Pharmacognostic Evaluation of *Manilkara zapota* (L.) P. Royen Root

Rupesh Pingale*1, Gouri Kumar Dash2

1Department of Pharmaceutical Sciences, NIMS University, Shobha nagar, Jaipur- India. 
2Faculty of Pharmacy and Health Sciences, Universiti Kuala Lumpur Royal College of Medicine Perak, 30450 Ipoh, Malaysia.

Available Online: 7th April, 2015

**ABSTRACT**

*Manilkara zapota* (L.) P. Royen (Family: Sapotaceae), commonly known as ‘Sapodilla’ is very popular in India with a long history of traditional and folklore medicinal uses. Traditionally, different parts of the plant are used in treating cough, cold, diarrhoea, hemorrhage ulcer and gonorrhoea. A variety of phytoconstituents like lignans, flavonoids, coumarins, steroids, terpenes, fatty acids, anthraquinone glycosides and aliphatic long-chain compounds have been isolated from the plant. The plant is reported to possess anti-inflammatory, analgesic, antidiarrheal, antimicrobial, antioxidant, and insecticidal activities. The present study was carried out to investigate macroscopical, microscopical and physiochemical parameters of *M. zapota* roots. Some of the diagnostic features of the roots were studied. All the parameters were studied according to WHO guidelines. The determination of these characters will help future researchers in phytochemical as well as pharmacological analysis of this species.

**Keywords:** *Manilkara zapota*, Sapotaceae, Sapodilla, Root, Microscopy

**INTRODUCTION**

*Manilkara zapota* (L.) P. Royen (Family: Sapodilae) is a large, evergreen tree, more than 30 m in height and with a diameter up to 1.5 m. The leaves are simple, elliptic or oblanceolate, apex obtuse to shortly acuminate, glabrous, spirally arranged and clustered at the shoot tips. Flowers are green in colour, solitary, with a brown pubescent peduncle, 6 sepal and 6 corolla lobes. Fruit is ovoid to globular berry with a rough brown skin, containing 1–12 shining, brown or black seeds (frequently 5), surrounded by a brownish, sweet, juicy, scented flesh. ‘Manilkara’ is a common name for a member of the genus in Malabar. The common name ‘Sapodilla’, by which the fruit is known, is taken from the Spanish ‘Zapotillo’ meaning ‘Small zapote’.

Traditionally, almost every part of the plant is used for its medicinal activity. To name a few, the leaf juice is used to treat common cold, fever, wounds and ulcers. The fruits are believed to be beneficial for the treatment of diarrhoea and pulmonary diseases. The infusion and decoction of the seeds are used as diuretic. In Nicaragua, the decoction of dried sap is taken orally for the treatment of aches and applied externally for treating skin rashes and sores. In Guatemala, the infusion of the bark is reported to be used orally for the treatment of gonorrhoea. Several biological studies such as analgesic, anti-inflammatory, antipyretic, antimicrobial, antioxidant, antitumor and anti-diabetic activity have been reported by different authors. The ground fresh roots along with water is taken orally by the Kondh tribes of Ganjam district of Odisha to treat diabetes mellitus. The present study was carried out to investigate macroscopical, microscopical and physiochemical parameters of *M. zapota* roots. The studies were carried out in accordance with WHO General Guidelines for Herbal Drug Standardization methodologies.

**MATERIALS AND METHODS**

**Plant material**

The plant specimens for the study were collected from the Junnar, (Pune, India) and were positively identified and authenticated by the Botanist Dr. Jayanthi, Botanical Survey of India, Pune. The voucher specimen No. RUPMANZ2, dated 31 / 07 / 2012 is preserved in the herbarium for future reference. Care was taken to select healthy fully grown plants with normal organs. The samples of root were cut suitably removed from the plant, thoroughly washed with water to remove the adherent impurities, and dried in sunlight. The roots which were used for the extraction process were primarily collected from local areas of Junnar. Further, these roots were subjected to air drying for about two weeks and were used for the extraction.

**Macroscopy**

The size, color, odour and taste of the roots were studied.

**Microscopy**

**Sectioning:** Selected samples of the dried root were stored in a solution containing formalin (5 ml), acetic acid (5 ml), and 70% v / v ethyl alcohol (FAA) (90 ml). After 24 hours of fixing, the specimens were dehydrated with a graded series of tertiary-butyl alcohol as per the method. Infiltration of the specimens was carried out by gradual addition of paraffin wax (50 – 60°C m.p.) until the tertiary-butyl alcohol solution attained supersaturation. The

*Author for Correspondence*
specimens were casted into paraffin blocks. The paraffin embedded specimens were sectioned with the help of a Senior Rotary Microtome, RMT-30 (Radical Instruments, India). The thickness of the sections was kept between 10 and 12 μm. The dewaxing of the sections was carried out as per the procedure described by Johanson24. The section was stained with phloroglucinol-hydrochloric acid (1 : 1) and mounted in glycerin.

Photomicrograph: Microscopic descriptions of the selected tissues were supplemented with micrographs. Photographs were taken with digital camera. For normal observations, a bright field was used. For the study of crystal, starch grains, and lignified cells, polarized light was employed. As these structures have a birefringent property under polarized light they appear bright against a dark background25.

Physicochemical evaluation

Physicochemical parameters of M. zapota root powder were determined26 and reported as total ash, water-soluble ash and acid-insoluble ash. Alcohol and water-soluble extractive values were also studied.

Preliminary phytochemical screening

The coarse root powder (25 g) was subjected to soxhlet for solvent extraction using Pet. Ether, Chloroform and Methanol. The extract was concentrated and subjected to various chemical tests to detect the presence of different phytoconstituents27,28.

RESULTS

Macroscopy

The root was long, hard, about 10 to 12 cm in length, and 10 to 20 mm in breadth. The outer surface appeared light brown and the inner was brown in color. The taste was astringent and odor was none. The fracture was fibrous [Figure 1].

Microscopy

Table 1: Results of physicochemical analysis

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total ash</td>
<td>7.79%</td>
</tr>
<tr>
<td>Acid-insoluble ash</td>
<td>2.19%</td>
</tr>
<tr>
<td>Water soluble ash</td>
<td>3.99%</td>
</tr>
<tr>
<td>Water-soluble extractive</td>
<td>8.93%</td>
</tr>
<tr>
<td>Alcohol-soluble extractive</td>
<td>6.27%</td>
</tr>
</tbody>
</table>

Fig. 1: External morphology of the M. zapota root

Fig. 2: Microscopical view of the T. S. of the M. zapota root (a) xylem, phloem, vascular bundle and sclerenchyma (b) the cortex and cork, enlarged at ×10 X ×45

Lignified fibres

Cork cells

Calcium oxalate crystals

Starch grains

Parenchyma

Phloem fibre

Table 1: Results of physicochemical analysis

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total ash</td>
<td>7.79%</td>
</tr>
<tr>
<td>Acid-insoluble ash</td>
<td>2.19%</td>
</tr>
<tr>
<td>Water soluble ash</td>
<td>3.99%</td>
</tr>
<tr>
<td>Water-soluble extractive</td>
<td>8.93%</td>
</tr>
<tr>
<td>Alcohol-soluble extractive</td>
<td>6.27%</td>
</tr>
</tbody>
</table>
The present study on the pharmacognostic evaluation of the roots of *M. zapota* will be useful with regard to its identification and standardization.

**ACKNOWLEDGMENT**
The authors are thankful to the Management of NIMS University, Jaipur for their constant help and support.

**CONFLICT OF INTEREST**
The authors declare that there is no conflict of interests regarding the publication of this article.

**REFERENCES**


