Pharmacognostic studies on the leaves of *Manilkara zapota* L. (*Sapotaceae*)

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**Abstract** *Manilkara zapota* L. (*Sapotaceae*) leaves have been reported to exhibit antibacterial and antioxidant activities. Establishment of pharmacognostic profile of the leaves will assist in standardization for quality, purity and sample identification. The present study was carried out to investigate macroscopical, microscopical and physiochemical parameters of *Manilkara zapota* L. leaves. Some of the diagnostic features of the leaves are the presence of trichomes, calcium oxalate prism, vessels, stomata, epidermis, and collenchyma cells. 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.

**Key words:** *Manilkara zapota* L., Leaves, Pharmacognostic

**Introduction**

Pharmacognosy is defined as the study of physical, chemical, biochemical and biological properties of drugs[1]. Pharmacognostical studies help in identification and authentication of the plant material. Correct identification and quality assurance of the starting materials is an essential prerequisite to ensure reproducible quality of herbal medicine which will contribute to its safety and efficacy[2]. Research in pharmacognosy includes phytochemistry, microbial chemistry, biosynthesis, biotransformations, chemotaxonomy and other biological and chemical sciences.

*Manilkara zapota* L. belongs to the family *Sapotaceae*. It is an evergreen, glabrous tree, 8-15 m in height. It is cultivated throughout India, though it is native to Mexico and Central America. The seeds are aperients, diuretic tonic and febrifuge. Bark is antibiotic, astringent and febrifuge. Chicle from bark is used in dental surgery. Fruits are edible, sweet with rich fine flavour. Bark is used as tonic and the decoction is given in diarrhoea and peludism[3]. The leaves are used to treat cough, cold, and diarrhoea[4,3]. Bark is used to treat diarrhoea and dysentery[4]. Antimicrobial and antioxidant activities are also reported from the leaves[6,7,8].

The objective of the present study was to evaluate various pharmacognostic standards like macroscopy and microscopy study of leaves; total ash, loss on drying, acid insoluble ash, water soluble ash, extractive values and microscopic characteristics of *Manilkara zapota* L. leaves powder.

**Material and methods**

**Plant material**

Fresh leaves of *Manilkara zapota* L. were collected in the month of August, 2009, from Jam-Jodhpur, Jamnagar, Gujarat, India. The plant was compared with voucher specimen (voucher specimen No. PSN429) deposited at Department of Biosciences, Saurashtra University, Rajkot, Gujarat, India. The leaves were separated, washed thoroughly with tap water, shade dried, homogenized to fine powder and stored in air tight bottles.

**Pharmacognostic studies**

**Macroscopy study**

The plant was macroscopically examined for shape, size, surface characteristics, texture, color, consistency, odour, taste, etc[9].

**Microscopy study**

Microscopic studies were done by preparing a thin hand section of midrib and lamina region of *Manilkara zapota* L. leaf. The section was stained by saffranin. The powder...
of the dried leaf was used for the observation of powder microscopic characters.

Physicochemical parameters
Physicochemical parameters like total ash value, loss on drying, water soluble ash, acid insoluble ash value, petroleum ether soluble extractive, acetone soluble extractive, methanol soluble extractive and water soluble extractive values were determined as per WHO guideline (2002). 

RESULTS AND DISCUSSION

Pharmacognosy study
The pharmacognostical study is the major and reliable criteria for identification of plant drugs. The pharmacognostic parameters are necessary for confirmation of the identity and determination of quality and purity of the crude drug. The detailed and systematic pharmacognostical evaluation would give valuable information for the future studies. The plant *Manilkara zapota* L. showed general characteristics of a dicot plant.

Macroscopically the leaf was green in colour. Apex and base were acute, margin was entire leathery, shape was oblong and petioles were 4.5 cm long (Fig. 1). The microscopy study revealed the presence of lower and upper epidermis, xylem, phloem, vascular bundles, mesophyll, trichome and collenchyma. Mesophyll was differentiated into palisade and spongy parenchyma. Palisade was formed from compactly arranged elongated, narrow columnar cells with beaded anticlinal walls. Palisade cells were filled with chlorophyll. Spongy parenchyma was made up of parenchymatous cells with varying size and shape. Vascular bundles were arc shaped. Xylem was lignified and phloem was non-lignified. Unicellular trichome was observed on the epidermis (Fig. 2).

Microscopy study of powder showed the presence of upper epidermis cells which were thick and irregular walled, prisms of calcium oxalate crystals, simple unicellular trichome, simple pitted vessels, actinocytic stomata and xylem vessels in longitudinal sectional view showed spiral thickening (Fig. 3).

Physicochemical characters
The moisture content of dry powder of leaves of *Manilkara zapota* L. was 8.0 % which seems to be lower than that necessary to support the growth of microbes to bring any change in the composition of the drugs. Physical constant like ash value of the drug gives an idea of the earthy matter or the inorganic composition and other impurities present along with the drug. Extractive values are useful for the determination of exhausted or adulterated drugs. The results of the physical constants of the drug powder are given in Table 1. Total ash of crude powder of leaves of *Manilkara zapota* L. was 6.15 %, acid insoluble ash was 0.85 % and water soluble ash was 7.6 %. Low amount of total ash, acid insoluble ash and water soluble ash indicate that the inorganic matter and non physiological matter such as silica is less in leaves. 

Figure 1: Macroscopic characteristics of *Manilkara Zapota* L. leaf
Manilkara zapota L. is used for the treatment of various diseases therefore it is important to standardize it for use as a drug. The pharmacognostic constants for the leaves of this plant, the diagnostic microscopic features and the numerical standards reported in this work could be useful for the compilation of a suitable monograph for its proper identification. Pharmacognostic studies on different plants like Polyalthia longifolia var. pendula Leaf[12], Manilkara hexandra (Roxb.) Dubard leaf[13], Punica granatum L. leaf[14], Cissus quadrangularis L. stem[15], Psidium guajava L. leaf[16] has been reported.

### CONCLUSION

Standardization of herbal drugs is very much essential as they are derived from heterogeneous sources which can lead to variations. These variations can lead to erroneous results in various pharmacological and phytochemical studies. Manilkara zapota L. leaves are known for many medicinal properties hence the present study may be useful to supplement information in respect to its identification, authentication and standardization; no such data is available for the same till date.
REFERENCES