



MACROSCOPIC AND MICROSCOPIC EVALUATION OF *CARICA PAPAYA* L. LEAVES WITH REFERENCE TO SEXUAL DIMORPHISM

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There has been a tremendous increase in the demand for plant based drugs over the last few years, due to this there is a need for standardization of the plant raw material. Although modern techniques are being widely used for standardization process, the pharmacognostic approach is still reliable for identification of the raw material. In the current study macromorphological and microscopic characterization of *Carica papaya* L. leaves with reference to sexual dimorphism was carried out. This information can be used as a reference for therapeutical and pharmacological evaluation of the species, this will be supportive in standardization for sample identification, it's quality and purity.

Keywords: standardization, pharmacognostic, macromorphological, microscopic, *Carica papaya* L.

Carica papaya Linn belonging to family Caricaceae is commonly known as papaya in English, Papita in Hindi and Erandakarkati in Sanskrit (Anonymous, Chaudhari (1996), Evans *et al.* (1997). The papaya is a large, tree-like plant, with an unbranched stem growing from 5 to 10 m (16 to 33 ft) tall, with spirally arranged leaves confined to the top of the trunk. The lower trunk is conspicuously scarred where leaves and fruit were borne. The leaves are large, 50–70 cm (20–28 in) in diameter, deeply palmately lobed, with seven lobes. Unusually for such large plants, the trees are dioecious. The tree is usually unbranched, unless lopped. The flowers appear in the axils of the leaves, maturing into large fruit - 15–45 cm (5.9–17.7 in) long and 10–30 cm (3.9–11.8 in) in diameter. The fruit is ripe when it feels soft and its skin has attained amber to orange hue.

MATERIALS AND METHODS

Plant Collection and Preparation

Leaves of *Carica papaya* L. were collected from Dahanu, Maharashtra and were sent for authentication (voucher specimen No.14830) to Blatter's Herbarium, St. Xavier's College, Mumbai, Maharashtra. The leaves were washed with water, shade dried followed by drying in oven at 40°C for three days. The dried leaves were then powdered removing the stalk and woody part, then kept in air tight container at

room temperature away from moisture for further study.

Organoleptic Characterization

The organoleptic characters like colour, odour and taste of the powder were studied for the plant leaf powder.

Microscopic Characterization

The microscopic evaluation was done as follows:

Powder Characteristics

Powder examination was studied by standard method. The powder was stained with saffranine and studied under microscope for identification of anatomical characters.

Sectioning

Microscopic sections were cut by free hand sectioning, temporary mounts of the sections of the leaf and petiole were made and examined microscopically. Transverse and longitudinal sections were cut and stained with saffranine and hematoxylin and observed under microscope for study of arrangement of various tissues and photographs were taken (Labomed LX-300).

Stomatal Index







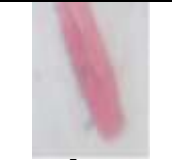


Stomatal index was calculated by standard procedure(Roseline 2011, Khandelwal 2008) for both the male and female plant leaves.

RESULTS AND DISCUSSION

Organoleptic Characterisation

| Property | Female | Male |
|----------|----------------|------------|
| Colour | Green | Dark green |
| Odour | Characteristic | Irritable |
| Taste | Bitter | Bitter |

Powder Characteristics (Magnification 40X)

| Plant | Characters | Characters | Characters | Characters | Characters |
|--------|--|--|--|--|---|
| Female |  |  |  |  |  |
| | Sclereids | Epidermal Cells | Sieve Tube | Crystals & Tracheids | Fibre |
| Male |  |  |  |  | |
| | Sieve tube with sieve plates | tracheids | Fibre | Crystals | |

Apart from the above mentioned characters female leaf powder also showed presence of different types of xylem - spiral, annular and reticulate whereas in male leaf powder annular

xylem was observed. The female leaf powder also showed abundance of sphaeraphides, starch grains and rhomboidal calcium oxalate crystals as compared to male leaf powder.

Transverse Section of Leaf:

Transverse section of the leaf shows a well-defined upper and lower epidermis surrounded

by well-defined 5-7 layers of collenchyma and sclerenchyma (Fig.1,2). The epidermis is composed of very large round cells with wavy and refractive walls. The inner walls of the cells

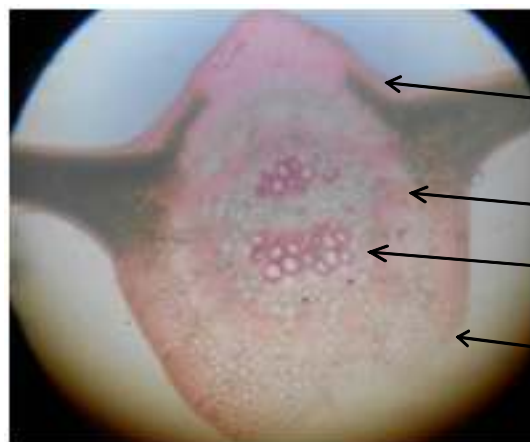


Fig. 1: T.S of Leaf (Male)

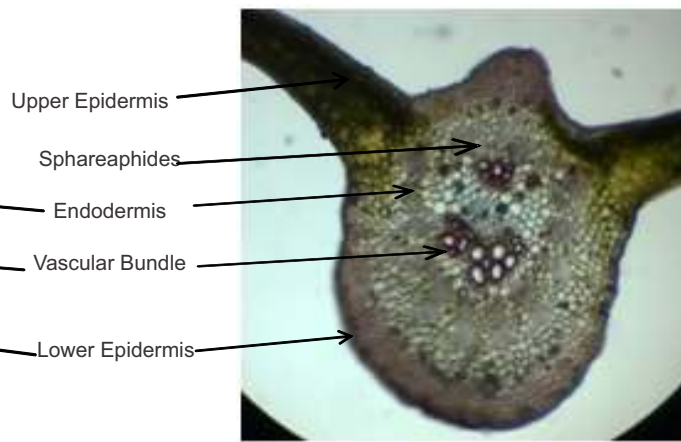


Fig. 2: T.S of Leaf (Female)

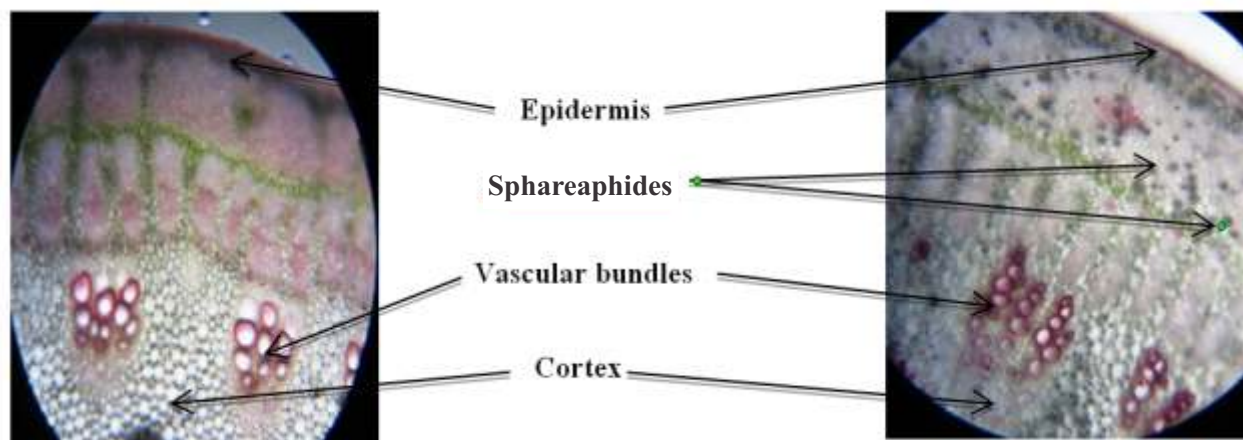


Fig. 3: T.S of Petiole (Male)

Fig. 4: T.S of Petiole (Female)

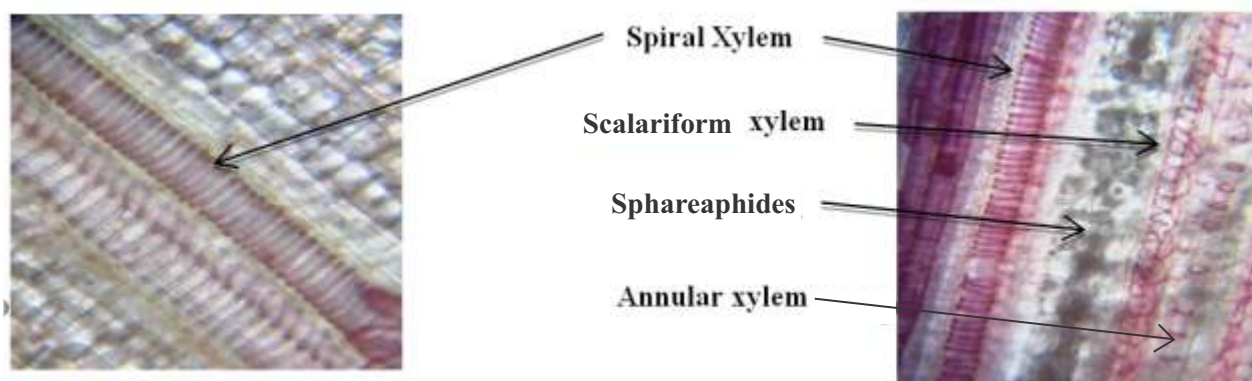


Fig. 5: L.S of Petiole (Male)

Fig. 6: L.S of Petiole (Female)

are strongly but unevenly thickened. The endodermis is composed of parenchymatous cells with moderately thickened walls and are found usually attached to the portions of the parenchyma the cells of which are small, thin walled and polygonal. The pith is found to be absent as the stalk is hollow from inside. A middle portion is covered with xylem and phloem surrounded by parenchymatous cell that in turn surrounded by sclerenchyma cells. However there is presence of sphaeraphides in abundance in female leaves (Fig.2)

Transverse Section of Petiole:

Transverse section of petiole shows well defined epidermis, few layers of collenchyma, and chlorenchyma (Fig 3, 4). Vascular bundles are aggregate in male plant and scattered in female plant. Pith is absent. The petiole of female plant shows presence of abundant sphaeraphides

Longitudinal Section of Petiole:

Longitudinal section of petiole shows presence of spiral xylem in case of Male plants (Fig. 5) whereas the female petiole shows different xylem types- spiral, annular and scalariform (Fig. 6). The female petiole also shows presence of abundant sphaeraphides.

Stomatal Index:

| Male Plant % | Female Plant % |
|--------------|----------------|
| 32.57±3.21 | 34.46±3.41 |

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