



MICROSCOPICAL AND PHYTOCHEMICAL INVESTIGATION OF ROOT *COCOS NUCIFERA* LINN.

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ABSTRACT

In the present study, dried and powdered root of *Cocos Nucifera* linn was extracted with various solvents of increasing polarity. The present study deals with microscopical and phytochemical investigation. This root consists of wide outer and inner cortex and solid circular stele. The cortex is differentiated into outer compact parenchymatous zone. The sub epidermal part consist of two or three layers of thick walled lignified sclerenchyma cells. Stele is centrally placed in circular shape. Some of the diagnostic features of the root are presence of air chambers, metaxylum element, outer cortex, pith, phloem, partition filaments are the diagnostic features of thin root. Diagnostic features of thick root are air chambers, meta xylem element, outer cortex, secretory canal. Powder characters of the root are a bundle of xylem elements and fibres with dark inclusion, xylum elements with annular thickenings, xylems elements with spiral and scalariform thickenings. The phytochemical investigation shows positive result for Carbohydrates, Proteins, Amino acids and glycosides.

Key words : *Cocos nucifera*, Parenchymatous, Sclerenchyma

INTRODUCTION

Cocos nucifera linn belonging to the family Palmae is commonly referred to as coconut or Nariyel¹. The coconut is a functional food because it provides health benefits beyond diets nutritional content². The root is used as antibacterial agent, in treatment for urinary tract infections and also in some skin infections³. Unlike some other plants, the palm tree has neither a tap root nor root hairs, but has a fibrous root system. *Cocos nucifera* linn contains Saccharose, mynostonol, sorbitol, Polyphenols, Sucrose, Glucose⁴ and number of chemical constituents. The study towards microscopical and phytochemical investigation is very less till today. Hence we investigated the microscopical and phytochemical characters of *Cocos nucifera* linn root by following standard methods.

MATERIAL AND METHODS

Collection of specimens

Fresh samples of *Cocos nucifera* linn were collected from the area of Bidar and authenticated by Prof.B.S.Sajjan Head Dept. of Botany, B.V.Bhoomareddy college Bidar (Karnataka, India). The required samples of different organs were cut and removed from the plant and fixed in FAA (Formalin-5ml+Acetic acid-5ml+70%Ethyl alcohol-90ml). After 24 hours of fixing, the specimens were dehydrated with graded series of tertiary-Butyl alcohol⁵. Infiltration of the specimens was carried by gradual addition of paraffin was (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 thickening of the sections was 10-12micron. Dewaxing of the sections was by customary procedure⁶. The sections were stained with Toluidine blue⁷ 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, blue to proteins bodies etc. wherever necessary sections were also stained with safranin and fast-green and IKI(for starch). For studying the stomatal morphology,

venation pattern and trichome distribution, paraderml sections (sections taken parallel to the surface leaf) as well as clearing of leaf with 5% sodium hydroxide or epidermal peeling by partial maceration employing Jeffrey's maceration fluid were prepared. Glycerine mounted temporary preparations were made for macerated/cleared materials. Powdered materials of different parts were cleared with NaoH and mounted in glycerine medium after staining. Different cell component were studied and measured.

Photomicrographs

Microscopic descriptions of tissues are supplemented with micrographs wherever necessary. Photographs of different magnifications were taken with Nikon lab photo 2 microscopic unit. For normal observations 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 as given in the standard anatomy books⁸.

Phyto chemical screening method

The required sample of *Cocos nucifera* root was cut dried and powdered. The powdered material is subjected for screening by following standard screening tests.

RESULT AND DISCUSSION

Thin Root Fairly This root consists of wide outer and inner cortex and solid circular stele(Fig1.1).The cortex is differentiated into outer compact parenchymatous zone, measuring thick,inner aerenchymatous zone of epidermis of wide,thinwalled rectangular cells consists of two or three layers of thick walled lignified sclerenchymatous cells(2.1). The aerenchyma zone comprises single layer of radially stretched, wide air-chambers,seprated laterally by radial, multilayered partition filaments(Fig.1.1,2.1). Stele is centrally placed, circular and measures 700µm in diameter.It comprises a distinct layer of endodermoid layer of elliptical thick walled cells. The pericycle is two layered and the cells are rectangular thick walled lignified cells. These are about

to meta xylem elements which are wide, angular or circular, and thick walled.

Thick roots The thick roots have wider cortex and thicker stele. With more number of xylum and phloem stands (Fig.1.2,3) The thick roots have central core of parenchymatous pith. The cortex is 1.1 to 1.4mm wide, The steel is 1-1.5 mm thick.

The cortex consists of sub epidermal layers of 3 or 4 cells thick sclerotic cylinder. The outer cortex is parenchymatous, the cells are thin walled and compact. Wide, circular secretory canals are seen in this inner boundary of the parenchymatous cortex (**Fig.3**). The aerenchymatous cortex consists of radially oriented wide air-chambers with multi seriate, branched or unbranched partitions(Fig.1.2.3.,3)

Powder microscopic results The powder preparation of the root exhibits the following inclusion when examined under the microscope:

(i)Fileres(Fig.4.1,2,3):- Xylem fileres are abundant in the powder. They are long, narrow thick walled cells with thick lignified walls. Some of the fileres have dark, dense granular inclusions (Fig.4.1,2) The fileres with dark inclusions are 910µm to 1.1 mm long and 40µm thick. These are also fileres without any inclusions. They have thick lignified walls and narrow lumen (Fig.4.3) These fileres are 610 µm long and 20 µm thick.

(ii)Parenchymatous cells: (Fig.4.2,3):Long, narrow, thin walled parenchyma cells, resembling the fileres are seen along with other components. They are wider than the fileres. Their walls are 660µm long 30µm wide.

(iii)Xylem elements(Fig.5.1,2,3):Broken ,thick bundles of xylum elements mixed with fileres and parenchyma cells are common in the powder. The xylem elements are meta xylem elements. The length of the elements cannot be determined, since they are very long cells. Mixed with the xylem elements are seen fileres with dark elements (Fig.5.1)

Legend for the figures

Fig.1.1: Transverse sections of roots : Thin –Root, 2,3:Thick roots

AC: Air- chambers ; En: Endodermoid Layer, MX: Meta xylem element; OC: outer cortex; Sc: Sclerenchyma; St: Stele

Fig.2. TS of thin root- a sector- enlarged.

AC: Air chamber; Co: Cortex; Ep: Epidermis; En: Endodermoid layer MX: metaxylem; Pe: Pericycle; PF: Partition Filament; Ph: phloem; Sc: Sclernchyma.

Fig.3.TS of Thick Root-A sector , enlarged.

AC: Air- chamber; En: Endodermoid layers; Mx: Metaxylem element; Pa: Parenchymatous outer cortex PF: Partition filament; Ph: Phloem;

Sc:Sclerenchyma ; SC: Secretory canal

Powder Microscopy

Fig.4. 1,2: Fileres with dark inclusions .

3. Filere without inclusions and a parenchyma cell (Fi: Filere ; Pa: Parenchyma cell)

Fig.5.1:A bundle of xylum elements and fileres with dark inclusions

2. Xylum elements with dark with annlar thickenings.

3. xylem elements with spiral and Scalariform Thickenings.

XE: (Xylum elements.)

PRELIMINARY PHYTOCHEMICAL SCREENING

Test	Inference
1. CARBOHYDRATES	+VE
2. PROTEINS	+VE
3. AMINO ACIDS	+VE
4. STEROIDS	-VE
5. ALKALOIDS	-VE
6. GLYCOSIDES	+VE
7. FLAVONOIDS	-VE

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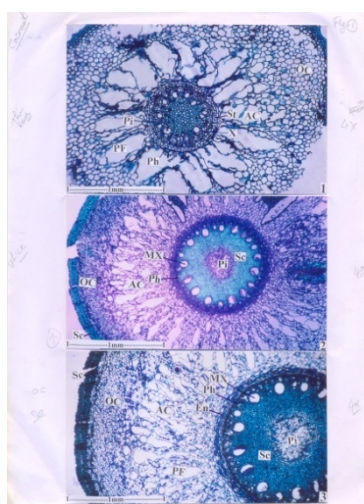


Fig1

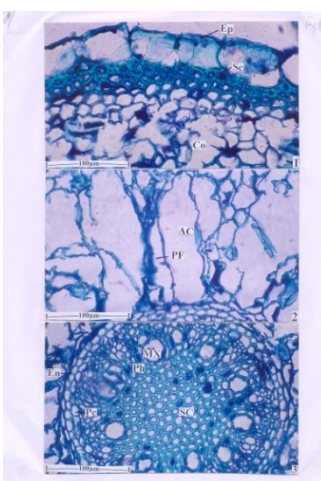


Fig.2

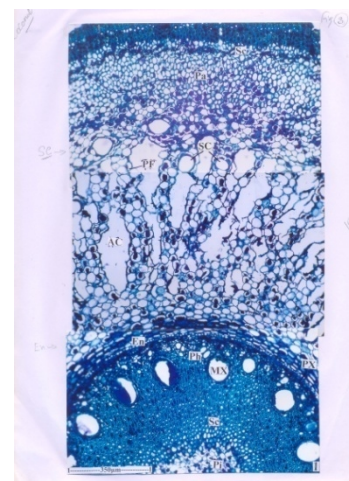


Fig.3

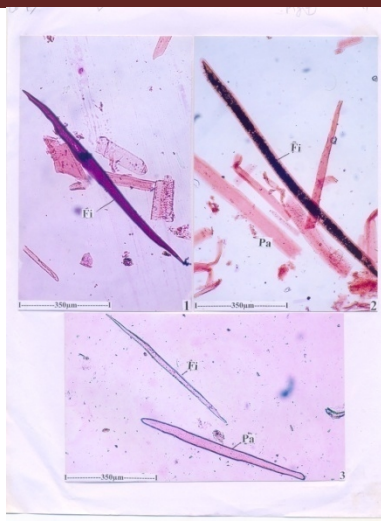


Fig.4

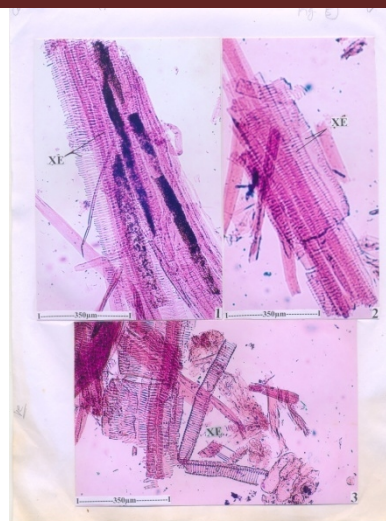


Fig.5

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