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ANATOMICAL STUDIES OF THE MEDICINALLY IMPORTANT PLANT *RUTA GRAVEOLENS* LINN.

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ABSTRACT

Ruta graveolens Linn. belongs to family Rutaceae. The herb contains a volatile oil, alkaloids, flavonoids and coumarins. The volatile oil, rue oil is strongly odoriferous, pungent and contain, methylnonal ketone (80-90%) methyl heptal ketone limonene, cineole etc. Herbs are staging a comeback and herbal 'renaissance' is happening all over the globe. The herbal products today symbolize safety in contrast to the synthetics that are regarded as unsafe to human and environment. Although herbs had been priced for their medicinal, flavouring and aromatic qualities for centuries, the synthetic products of the modern age surpassed their importance, for a while. The venation is Pinnate Craspedodromous and stomata are atinocytic and brachyparatetracytic. The present work is a small effort towards the anatomical standardization of the plant material, which can be used as medicine.

KEY WORDS: *Ruta graveolens*, anatomical studies, Pinnate Craspedodromous, atinocytic, brachyparatetracytic.

INTRODUCTION

Ruta graveolens Linn. belongs to family Rutaceae as given by Hooker (1883). **Vernacular Names:** Sanskrit-Sdapaha; Hindi-Sadap; English-Gardenrue; Bengali- Ispand; Sinhalese, Aruda; Japanese -Matskareso; Chinese-T'sao; German-Raute; Unani-Sudap; Arabian-Sudap; Persian-Sadap; Tamil-Aruvada which is mentioned by Kapoor (1990).

Fig. 1 *Ruta graveolens* Linn. plant.

Ruta is a strong smelling glandulosco-punctate herb, often shrubby below. It is used as antiseptic, stimulant, emmenagogue, and abortifacient. The glucoside rutin present in it is reported to restore capillary fragility to normal, thus preventing capillary hemorrhage and therefore it is employed in cases of hypertension and radiation injury as described by Kapoor (1990).

Leaf architectural study is found to be useful for taxonomic purpose. Ettingshausen (1861, 1865, 1869, 1872) pioneered the leaf architectural studies. Kerner and Olliver (1895) had worked out systems of classification based on foliar venation. Later Foster (1936, 1950a, b; 1952, 1953) published papers dealing with foliar venation. The different type of stomata have been reported on the same surface of an organ in diverse angiospermic families as suggested by Tognini (1897), Loftfield (1921), Sen (1958), Pant and Kidwai (1964), Paliwal, 1965; Pant and Mehra, 1965; Inamdar, 1969; Bahadur et al, 1971).Wilkinson (1979) suggested that structurally there are several types of hydathodes but within this study the term is restricted to giant stomates.

MATERIAL AND METHOD

The plant material, leaves of *Ruta graveolens* for the present work was collected from Dadar market & authenticated. For the study of leaf architecture, the method used to prepare slides of whole leaves is as follows: The mature leaves fresh, dried or preserved were first cleared by keeping them in 5% sodium hydroxide solution at room temperature for 1-2 days. The decoloured leaves were washed and transferred to 5% sodium hypochlorite till they were transparent. For more clarity the leaves were washed and put into the solution of trichloroacetic acid and phenol (2:1 by weight) for a few minutes at room temperature. They were then thoroughly washed to remove acid traces and were stained with aqueous Saffranine

by keeping them in it for 10-15 minutes. The leaves were then transferred to 50% glycerine and mounted in glycerine jelly as suggested by Payne (1969) and Mohan Ram and Nayyar (1978).

For epidermal studies:

For the study of stomata the leaf pieces were boiled in concentrated nitric acid with little potassium chlorate added to it. The leaves turn brown and then yellowish white. They were then transferred to water to separate the epidermal peelings. These peelings were washed thoroughly, stained with aqueous Saffranine or Delafield Haematoxylin and mounted in glycerine as described by Gupta (1961).

The terminology used in anatomical studies is in accordance with Hickey and Wolfe (1975), Melville (1976), Hickey (1973, 1979) and Dilcher (1974).

The microphotographs showing different anatomical features were taken by using Cosina Camera at various magnifications as mentioned in the plates.

OBSERVATIONS

Leaf organization is simple. With respect to leaf shape and size, the length of the whole leaf is 145mm and the width is 68mm. The lamina is symmetrical; base is symmetrical; form is very narrow oblong; apex is acute and base is acute. The margin is entire. The leaf texture is coriaceous. There are no glands and the petiole is normal.

The type of venation is Pinnate Craspedodromous, simple. Primary vein (1^0) is massive; its course is curved. Secondary veins (2^0) are present; angle of divergence is acute narrow. The variation in the angle of divergence is nearly uniform. The relative thickness of secondary veins is moderate; its course is curved abruptly and unbranched. Intersecondary veins are composite. Intramarginal vein is present. Tertiary veins (3^0) are present; angle of origin exmedial to admedial side is RR; the pattern is random reticulate. The higher order venation forming a reticulum in which vein orders are distinct. Quarternary veins (4^0) are thin; its course is orthogonal. The highest vein order of leaf is 4^0. The marginal ultimate venation is fimbrial. Areoles are well developed; arrangement is oriented and shapes are quadrangular, pentangular and polygonal. Veinlets are present.

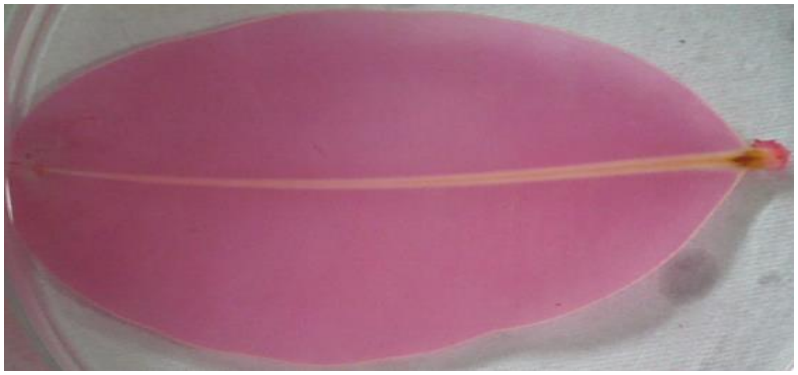

Fig. 2 Entire leaf of *Ruta graveolens* Linn.

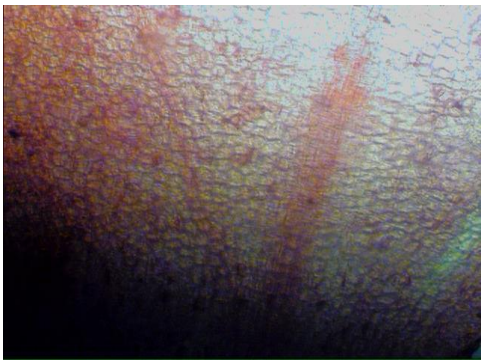

Fig.3 Study of Venation at Lamina region 10x 40X.

TYPES OF STOMATA

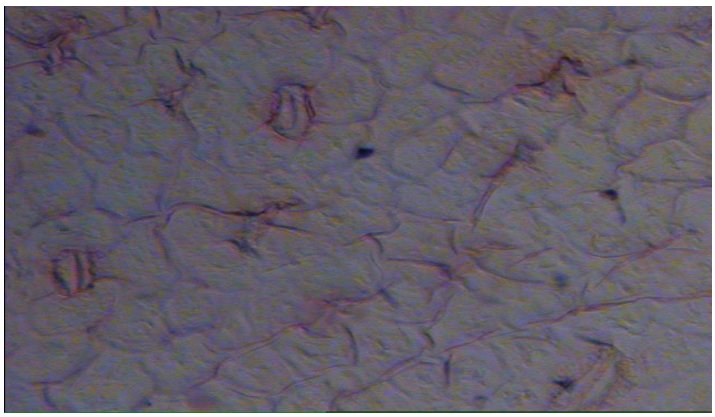

Fig. 4 Upper epidermis 10x 40X.

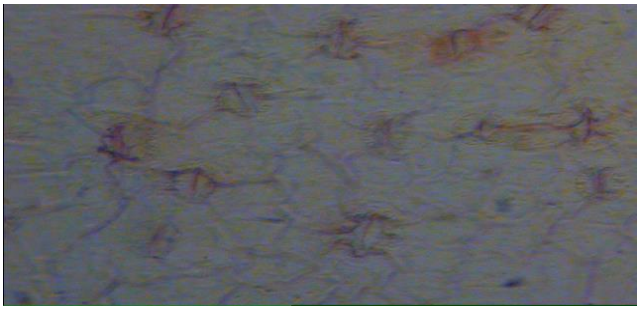

Fig. 5 Lower epidermis 10x 40X.

Stomata are found on both the surfaces.

Upper epidermis

Stomata are atinocytic & brachyparatetracytic. The epidermal cells are smooth in outline.

Lower epidermis

Stomata are atinocytic (single ring of somewhat enlarged or elongated cells enclosing the guard cells) & brachyparatetracytic (two short cells lateral & parallel to guard cells & two wide polar cells). The guard cells are elongated and kidney shaped. Epidermal cells are smooth in outline.

T.S. OF LAMINA

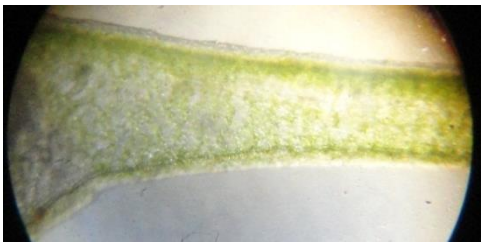

Fig. 6 T.S. of leaf through midrib 10 x 10 X.

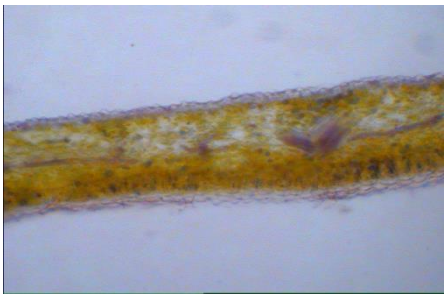

Fig. 7 T.S. of leaf through lamina region 10 x 10 X.

EPIDERMIS

It is single layered covered with cuticle. Just below it is a layer of palisade tissue followed by many layered spongy cells filled with chloroplast. The lower epidermis is also single layered and covered with cuticle.

MIDRIB

the upper and lower epidermis is similar to the lamina. Just below the upper epidermis there are collenchyma cells continued with compactly arranged parenchyma cells. The vascular bundle is V-shaped with xylem on the upper side and phloem on the lower side.

RESULT AND DISCUSSION

The type of venation is Pinnate Craspedodromous and simple simple. The highest vein order of leaf is 4^0. The marginal ultimate venation is fimbrial. Areoles are well developed. Veinlets are present. Stomata are found on both the surfaces. Stomata are atinocytic and brachyparatetracytic.

In the present work these anatomical characters can be useful in standardization of the drug which is used as medicine.

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