

EXPERIMENT NO. 7

THE MORPHOLOGICAL, HISTOLOGICAL, POWDER CHARACTERISTICS, EXTRACTION AND DETECTION OF EPHEDRA STEM.

AIM OF THE EXPERIMENT :

To study the morphological, histological, powder characteristics, extraction and detection of Ephedra stem.

Requirements :

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

Chemicals: Conc. HCL, Fluroglucinol, Glycerine, petroleum ether, dilute ammonia alcohol, Sodium carbonate, toluene, chloroform, ethanol, dragendroff's reagent, etc

THEORY:

Ephedra

Synonyms: Ma-Huang

Biological source: It consists of dried young stem of Ephedra gerardiana.

Family: Ephedraceae (Gnetaceae)

Chemical Constituents:

Alkaloids 0.5 to 2%, Alkaloidal amines, Ephedrine and pseudoephedrine (30 to 90% of alkaloids).

Uses:

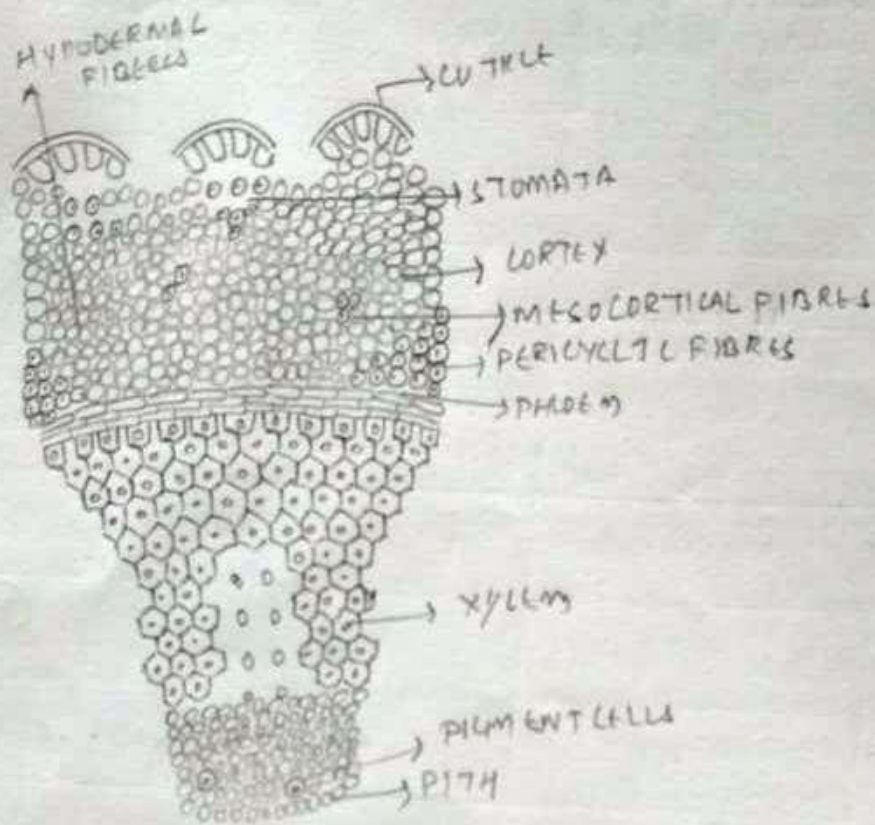
It is used to cure bronchitis, dyspnoea, and cough. In digestive system It is used to treat dyspepsia (chewing), abdominal colic, digestive upsets, flatulence, constipation, piles, jaundice, worms-infestation, irritable bowel syndrome (boiled). In urino-genital system it is used to treat dysurea and incontinence of urine and in mydriasis, sympathomimetic.

MORPHOLOGICAL CHARACTERS:

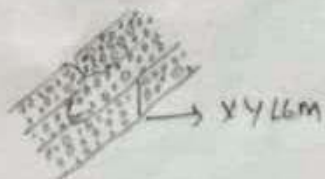
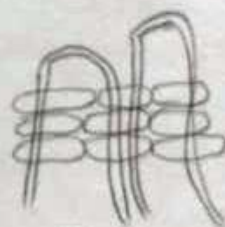
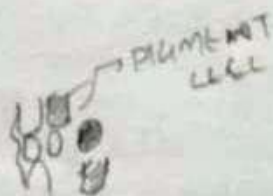
- 1) Colour: Greenish yellow
- 2) Odour: Agreeable and slightly aromatic
- 3) Taste: Astringent and bitter
- 4) Size: 12-33 cm in length and 0.8-1.5 mm in thickness
- 5) Shape: Cylindrical

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T.S of EPHEDRA STEM



(25)



6) No. of Ridges: 24-28-36 ridges

7) Surface: Rough because of longitudinal ridges

MICROSCOPICAL CHARACTERS:

1) Epidermis:

It is the outermost layer of thick walled cells, covered with a thick layer of cuticle. Sunken stomata are present on the slopes of the ridges in the circular pits.

2) Hypodermis:

It is present just below the ridges. It is made up of sclerenchymatous cells and provides mechanical strength to the plant.

3) Cortex:

It is present between the thick walled sclerenchyma and vascular cylinder. It can be differentiated into outer and inner cortex. The outer cortex contains 2-3 layers of radially elongated palisade tissue and inner cortex consists of 2-3 layers of spongy loosely arranged with large parenchyma. The cells of outer and inner cortex are intercellular spaces and are provided with chlorophyll to perform the function of photosynthesis. A few patches of sclerenchymatous cells may also occur in the cortex to provide mechanical support to the young axis.

4) Endodermis:

It is the innermost layer of cortex. It is not easily distinguishable from the cortical cells.

a) **Fibres:** Lignified and non-lignified long, slender and cylindrical.

b) **Xylem:** Tracheids with bordered pits.

c) **Phloem:** Containing sieve tubes and companion cells.

d) **Medullary rays:** Broad, parenchymatous medullary rays are present in between the vascular bundles. Medullary rays connect the pith with cortex.

e) **Pith:** It is present in the centre. It is made up of thin walled, lignified, polygonal Parenchymatous cells. Near the node, its cells become strongly lignified forming a peridermal diaphragm which accounts for the rapid separation of the branches in the region.

POWDER CHARACTERISTICS:

Epidermis: Fragment of epidermis, quadrangular cells and outer walls are ridged.

Fibres: Lignified and non-lignified, long, slender and cylindrical.

Xylem: Tracheids with bordered pits.

Micro-chemical test.

Sl. No.	Reagent	Observation	Characteristics
1.	Phloroglucinol HCl (1:1)	Red/Pink	Large red fibres vascular bundles & pectocyclic fibres.

Sl. No.	Test	Observation
1	10mg drug + 1 ml water + 0.2 ml dil. HCl + 1 ml copper sulphate + 1 ml 10% hydroxide sol ⁿ becomes violet add 1 ml solvent ether & shake	Ether layer becomes purple, aqueous layer is blue
2	Drug + Dragendorff's Reagent	orange brown ppt
3	Drug + Mayer's reagent	Precipitate
4	Drug + Hager's Reagent	Yellow ppt
5	Drug + Wagner's Reagent	Raddish brown ppt

Calculation

$$\% \text{ Yield} = \frac{\text{Essential oil wt}}{\text{Sample wt.}} \times 100$$

$$= \frac{1.567}{100} \times 100 = 1.567 \%$$

$$R_f \text{ value} = \frac{\text{Distance travelled by solute}}{\text{Distance travelled by solvent}} = \frac{3.8}{5.5} = 0.71$$

Brownish matter: Abundant, dark, brownish mucilaginous substance from pith.

EXTRACTION OF EPHEDRINE:

For the extraction of ephedrine alkaloids take, specified quantity of raw medicinal material of ephedra stem was crushed into small pieces and then extracted with petroleum ether. After filtration, the marc was moistened with dilute ammonia. Extract the marc with aqueous alcohol, filter and evaporate to obtain syrupy mass. Then again, extract the marc with 3 portion of aqueous alcohol and add sufficient quantity of sodium carbonate solution and make the extract alkaline. Filter and evaporate filtrate to obtain dry residue of ephedrine.

IDENTIFICATION BY TLC:

Ephedrine alkaloids is identified by thin layer chromatography by using silica gel as stationary phase and toluene: chloroform: ethanol (29:6:15) as mobile phase. After drying the TLC plate, ephedrine alkaloids was detected as orange brown colour after spraying dragendroff's reagent.

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Result:

- From the above experiment the morphological, histological and powder characteristics of ephedra stem was studied.

The percentage yield of ephedrine alkaloid from ephedra stem was found to be 1.567%.

The extracted ephedrine alkaloid was identified by TLC method & R_f value is 0.71

Signature of Faculty

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