

EXPERIMENT NO-2

MORPHOLOGICAL, HISTOLOGICAL, POWDER CHARACTERISTICS, EXTRACTION AND DETECTION OF CINNAMON BARK.

AIM OF THE EXPERIMENT:

To study the morphological, histological, powder characteristics, extraction and detection of Cinnamon bark

Requirements :

Apparatus: Compound Microscope, Petri plate, cover slip, Glass-Slide, beaker, dropper, filter paper, forceps, tripod stand, wire gauze, dissecting needle, sharp razor, etc.

Chemicals: Conc. HCL, Fluoroglucinol, Glycerine, alcoholic KOH, NaOH, conc. H₂SO₄, toluene, ethyl acetate, diethylamine, etc.

Theory :

Cinnamon :

Synonyms: Cinnamon bark; Chinese cinnamon, kalmi dalchini

Biological source: It consists of dried inner stem bark of the plant *Cinnamomum zeylanicum*

Family: Lauraceae

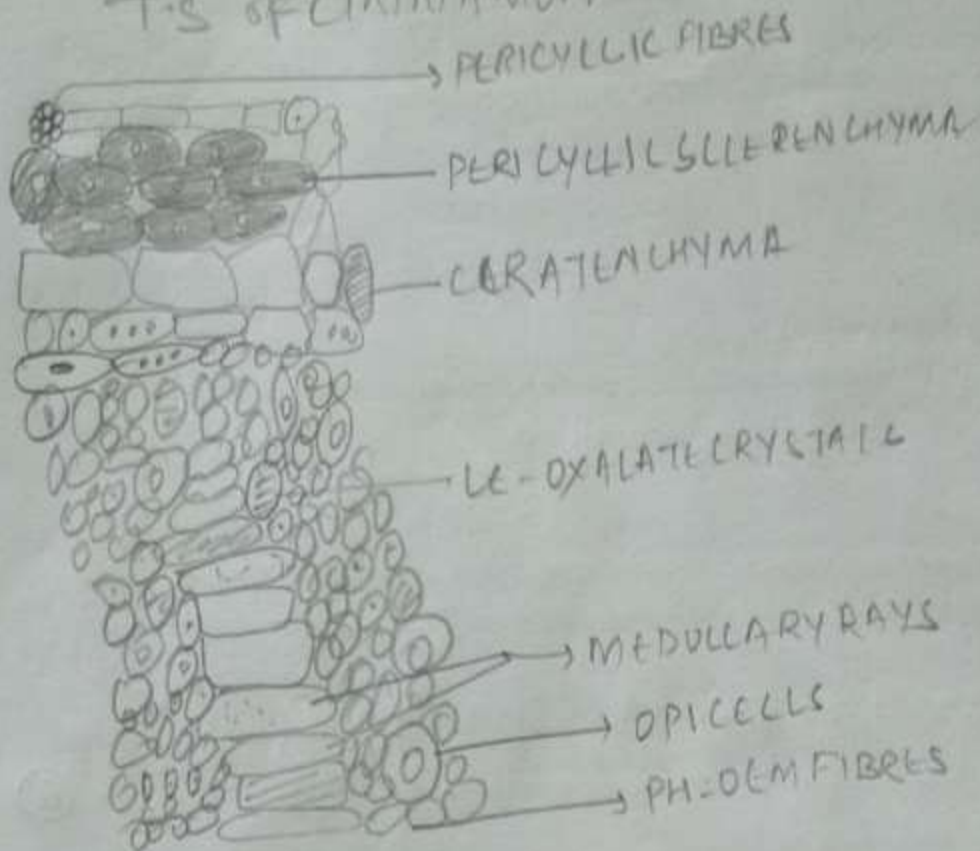
Chemical Constituents: It contains volatile oil in the form of cinnamaldehyde, eugenol and camphor. It also contains cinnamyl acetate, cinnamyl alcohol, and other Constituents like mucilage, starch and mannitol.

Uses: Cinnamon bark is widely used as spice, condiment and flavouring material. It is principally employed for antimicrobial and antioxidant properties. It is also used as aromatic, carminative, stimulant and antiseptic.

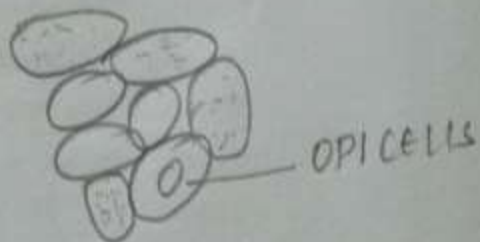
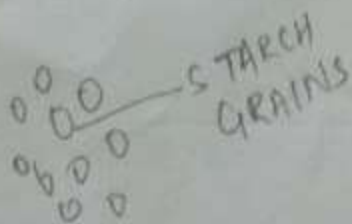
MACROSCOPICAL CHARACTERS:

- 1) **Colour:** Dirty brown (both side)
- 2) **Odour:** Characteristic, sweet, aromatic.
- 3) **Taste:** Slightly sweet and aromatic
- 4) **Size:** 5 to 40 x 12 to 18 x 1 to 3 mm.
- 5) **Shape:** Single quill

T.S OF CINNAMON BARK



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6) Fracture: Splintery

MICROSCOPICAL CHARACTERS:

1) Periderm:

a. **Cork**: It consists of several layers of radially arranged rows of thin walled cells with dark brown contents. The cork cells are impregnated with suberin.

b. **Phellogen**: It consists of 2-3 layers of thin walled rectangular cells without any cellular contents.

c. **Phelloderm**: 6 to 8 layers of thin walled rectangular cells without any cellular contents. Like cork, they are arranged at times in radial rows.

2) Cortex:

They consist of several layers of thin walled and tangentially elongated cells containing yellowish brown matter. Some of the cortical cells are filled with microsphenoidal crystals of calcium oxalate and the rest with minute starch grains.

3) Secondary phloem:

It consists of phloem parenchyma, phloem fibres and medullary rays.

4) Medullary rays:

Medullary rays transverse radially the phloem parenchyma; 1 to 3 cells wide, extend up to cortex, cells radially elongated and contain starch grains.

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POWDER CHARACTERISTICS:

Phloem fibres: About 30 μ in diameter and 200-600 μ m length, stratified thick lignified wall and narrow lumen.

Stone cells: U shaped, lignified structures with one side thin.

Starch grains: About 10 μ in diameter and present in the parenchymatous cells of phloem and medullary rays.

Calcium oxalate crystals: Small acicular raphides from parenchyma and medullary rays.

Oil cells: Isolated and big in size or fragments.

EXTRACTION OF VOLATILE OIL:

The cinnamon essential oil was extracted by using hydrodistillation with a Clevenger type apparatus with slight modification. About 30 gm of precisely weighed of cinnamon bark powder has been put into 500 ml distillation flask with four boiling chip and 300 ml of

Microchemical Test

S.No.	Reagents	Observation	Characteristic
1.	Phloroglucinol conc. HCl (1:1)	Pink	lymphoid cells, pericyclic fibres, stone cell, cork cell
2.	Dil. Iodine solution	Blue	Starch
3.	Dil. Acetic acid	Insoluble	Calcium oxalate crystals
4.	Dil. HCl	Soluble	Calcium oxalate crystals
5.	Sulphuric acid (6v)	Calcium sulphate crystals formation	Calcium oxalate crystals
6.	Rathenium reagent	Pink	musilage cells
7.	1% Orcinic acid sol ⁿ	Brown / pale	Volatile oil
8.	Dil. solution of Alkaline.	Red. in standing for 20 min.	Volatile oil

$$\% \text{ Yield} = \frac{\text{essential oil wt.}}{\text{sampled wt.}} \times 100 = \frac{0.829}{30} \times 100 = 2.98\%$$

Chemical test

S.No.	Tests	Observation	Inferences
1.	Alcohol extract of drug + one drop of ferric chloride sol ⁿ	Green colour	Cinnamic aldehyde, cinnamal
2.	Chloroform extract of drug + 10% aqueous sol ⁿ of phenylhydrazine	Red colored crystals of benzoin aldehyde	Cinnamic aldehyde
3.	Aqueous extract + 5% FeCl ₃	Dark colour	Tannins
4.	Aqueous extract + lead acetate reagent	white precipitate	Tannins
5.	Aqueous extract + potassium sol ⁿ , potassium permanganate.	Decolorization	Tannins

Calculation:-

$$R_f \text{ value} = \frac{\text{Distance travelled by solute}}{\text{Distance travelled by solvent}} = \frac{3.7}{4.0} = 0.925$$

distilled water was poured into the flask. They were immersed for 1 hr, followed by heating at 100 °C for 6 hrs. Then, the distillate was transferred to a 250 ml conical flask. Then, the volatile compounds were extracted from the water phase three times using dichloromethane and dehydrated over anhydrous sodium sulphate for 30 min and filtered through a mid-speed filter paper. The cinnamon oil obtained was concentrated and stored at 40 °C for further analyses. The percentage yield of cinnamon essential oil has been calculated using the given formula.

DETECTION BY TLC :

Volatile oil is identified by thin layer chromatography by using silica gel as stationary phase and Ethyl acetate: toluene (93:7) as mobile phase. After drying the TLC plate, the spot was detected after spraying vanillin- sulphuric acid solution. Calculate the R_f value by using formula


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RESULT

From the above experiment the morphological, histological and powder characteristics of cinnamon bark was studied.

The percentage yield of cinnamon oil was found to be 2.98%.

The extracted cinnamon oil were identified by TLC method.


Signature of Faculty

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