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Pharmacognostical standardization of roots of *Curcuma angustifolia* ROXB

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Abstract

Curcuma angustifolia (Zingiberaceae) is traditionally used in the treatment of leprosy, asthma, fever, jaundice, anaemia, ulcers etc, the leaves are used as antifungal, antibacterial. The present study highlight the pharmacognostical standardization of roots which includes macroscopy, microscopy as well as WHO recommended physico- chemical parameters. The results of this standardization may be helpful for identification and judging the quality& purity of the plant which will be useful to differentiate the plant from its other species and to detect the adulterants.

Keywords: *Curcuma angustifolia*, Roots, Pharmacognostical standardization

1. Introduction

Curcuma angustifolia is also known as East Indian Arrowroot, “Koova powder” in Malayalam and “Koova podi” in Tamilnadu. East Indian Arrow root is also used for medicinal purposes by the local herbalists¹. *Curcuma angustifolia* is one of over 80 species belonging to the genus *curcuma* and family Zingiberaceae². This species is native to the Indian subcontinent and is more commonly known as East Indian Arrowroot. The plant grows from 9-12m in height³.

Curcuma angustifolia leaves are used as antifungal, antibacterial. The rhizomes are used in bone fracture, inflammation, intestinal disease. Since, no pharmacognostical work has been carried on the roots of this plant, the present study is aimed at carrying out the pharmacognostical standardization on the roots of *Curcuma angustifolia*⁴.

2. Materials and methods

2.1 Collection

The fresh roots of *Curcuma angustifolia* Roxb, was collected from Kerela and authenticated by Prof. Jayaraman, Botanist, Director, Plant Anatomy Research Centre, Tambaram.

2.2 Macroscopic and Microscopic analysis

The macroscopic characters such as colour, odour, taste, nature were studied. For anatomical investigation, customary techniques of Rotary Microtome were followed⁵. Paraffin embedded sections of 10-12µm thick were stained with Toluidine blue⁶. Photomicrographs were taken with NIKON lab photo 2 microscopic unit. The powder analysis has been carried out according to the method of Brain and Turner⁷.

2.3 Physicochemical studies

The ash values, extractive values, loss on drying and foaming index, swelling index were performed according to the official methods prescribed in Indian pharmacopoeia and WHO Guidelines on quality control methods for medicinal plant materials^{8,9}.

2.4 Preliminary phytochemical screening

The preliminary phytochemical tests were carried out for the powdered roots according to that standard procedure described by Kokate¹⁰.

3. Results and Discussion

3.1 Macroscopy

Colour - Dark brown
 Odour - Aromatic
 Taste - Bitter

Size - Irregular
 Shape - 2-4cm
 Length - 201mm
 Width - 46mm
 Thickness - 2-45



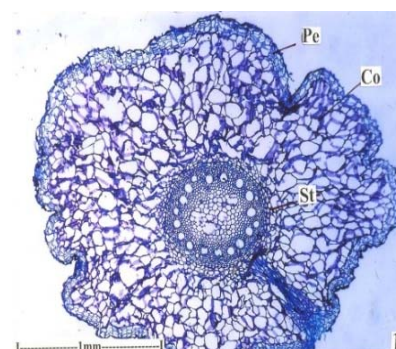
Fig 1.1 *Curcuma angustifolia*

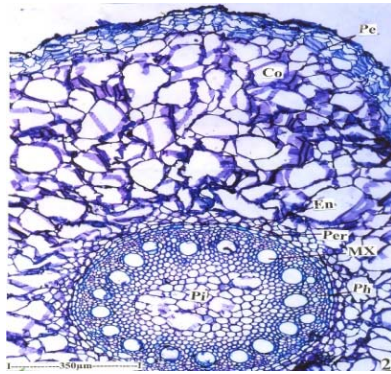


4. T.S. of Root [11-18]

The root is slightly wavy in cross sectional out line. It is 2-45mm thick. It consist of a thin periderm, wide parenchymatous cortex and a stele with radial type of vascular system. It consist of a thin periderm, wide parenchymatous cortex and a stele with radial type of vascular system (fig.1.1). The periderm is 80-100µm thick and includes about five layers tabular, thin walled, suberised cells (fig.1.2). The cortical zone is 600µm thick. It consists of wide, thin walled, variously shaped The stele is circular measuring 850µm in diameter. It is typical monocot type of stele. It consists of a thin endodermoid layer of the walled spindle shaped cells and a thin layer pericycle with the cells being similar to the endodermoid layer. (Fig1.2). The stele consists of sclerenchymatous outer zone and central core of parenchyma tissue. These are numerous exarch xylem strands alternating with small clusters of phloem. The meta xylem elements are

wide and circular thin walled and 50µm in diameter. The vascular strands are surrounded by fairly thick walled, narrow sclerenchymacells. The pith tissue is more or less presened and include wide, angular compact parenchyma cells.





1.1 T.S of Root entire view 4x 1.2 T.S of root a sector enlarged 10x

(CO- Cortex, EN- Endodermis, MX-Meta xylem, Per- Pericycle, PH-Phloem, PI-Pith, ST- Stele)

6. Powder Microscopy

Colour: Light dark brown

Odour : Aromatic

Taste : Bitter

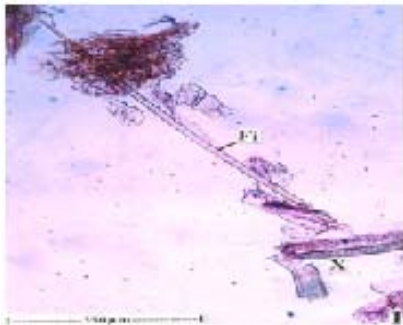


Fig 1: Xylem Fibre & Xylem Vessel Entire View 10x

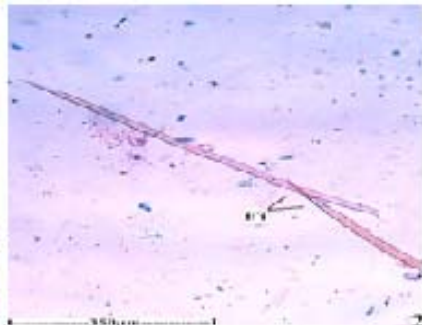


Fig 2: Xylem Fibres Entire View 10x

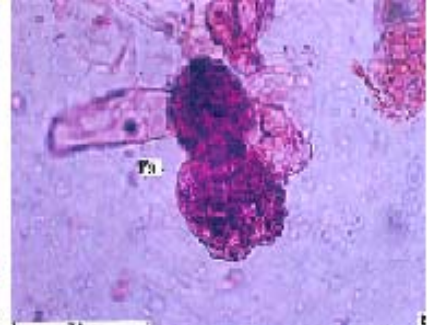


Fig 3: Isolated Parenchyma Cells in the Powder 40x (Fi- Fibre, Pa- Parenchyma)

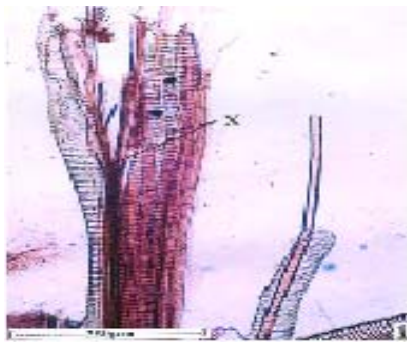


Fig.4 Xylem Fibres

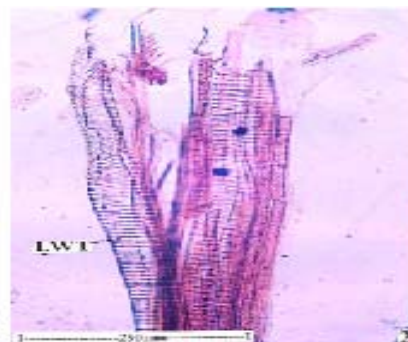


Fig 5: Xylem Vessel -16x Entire View 10x

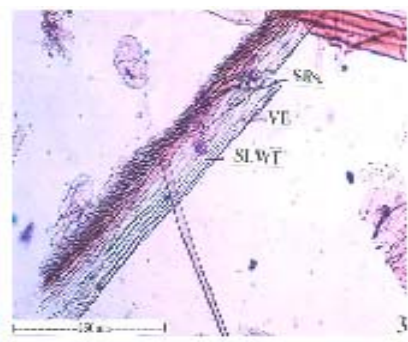


Fig.6vessel Elements – 16x

(LWX-Lateral wall thickening, SLWT –Scalariform lateral wall thickening, SPE – Scalariform perforation, VE- Vessel element, X- Xylem)

7. Physico-Chemical Parameters

Physico-chemical parameters are mainly used in judging the purity and quality of the powdered drug (Table.No.1). Ash values of a drug give an idea of the earthy matter or inorganic composition and other impurities present along with the drug. The extractive values give an idea about the chemical constituents present in the drug as well as useful in the determination of exhausted drug.

Loss on drying of the powdered drug was carried out to find out the percentage of moisture present in the drug since moisture facilitates the enzymatic hydrolysis or growth of microbes which lead to deterioration can be implied to determine the nutritive value.

Table 1: The physio- chemical constant analysis of root of *Curcuma angustifolia* Roxb

S.No	Physico Chemical Constant	Percentage (%W/W)
I	ASH VALUES	
1	Total ash	10.48±0.16
2	Water soluble ash	2.27±0.03
3	Acid insoluble ash	2.14±0.08
4	Sulphated ash	12.23±0.12
II	EXTRACTIVE VALUE	
1	Alcohol soluble extractive value	6.90±0.30
2	Water soluble extractive value	11.16±0.15
3	Non- volatile ether soluble extractive value	3.13±0.14
4	Volatile ether soluble extractive value	2.05±0.05
III	Loss on drying	14.02±0.04
IV	FOAMING INDEX	>100
v	Swelling Index	Nil

8. Preliminary Phyto – Chemical Screening

The preliminary phyto-chemical screening was carried out for the root powder and it showed be the presence of Carbohydrates, Flavanoids, Phenolic compounds, Saponins Glycosides and Tannins.

Table 2. Preliminary phytochemical screening on root of *Curcuma angustifolia* Roxb

S.	Phyto	Powd	Hexa	Chlorofo	Ethyl	Ethan
1	Carbohydr	+	—	-	+	+
2	Flavonoids	+	—	—	+	+
3	Glycosides	+	—	—	+	+
4	Alkaloid	—	—	—	—	—
5	Saponin	+	—	—	+	+
6	Phytosterol	—	—	—	—	—
7	Phenolic	+	—	+	+	—
8	Proteins	—	—	—	—	—
9	Fixed oils	—	—	—	—	—
10	Tannins	+	—	—	+	+
11	Triterpenoi	+	+	+	—	—
12	Gums and	—	—	—	—	—

+ve – indicates the presence of phytoconstituents.

-ve – indicates the absence of phytoconstituents

9. Conclusion

In the present work a medicinally useful plant in folklore claim in the Indian system of medicine, *Curcuma angustifolia* Roxb was selected. The majority of information on the identity, purity and quality of the plant can be obtained from macroscopy, microscopy and physicochemical parameters. As there is no pharmacognostical work done in the root of *Curcuma angustifolia* the present work was under taken to produce some pharmacognostical standards which can very useful in the identification of the plant in whole and fragmentary form.

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