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APPLICATION OF MICROSCOPY IN AUTHENTICATION OF UNANI TRADITIONAL PLANT *RUTA GRAVEOLENS*

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ABSTRACT

Ruta graveolens, ethanodrug popularly used from Indian garden, was studied to reveal the indispensable morphoanatomic details. The fixed, sectioned and stained plant materials as well as powder and macerated materials were studied using light microscope according to the usual microscopic techniques. The results of microscopic feature of *R. graveolens* were systematically described and illustrated. The root had thick walled cork; cortex and hypodermis was distinct; fibres, vessels and medullary rays were lignified. Centre was occupied by pith in root section. In the stem, cork cambium was present, initially superficial. Stone cells (oval in shape, abundant in group of 10-15 cells each, with wide lumen, highly lignified) were observed in the cortex. In stem section, centre was occupied by pith, consisting of oval, parenchymatous cells, pericycle was continous and non- lignified. Vessels and fibres were lignified in stem section. Anomocytic stomata were present on both surfaces of leaf. In leaf, epidermis was single layered, thin walled covered with thick, striated cuticle. Trichomes were glandular and had underlying palisade cells. Leaves also had spongy parenchymatous cells. Epidermis of pods shows stomata underlying schizogenous or schizolysogenous cavities with essential oils. Also, semiquantitative and quantitative micrographic parameter tables were simultaneously presented. Further, the key authentication parameters were concluded. The study indicated that light microscopy and related techniques could be unambiquously applied to the authentication of *Ruta graveolens.*

Key words: *Ruta graveolens, microscopy, authentication, trichomes,* anomocytic stomata

INTRODUCTION

Ruta graveolens Linn (Rutaceae) is an important medicinal plant in unani system of medicine, which is used in all over the world. The genus name Ruta came from Greek word “reuo” meaning “to set free” which indicates herbs reputation in treatment of

disease [1]. Ruta is genus having several species viz *Ruta chalepensis, Ruta bracteosa, Ruta angustifolia* and *Ruta graveolens*. It is commonly known as Common rue or Sudab/ Sadab. [2] Herb is used in capillary fragility, [3] for treatment of eye disease and as stimulant, emmenagogue. [4] Report on microscopy of *Ruta graveolens* whole parts is not available. As the whole parts of herbs are used widely especially in gynecological problems, so it was thought worthwhile to authenticate them.

OBJECTIVE

To authenticate the plant *Ruta graveolens* using microscopic techniques.

MATERIALS AND METHODS

Materials

Whole plant was collected from *Ruta graveolens* herbs growing naturally in Madhya Pradesh, in the month of December and January, 2007 and identified by an expert taxonomist, H.B. Singh, NISCAIR, Pusa Institute, Patel Nagar, Delhi. Voucher specimen of the *Ruta graveolens* (NISCAIR876/60) has been retained in the laboratory for reference purpose.

Methods

Microscopical examination of powder and transverse section of various parts of *R. graveolens* was performed using standard procedures and staining techniques under light microscope. [5]

RESULTS AND DISCUSSION

The results of the study are as follows.

(A) Powder microscopy:- Powdered sample of *R. graveolens* was examined for their organoleptic properties. Microscopical evaluation of powder of *R. graveolens* shows characters of leaves, stem, roots and fruits as described below. Powder sample is light green in colour with disaggreable odour nauseous and bitter taste.

1. **Epidermis:** polygonal, thin walled with a striated thick cuticle.
2. **Stomata and Trichomes:** anomocytic type stomata, glandular trichomes.
3. **Hypodermis**: patches of collenchyma constitute the brown hypodermis.
4. **Stone cells:** abundant, in groups of 10-15 cells each, with wide lumen, highly lignified, oval to elliptical shaped. Stone cells of stem portion are bigger than the root portions.

5. **Fibres:** cylindrical, lignified with simple pits, aseptate, about 40-50µ diameter.
6. **Vessels**: cylindrical, having simple pits, 50-120µ in diameter, lignified. Roots vessels are larger than of stem.
7. **Xylem parenchyma**: lignified with simple pits, polygonal cells.
8. **Cork:** thin walled, several layered, regularly arranged cells.
9. **Crystals**: abundant fragments of crystalline calcium oxalate crystals are present.
10. **Epidermis of pods**: polygonal, stomata with underlying schizogenous or schizolysogenous cavities with essential oil.

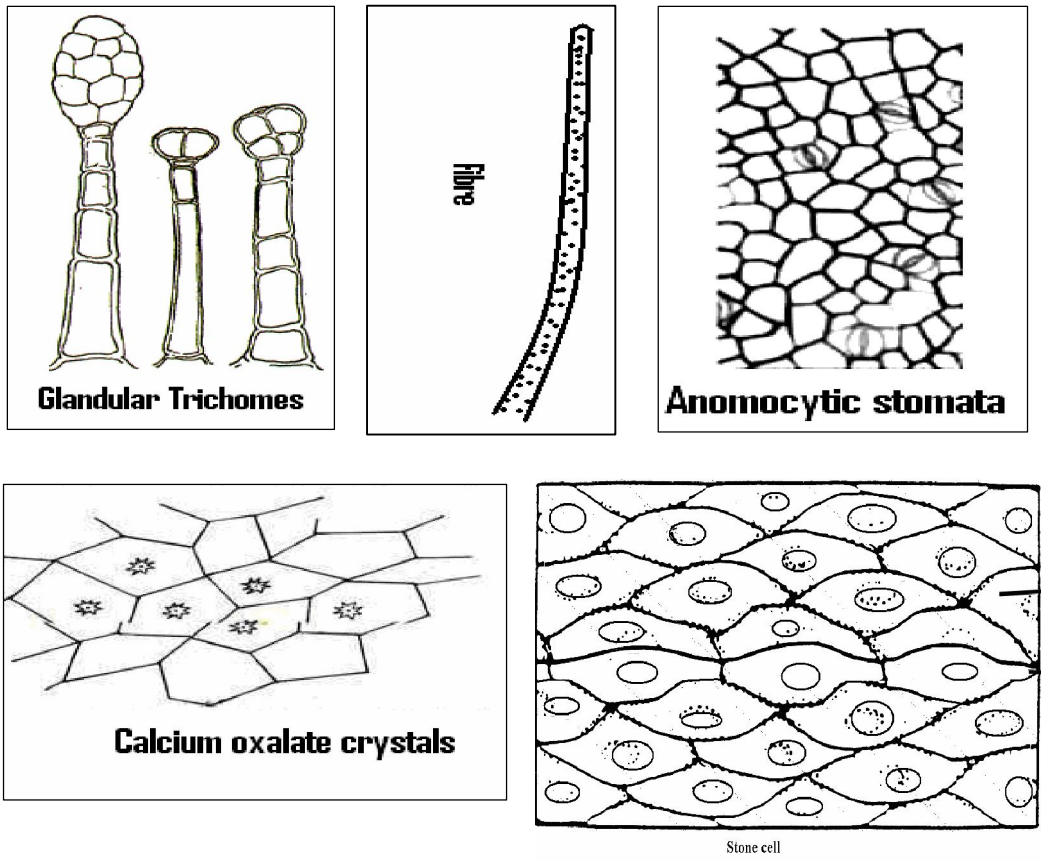

Figure 1
Microscopical characters of *R. graveolens*

(B) TRANSVERSE SECTION

Root:-It shows thick walled cork, several layered regularly arranged. Epidermis is thin walled and single layered, cortex and hypodermis is distinct, fibres and vessels are lignified, medullary rays are thick walled and lignified. Centre is occupied by the pith which is thin walled and has parenchymatous cells.

Stems: - Cork cambium present, initially superficial. It shows a single layered epidermis composed of thin walled, flattened, and covered with thick cuticle. Hypodermis consists of collenchymatous cells. Cortex composed of 4-5 layers of polygonal thick walled, non lignified cells. Stone cells oval in shape, abundant in group of 10-15 cells each, with wide lumen, highly lignified. Pericycle represented by non lignified fibres. Vessels are lignified cylindrical with simple pits. Xylem parenchyma lignified polygonal with simple pits. Fibres are cylindrical, lignified with simple pits, aseptate. Centre occupied by pith, consisting of oval, parenchymatous cells. Crystals are abundant; fragments of crystalline calcium oxalate crystal are present.

Leaf: - Epidermis is single layered thin walled covered with thick, striated cuticle. Upper surface of leaf has less epidermis than lower surface. The trichomes are glandular, it has underlying palisade cells. Anomocytic stomata present on both surfaces.

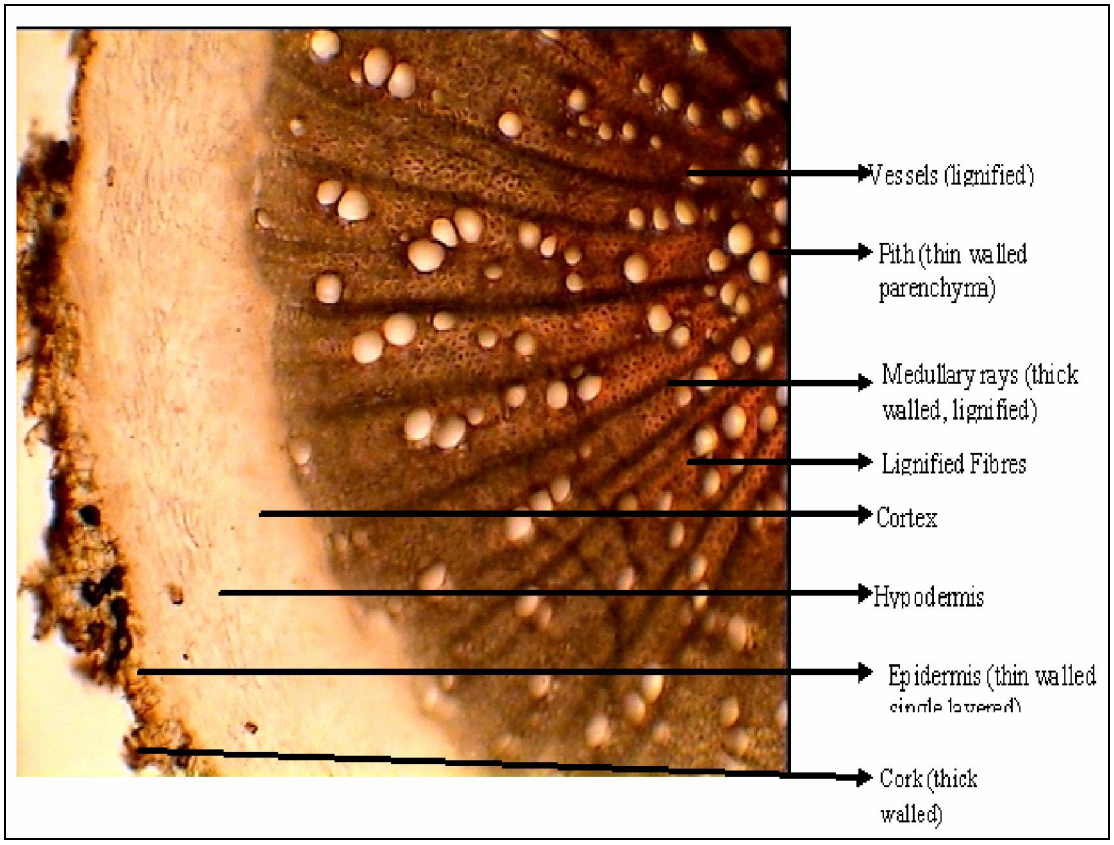

Figure 2
Ruta graveolens root T.S. at 10 X

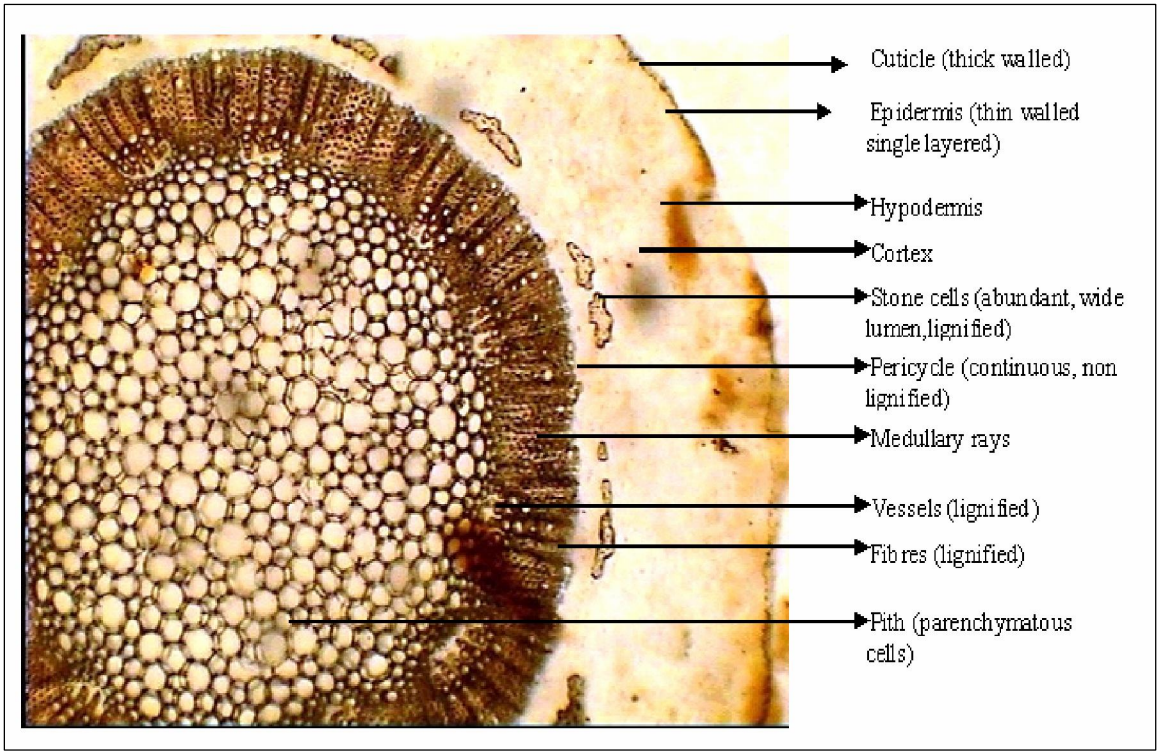

Figure 3
Ruta graveolens stem T.S. at 10X

Figure 4
Ruta graveolens leaf lamina T.S. at 10X

CONCLUSION

From the above work it is concluded that *R. graveolens* have glandular trichomes, anomocytic and sunken stomata and stone cells in groups 10-15 cells and bigger in dimension. This present work will definitely adds to the exiting knowledge of *Ruta* whole plant and quite useful for development of a formulation for treating various diseases especially gynecological problems. Pharmacological studies are also required to validate the utility of whole plants in gynecological problems.

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