



PHARMACOGNOSTICAL STUDIES OF LEAVES OF PHOENIX SYLVESTRIS

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ABSTRACT

Natural products have been well described for the treatment of numerous human diseases like cancer, coronary heart diseases, diabetes and other microbial infections. The WHO has estimated that 80% of world population uses plant-derived formulations as traditional therapies. Indian traditional system of treatment has great reference of traditional medicinal plants to cure various diseases and disorders which are need to explore the new and novel formulations. The herbal drugs are prepared with the traditional methods through slow grinding and mixing processes and so all the natural substances within it are in the “Naturally balanced form” without losing any essential components and thereby maintain the activity and purity of the drug. There is a need for the application of this knowledge in authentication, detailed study and practical utilization of crude drugs. In the present study, Pharmacognostical studies of leaves of *Phoenix sylvestris* were carried out. The parameters studied are, Macroscopy and Microscopy of leaves, Powder microscopy and Fluorescence analysis.

KEYWORDS: *Phoenix sylvestris*, Pharmacognostical studies, Fluorescence analysis.

INTRODUCTION

In India, approximately 7500 plants are known to be used traditionally by tribal and villagers for health benefits. The family Palmae (Arecaceae) “The Princess of the plant kingdom” is a wild plant family having approximately 2600 species distributed all over the world. Amongst all the species *Phoenix sylvestris* Roxb, wild Indian date palm, is the most dominant and important species in Indian subcontinent. *Phoenix sylvestris* Roxb is a moderate sized dioecious tree, 7.5-15 m tall, without root suckers, stem clothed with remains of petiole bases. Leaves are 96 cm - 4 m long, greyish green, quite glabrous, pinnately divided into numerous leaflets. Flowers are rounded, green and distant.^[1-3] It is an important medicinal plant used for treatment of various diseases. Roots possess Anthelmintic, Cytotoxic activity. Leaves, seeds, pollens possess antibacterial activity. Fruits and sap having high nutritive value.^[4-9] The present work aims to contribute towards solving the problem of controversial drugs prevalent in Ayurveda besides helping in laying down standards. An attempt has been made to standardize the drug on the basis of Pharmacognostical parameters.



Figure 1: Leaves and Fruits of *Phoenix sylvestris*.

MATERIALS AND METHODS

Macroscopy

Fresh leaves of *Phoenix sylvestris* were collected and different organoleptic features viz colour, nature, odour, taste were observed. These parameters are considered useful in the qualitative control of the crude drug and evaluated as per standard WHO guidelines.

Microscopy

The plant specimens for the proposed study were collected from Thiruvallur district. Care was taken to select healthy plants and normal organs. The required samples of different organs were cut and removed from the plant and fixed in FAA (Formalin-5ml + Acetic acid -

5ml + 70% Ethyl alcohol - 90ml). After 24 hrs of fixing, the specimens were dehydrated with graded series of tertiary – butyl alcohol. Infiltration of the specimens was carried by gradual addition of paraffin wax (melting point 58-60° C) until TBA solution attained super saturation. The specimens were cast into paraffin blocks.

Powder microscopy

Shade dried leaf of *Phoenix sylvestris* were powdered well and used for powder analysis. Various staining reagents viz 1% phloroglucinol in 90% ethanol, conc HCl and N/50 iodine were used. Slides were observed under the microscope.

Linear measurements

Linear measurements were done on coarse powder of 1mm size.

Fluorescence analysis

Dried powder was treated with various chemical reagents and various extracts of the *Phoenix sylvestris* were exposed to visible, ultraviolet light to study the fluorescence behaviour.^[10-16]

RESULTS AND DISCUSSION

Organoleptic characters (for powder)

Colour : Dark green

Odour : Characteristic

Taste : Bitter

Nature : Coarse powder.

Macroscopy

Leaves are compound, 96cm - 4m quite glabrous, pinnately divided into numerous leaflets. Leaves are gently recurved, with few spines at the base, sharply pointed at the end. Leaflets are fascicled. Surface is rigid with parallel venation.

Leaflets

Length – 14 to 20 cm

Width – 0.5 to 2 cm

Thickness – 2 mm.

Microscopy

T.S of Leaf through midrib

The leaf is isobilateral. In transactional view, the leaf exhibits midrib, lamina which has mesophyll present near epidermis (Fig 2.1) and thick walled vascular bundles.

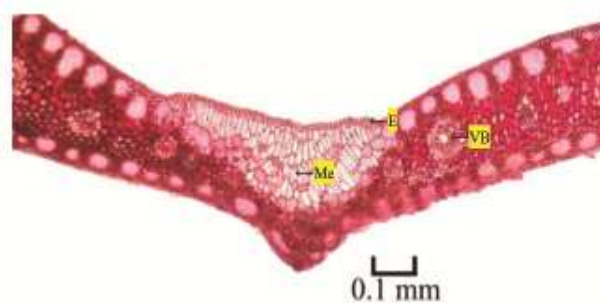


Figure 2.1: TS of Leaf through midrib.

Me - Mesophyll, E - Epidermis, VB - Vascular bundle

T. S. of Midrib

It consists of two epidermal layers which are composed of compactly-arranged cells with cuticularised outer walls. Below the epidermis single layered hypodermis is present, which are larger than the epidermal cells (Fig 2.2). Mesophyll is composed of more or less isodiametric cells with small intercellular spaces. Differentiation into palisade and spongy cells is absent. Group of fibres occur more or less in parallel series near to both the upper and lower epidermis.

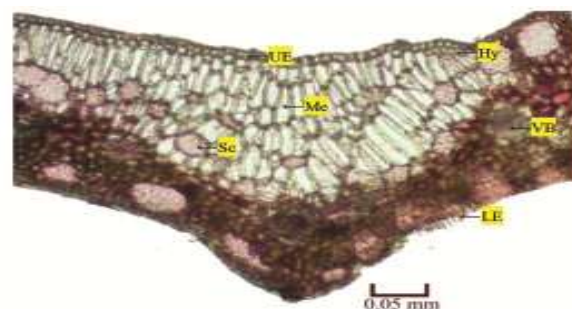


Figure 2.2: T. S of Midrib.

UE – Upper Epidermis, LE – Lower epidermis, Hy – Hypodermis,

Me – Mesophyll, Sc – Sclerids, VB – Vascular bundle.

T.S of Lamina

There are two types of vascular bundles (Fig 2.3) viz., large and small are parallelly arranged. The bundles are collateral and closed surrounded by heavily thick walled sclerenchymatous pericycle. Each bundle has xylem on the upper and phloem on the lower side. Xylem is mainly composed of vessels while isolated fibres are seen in the phloem (Fig 2.4).

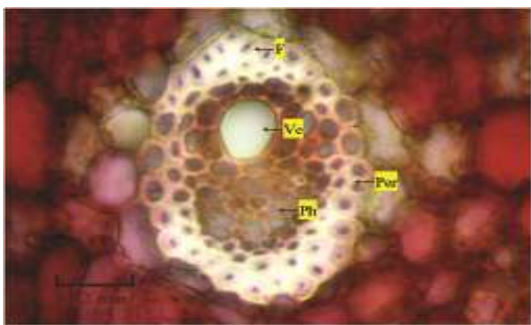


Figure 2.3: Vascular bundle – enlarged.

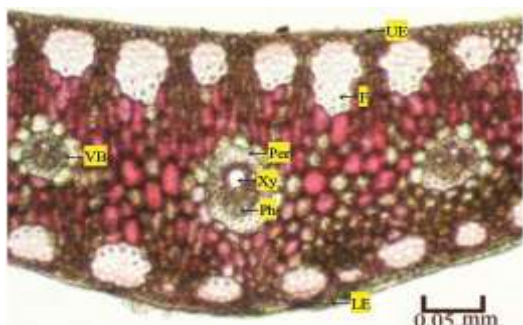


Figure 2.4: T.S of Lamina.

F – Fibres, Per – Pericycle, Ph – Phloem, Ve – Vessel, Xy – Xylem, Ph – Phloem, VB – Vascular bundles.

Powder Microscopy

Epidermis with stomata

Epidermis composed of compactly-arranged cells (Fig 3.1). Stomata are brachyparahexacytic, two elongate cells which are lateral and parallel to the guard cells, present two narrow cells (Fig 3.2 & 3.3).



Figure 3.1: Epidermal cells.



Figure 3.2: Upper epidermis – Stomata.



Figure 3.3: Lower epidermis – Stomata.

Parenchyma

Parenchyma cells are non-lignified cells, polygonal in shape and are the several layers of palisade like cells (Fig 3.4).

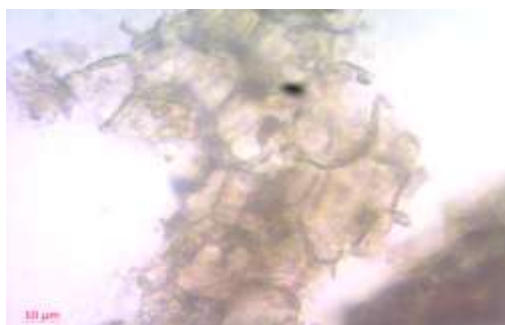


Figure 3.4: Parenchyma cells.

Mesophyll

Mesophylls are large, non-lignified, isodiametric tissues. Veins are lie on the mesophyll.

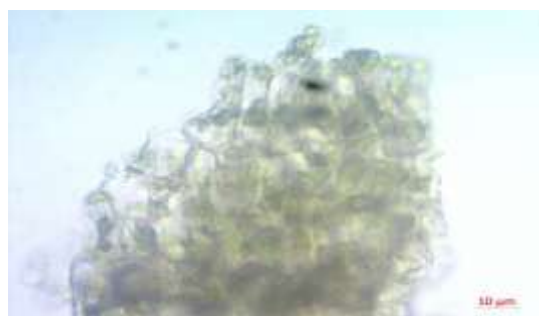


Figure 3.5: Mesophyll tissues.

Fibres bundles and Fibres

Fibre bundles are non-lignified cells with vascular tissues are scattered in central part of petioles (Fig 3.6). Fibres are thick lignified cells which are long and wide (Fig 3.7).



Figure 3.6: Fibre bundles.



Figure 3.7: Fibres.

Linear Measurement of Fibres

Table 1: Quantitative microscopy - Linear measurement of fibres.

S. No.	Parameters	Minimum (μm)	Average (μm)	Maximum (μm)
1	Length	143	261.3	429
2	Width	13	26	39

Fluorescence Analysis

Table 2: Fluorescence analysis of powdered leaves of *Phoenix sylvestris*.

S. No.	Treatment	Daylight	Short UV (254 nm)	Long UV (365 nm)
1	Powder	Light green	Yellowish green	Light green
2	Powder + Water	Light green	Brown	Light green
3	Powder + Ethanol	Green	Greenish brown	Green
4	Powder + 1N HCl	Green	Brown	Green
5	Powder + 1N H ₂ SO ₄	Yellowish green	Brown	Green
6	Powder + 1N NaOH	Brown	Brown	Greenish brown
7	Powder + 1N alcoholic KOH	Greenish brown	Brown	Greenish brown
8	Powder + FeCl ₃	Dark green	Brown	Greenish brown
9	Powder + Acetic acid	Green	Brown	Greenish brown
10	Powder + Ammonia	Light green	Greenish brown	Green
11	Powder + Iodine	Greenish brown	Brown	Green

Table 3: Fluorescence analysis of the extracts of leaves of *Phoenix sylvestris*.

S. No.	Extracts	Daylight	Short UV (254 nm)	Long UV (365 nm)
1	Petroleum ether	Green	Brown	Greenish brown
2	Chloroform	Dark green	Brown	Dark brown
3	Ethyl acetate	Greenish brown	Brown	Greenish brown
4	Ethanol	Dark brown	Brown	Dark brown
5	Aqueous	Light brown	Brown	Dark brown

The powdered leaves and extracts of *Phoenix sylvestris* showed absence of fluorescence characters.

CONCLUSION

Standardisation is very much essential for assessment of purity and identification of any sample. Pharmacognostical evaluation such as macroscopy, microscopic analysis, powder microscopy, linear measurements were carried out on plant samples in order to establish appropriate data that can be used in identifying crude drugs particularly those supplied in powder form. These are standard Pharmacognostical parameters that can be used to differentiate closely related plant species or varieties. The present work can be used in confirming the identity of the plant and to detect adulterants and their nature.

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