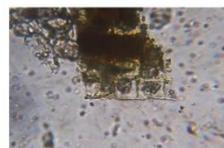
**Fig j**



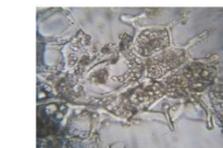
**Fig k**



**Fig l**



**Fig m**



**Fig n**

Fig a : Plant in natural habitat, Fig b : Pieces of bark in dry condition, Fig c-f : Various parts of TS in enlarged view, Fig g-n : Powder characters of bark in enlarged view

Ccr-Cluster crystal, Ck-Cork, Cor-Cortex, Mr-Medullary rays, Par-Parenchymatous cells, Pig-Pigmented cells, Prc-Prismatic crystal, Rc-Rosette crystal, Rh-Rhytidoma, Sg-Starch grain, St-Stone cells

### Microscopic characters

Diagrammatic T.S. shows outermost region is occupied by rhytidoma consisting of spherical elongated cells embedded with dark brown content followed by wide zone of multilayer cortex which at places lignified and thick walled.

Cork is multilayered, stratified, compressed and non-lignified. Sclereids and cluster, rosette and prismatic crystals of calcium oxalate are present in cork at places. Cortex is wide, parenchymatous, embedded with cluster, rosette, and prismatic crystals of calcium oxalate, small size starch grains and few laticiferous vessels are present at places. Cortical fibres are thick walled and dark reddish brown and are isolated. Brown coloring pigmented cells traversed throughout the section. Phloem is very wide, shows radially uni to tri seriate medullary rays filled with brown pigment. At places non-lignified to slightly lignified groups of fibres runs horizontally and associated with rows of cluster crystals of calcium oxalate. The innermost zone of the bark shows radially elongated parenchymatous cells and dark brown pigment cells. Fibres are absent from this area. (Fig. c-f)

### Powder study

The powder is pinkish brown with characteristic odour and astringent taste.

The diagnostic characters of powder are:

- Plenty of sclereids especially from the region of cortex, oval to elongated in shape.(fig k)
- Plenty of simple fibres without lumen and with lumen, septate fibre and thick walled fibre throughout the material. (fig g, h)
- The abundant prismatic crystals, cluster crystals and simple starch grains are present throughout the powder. (fig m, n)
- Fragments of pink colored pitted parenchyma in surface view. (fig l)

- Cork in surface view embedded with stone cells. (fig j)
- Part of phloem in radial view showing the medullary rays crossing the fibre, phloem parenchyma with sieve tube showing the sieve plates. (fig m, n)
- Spiral vessels. (fig i)

### CONCLUSION

The stem bark of *Croton roxburghii* Balak. (Euphorbiaceae) shows presence of cluster and rosette crystals of calcium oxalate throughout the powder and embedded in the parenchymatous cells of cortex and phloem, plenty of simple fibres without lumen and with lumen, septate fibre and thick walled fibre throughout the material can be considered as the diagnostic characters of the stem bark.

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