PHARMACOGNOSTIC STUDIES OF MORINGA OLEIFERA LEAFLET

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ABSTRACT

Moringa pterygosperma or Moringa oleifera Lam (family: Moringaceae) is a small- or middle-sized tree, which is cultivated throughout India. Various parts of the M. oleifera tree have been studied for several pharmacological actions like anti-cancer, hypercholesterolaemic, anti-microbial, anti-oxidant, hypotensive, anti-diabetic etc. Although the parts are utilized medicinally, pharmacognostical study of the plant parts leaflet is not reported. Hence, leaflet of the plant were evaluated for its macroscopical, microscopical and phytochemical parameters. The result revealed that plant is authentic as per the pharmacopoeial standards.

Keywords: Moringa oleifera, Phytochemical, Microscopical, Macroscopical.

INTRODUCTION

Moringa oleifera Lam. (drumstick tree, horse-radish tree, synonym: Moringa pterygosperma Gaertn.), a member of the family Moringaceae, is a small-medium sized tree, 10–15m high, widely cultivated in East and Southeast Asia, Polynesia and the West Indies. Different parts of the Moringa oleifera tree are reported to possess various pharmacological actions. The potential therapeutic values against cancer, diabetes, rheumatoid arthritis and other diseases have earned this plant the name of “wonder tree” in Thailand1. Leaves are also known to have anti-oxidant properties and are known to cures hallucinations, dry tumors, hiccups and asthma. The root and bark are useful in treatment of heart complaints, eye diseases, inflammation, dyspepsia, and enlargement of spleen. The flowers are known to cure inflammations and muscle diseases. Seed oil is known to be useful in treatment of leprous ulcers2. Almost all the parts of this plants have been used for various ailments in the indigenous medicine of South Asia, including the treatment of inflammation and infectious diseases along with cardiovascular, gastrointestinal, hematological and hepatorenal disorders3. As far as our literature survey could ascertain, there is no study reported on pharmacognostic study on leaflet of the
plant Moringa. Considering the importance of this plant, an attempt was made in the present study to carry out Macroscopical, microscopical and phytochemical parameters evaluation of M. oleifera leaflet.

MATERIALS AND METHODS

Collection and authentication of plant material

Fresh leaflets of *Moringa oleifera* Lam. were collected in the month of October, 2010, from area surrounding Rajkot (Gujarat, India). The herbarium was prepared and sent to Botanical Survey of India, Jodhpur for authentication.

Macroscopy

The leaflet was identified by comparing the morphological characters with description given in different standard texts like Wealth of India\(^4\), Indian Medicinal Plants\(^5\), The Ayurvedic Pharmacopoeia of India\(^6,7\). The powder was subjected to macroscopic studies which comprised of organoleptic characters of the drugs viz., Size, shape, color, odour, taste, and extra features\(^8\).

Microscopy

Microscopic identification of medicinal plant materials is indispensable for the identification of broken or powdered materials; the specimen may have to be treated with chemical reagents. Free hand transverse section (TS) of leaflet *Moringa oleifera* Lam. was taken. The TS of leaflet was cleared with chloral hydrate. The TS was treated with phloroglucinol and a drop of concentrated hydrochloric acid to stain the lignified elements. The TS was then mounted on a glass slide with glycerine and was covered with cover-glass. The cover-glass was pressed lightly and excess fluid was removed from the margin of the cover-glass with a strip of filter-paper. The slide was then observed under compound microscope\(^8,9\).

Surface preparation of *Moringa oleifera* leaflet

Few small pieces (2 mm square) of the leaflet were placed in solution of chloral hydrate in the test tube. It was boiled in a water bath until sufficiently transparent. It was then mounted in a mixture of equal parts of glycerin and chloral hydrate solution and examined microscopically\(^9\).

Powder study of the *Moringa oleifera* leaflet powder
The powdered slide was treated with phloroglucinol along with a drop of concentrated hydrochloric acid and iodine to stain the lignified elements and starch grains respectively. To check the presence of calcium oxalate crystals the powder was mounted with glycerin.

Phytochemical parameters

Preliminary phytochemical screening

Preliminary phytochemical screening of the Moringa leaflet powder was carried out for the detection of the various plant constituents like primary and secondary metabolites.

Evaluation of Physical parameters

Leaflet powder was evaluated for various physical parameters like foreign matter, pH, loss on drying at 105°C, total ash, acid-insoluble ash, water soluble ash, sulphated ash, water soluble extractive and alcohol soluble extractive.

RESULTS AND DISCUSSION

Authentication of plant material

The collected leaflets were authenticated by Dr. R. P. Pandey, Scientist In-charge, Botanical Survey of India, Jodhpur (Rajasthan, India).

Macroscopy

The leaflets were subjected to macroscopic studies which comprised of organoleptic characters as follows:
Figure 1 a and b shows leaflets of *Moringa oleifera*

**Size:** 1.2-2.5 cm long and 0.5-1.5 cm wide

**Shape:** Lateral elliptic and terminal ovate or obovate

**Colour:** Greenish grey to pale green

**Odour:** Not distinct

**Taste:** Not distinct, bitter

**Extra Features:** Leaves are usually tri pinnate compound, available in the form of leafletlets (12-20) and some broken pieces of rachis, slender, thickened and articulated at the base.

** Apex:** Obtuse

**Margin:** Entire

**Base:** Rounded or narrowed

**Texture:** Smooth

**Venation:** Reticulate

Figure 1 a and b leaflets of *Moringa oleifera*

**Microscopy**

**Transverse section (TS) of *Moringa oleifera* leaflet**

Leaflet shows dorsiventral structure; epidermis and unicellular hairs present on both the surfaces; palisade single layered; spongy parenchyma 2-3 layers; central region occupied by a crescent-shaped, collateral vascular bundle surrounded by 2-4 layers of collenchymatous cells; rosette crystals of calcium oxalate present in mesophyll and collenchymatous cells; anomocytic stomata are present on both surface but more on lower surface (Figure 2).

**Surface preparation of *Moringa oleifera* leaflet**

Surface preparation shows the presence of anomocytic stomata and unicellular thick walled trichome (Figure 3).
Figure 2 Transverse section of Moringa oleifera leaflet

Figure 3 Surface preparation of Moringa oleifera leaflet

Powder study of the Moringa oleifera leaflet powder
Greyish-green coloured powder shows groups of spongy parenchyma, anomocytic stomata, calcium oxalate crystals (Figure 4.1); spiral vessels (Figure 4.2); Multicellular uniserriate trichome (Figure 4.3); unicellular hairs with blunt tip (Figure 4.4); rosette crystals of calcium oxalate (Figure 4.5); cell containing pigment (Figure 4.6) and starch (Figure 4.7).

![Image](Figure 4.1 Spongy parenchyma with anomocytic stomata and calcium oxalate crystal (40X))

![Image](Figure 4.2 Spiral vessel (40X))
Figure 4.3 Multicellular uniseriate trichome (40X)

Figure 4.4 Unicellular hairs with blunt tip (40X)

Figure 4.5 Parenchyma containing rosette crystal of calcium oxalate
Preliminary phytochemical screening

Preliminary phytochemical screening of the Moringa leaflet powder showed the presence of various plant constituents like amino acids, carbohydrates, cellulose, lignin, proteins, starch and steroids.

Physical parameters

Leaflet powder was evaluated for various physical parameters and the results are described in Table 1.
<table>
<thead>
<tr>
<th>Sr. no.</th>
<th>Physical parameter</th>
<th>Values obtained</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Foreign matter (gm/100 gm)</td>
<td>0.90</td>
</tr>
<tr>
<td>2</td>
<td>pH</td>
<td>5.50</td>
</tr>
<tr>
<td>3</td>
<td>Loss on drying at 105°C (mg/gm)</td>
<td>5.50</td>
</tr>
<tr>
<td>4</td>
<td>Total ash (%)</td>
<td>10.90</td>
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<tr>
<td>5</td>
<td>Acid-insoluble ash (%)</td>
<td>3.79</td>
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<td>6</td>
<td>Water soluble ash (%)</td>
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<td>7</td>
<td>Sulphated ash (%)</td>
<td>16.23</td>
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<tr>
<td>8</td>
<td>Water soluble extractive (%)</td>
<td>30.90</td>
</tr>
<tr>
<td>9</td>
<td>Alcohol soluble extractive (%)</td>
<td>8.90</td>
</tr>
</tbody>
</table>

The result revealed that the plant is authentic as per the pharmacopoeial standards. Thus, macroscopical and microscopical studies will be useful in identifying the plant drug in crude form. The above microscopical powder study, phytochemical parameters will prove the authenticity of the drugs in powder form. Preliminary phytochemical screening will provide the general idea regarding the presence of primary and secondary metabolites. Thus, the pharmacognostical standards put forth can add valuable information about the said plant for its authentication, identification and ultimately may add to its medicinal importance.

REFERENCES


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