

## Pharmacognostical Evaluation of *Elaeocarpus sphaericus* (Rudraksha) Leaves

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### ABSTRACT

*Elaeocarpus sphaericus* (Rudraksha) is a broad leaved tree, belonging to family *Elaeocarpaceae* found in tropical & subtropical areas. Traditionally rudraksha is used for the treatment of various ailments like stress, anxiety, depression, nerve pain, epilepsy migraine and lack of concentration etc. In India the tree occupies the regions ranging from the Gangetic plains to the foothills of the great Himalaya. The investigation was carried out to study the pharmacognostical characteristics of the plant material. Rudraksha is a large evergreen, drought tolerant, perennial broad leaved tree; the stem is cylindrical with a dirty white and coarse textured bark. Morphology of the entire plant has been studied with pharmacognostical, & histological parameters which can possibly help to differentiate the drug from its other species/varieties.

**Keywords:** *Elaeocarpus*, histology, pharmacognostical characteristics, Rudraksha.

### INTRODUCTION

The use of plants as sources of medicines are human substance has been in vogue since antiquity<sup>1</sup>. According to a survey of World Health Organization, the practitioners of traditional system of medicine treat about 80% of patients in India, 85% in Burma and 90% in Bangladesh<sup>2,3</sup>. India harbors about 15 percent (3000-3500) medicinal plants out of 20000 medicinal plants out of the world<sup>4</sup>. The medicinal use of plants is very old, writings indicate that therapeutic use of plants is as old as 4000–5000 B.C. Large numbers of plants are utilized in various systems of medicine practiced in India and local health traditions for the treatment of human diseases since time immemorial. Most of these medicinal plants have been identified and their uses are well documented by different authors.<sup>5,6</sup>

*Elaeocarpus* is a genus of tropical and subtropical evergreen trees and shrubs, belonging to family *Elaeocarpaceae*, the genus includes approximately 350 species distributed from Madagascar in the west to New Zealand in the east<sup>7</sup>. *Elaeocarpus sphaericus* Geertn. K. Schum. (Syn. *Elaeocarpus ganitrus* Roxb.) is commonly known as Rudraksha (in Hindi) or Bead Tree (in English). The trees occupy the areas starting from Manila, Philippines through Myanmar to whole North –east India, Bangladesh, Nepal and Bhutan<sup>8</sup>. In Ayurveda it is used as cerebral sedative, expectorant, liver tonic and febrifuge and is useful in epileptic fits, melancholia, manic conditions, mental disorders,

convulsions, insomania, cephalagia, hypertension and bronchitis, etc., the fruits of *Elaeocarpus sphaericus* imposes positive effect on stress, anxiety, depression, palpitation and lack of concentration, it cools down the body temperature and brings calm to mind<sup>8</sup>.

### MATERIALS AND METHODS

Collection and authentication of plant material: The leaves of *Elaeocarpus sphaericus* was collected from the Patanjali yogapeeth, Haridwar in the month of December 2012. It was identified by the taxonomic experts from Patanjali yogapeeth Haridwar and Mr. S. N. Ojha Botanist and the voucher specimen was deposited in the Herbarium section of Pharmacognosy and phytochemistry division of Smt Tarawati Institute of biomedical and allied sciences Roorkee. Plant was dried in shade and ground into uniform size in a milling machine<sup>9,10</sup>.

Organoleptic properties: Morphological study of the plant was carried out as per the reported methods for its morphological characters such as colour, odour, taste, shape, size etc<sup>11,12</sup>.

Physico-chemical evaluation: The various physico-chemical parameters like ash values (total ash, acid insoluble ash values), determination of ph of solution(10%), extractive values (ethanol soluble and water soluble) were carried out according to the reported methods.<sup>13</sup>

Table 1 Organoleptic properties of *Elaeocarpus* leaves

Colour	Green
Odour	Odourless
Taste	Slightly bitter
Length	18-20 cm
Width	6-8 cm
Apex	Acute
Base	Symmetric
Margin	Undulate
Shape	Oblong-Lanceolate

Table 2 Physicochemical properties of *Elaeocarpus* leaves

Loss on drying		8.55 ± 0.45 % w/w
Water extractive	soluble	12 ± 1.05 % w/w
Alcohol extractive	soluble	16 ± 0.90 % w/w
Foreign matter		0.04 % w/w
Total Ash		2.7 ± 0.98 % w/w
Water soluble ash		1.6 % w/w
Acid insoluble ash		1.9 ± 0.56 % w/w
Sulphate ash		0.7 ± 0.04 % w/w

Microscopical studies: Free hand transverse sections of the leaf were taken and treated with various reagents. The leaves were boiled separately with saturated chloral

hydrate solution for surface studies and quantitative microscopical estimation of the leaf.

Powder Microscopy: The dried powder mass after passing through sieve No. 40 was used for powder microscopical studies, powdered crude drugs consist of the fragments of cells in the form of recognizable tissues and the study of surface constants like fibres, lignified vessel, epidermal cells, calcium oxalate crystals, starch grains, etc. powdered drug is placed on the slide and stain with various reagent like safarine,

iodine solution, furoglucinol etc. was examined under microscope<sup>15</sup>.

Fluorescence analysis: Organic molecules absorb light usually over a specific range of wave length; many of them reemit such radiations. So if the powder is treated with different chemical reagents and seen in the UV cabinet, different colours will be produced. Therefore it can be used for the identification of the drug. The fluorescence characteristic of the drug powder with different chemical reagent was studied by observing under UV Light at 254nm. The tests and observations were recorded<sup>16</sup>.

## RESULTS AND DISCUSSION

Organoleptic properties: The evaluation of a crude drug is a vital part for establishing its exact identity and quality. Before inclusion of a crude drug in a herbal pharmacopoeia, pharmacognostical parameters and standards must be established. Macroscopic identity of medicinal plant material is based on shape, size, colour, odour and surface characteristics. The organoleptic properties of *Elaeocarpus sphericus* leaves were studied and shown in table. 1.

Physico-chemical evaluation: The physico-chemical characters of powdered drug of leaf such as the percentage of total ash, acid-insoluble ash, water-soluble ash, sulphated ash, alcohol soluble extractives, loss on drying and foreign matter are presented in table 2.

Microscopical Evaluation: The transverse section of leaf was divided into three regions of epidermis, mesophyll and vascular bundle. The epidermis was found in both upper and lower surface. It was found to be single layered, compactly arranged parenchyma cells covered externally with a cuticle. Trichomes were found to be present (fig. 1, 2).

Mesophyll: Mesophyll was found to be present in between the two epidermal layers (Upper & Lower). It comprised of palisade cells which were made up of two layers of elongated, compactly arranged chlorenchyma

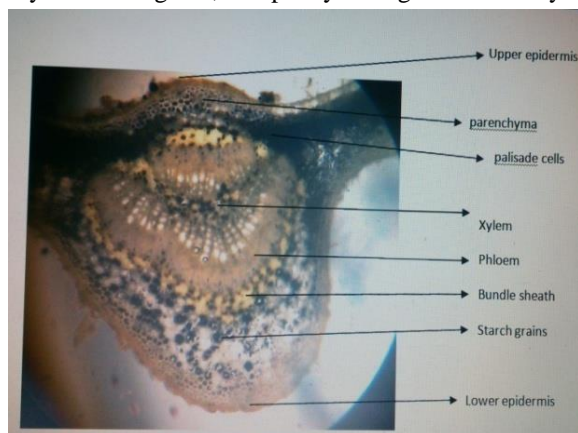
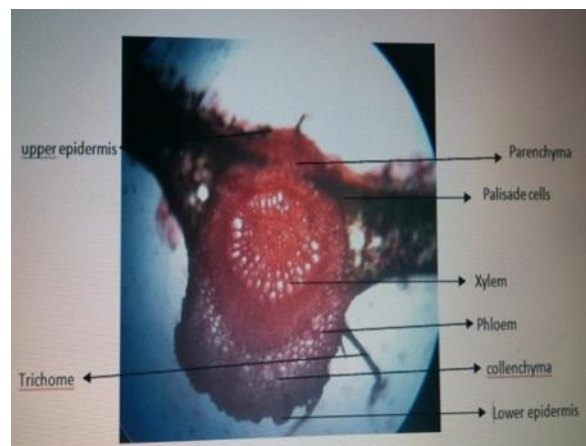


Fig. 1 T. S of Rudraksha leaf

Table 3: Fluorescence analysis

REAGENT	DAY LIGHT	UV (254nm)
Concentrate H <sub>2</sub> SO <sub>4</sub>	Reddish brown	Ambered
50% H <sub>2</sub> SO <sub>4</sub>	Black	Black
Concentrate HCl	Yellowish brown	Dark green
50% HCl	Light yellow	Light green
NH <sub>3</sub>	Light green	Light green
HNO <sub>3</sub>	Orange	Yellowish orange
50% HNO <sub>3</sub>	Yellow	Light yellow
5% FeCl <sub>3</sub>	Blackish brown	Dark brown
5% KOH	Pale yellow	Yellowish brown
5% NaOH	Yellowish brown	Yellowish ambered
1N KOH	Light ambered	Ambered
1N NaOH	Blackish brown	Dark yellow
Methanol	Green	Green

cells, found only in the lamina region. Spongy parenchyma was also found which consisted of a few layers of loosely arranged oval chlorenchyma cells. A few vascular strands, prisms of calcium oxalate were also found in the mesophyll.

**Midrib:** The epidermal layers were found to be continuous over the midrib region. 2-3 layers of collenchyma cells were found below the upper epidermis and above the lower epidermis. Bulk of the midrib region is made up of oval parenchyma cells which are arranged without intercellular spaces. A few prisms of calcium oxalate were also found scattered in the cells of the midrib. 3-9 vascular bundles are found in the centre of the midrib region. The vascular bundles are described as conjoint, collateral and closed. A patch of

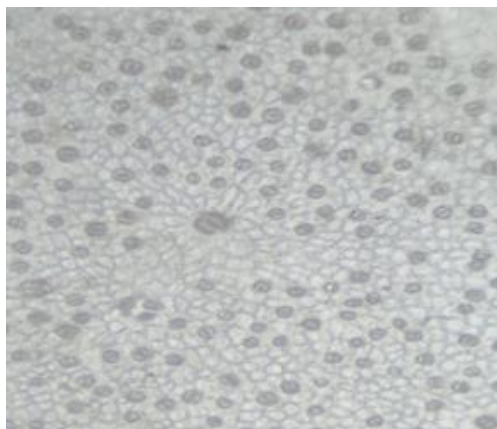


Figure 2 Stomata present in *Elaeocarpus sphaericus*

pericyclic fibres were found above and below each vascular bundle.

**Stomata:** The stomata were found to be large no. in leaf. They were present in lower epidermis. The type of stomata is paracytic because stomata comprises two

guard cells covered by two subsidiary cells, the long axes are parallel to that of stomata (Fig. 2).

**Trichome:** Trichomes are the elongated or glandular outgrowth of the epidermal cell. Trichomes are also called as plant hairs. The type of trichome found was unicellular. Non-lignified trichomes are seen. Only covering trichomes are present.

**Powder microscopy:** In the powdered preparation, square shaped calcium oxalate crystals were present. Xylem vessels were found to be lignified, pitted walls and some of these having spiral arrangements. Ground tissues were found to be thin walled & polygonally arranged. Xylem and phloem parenchymatic cells, spongy parenchyma, unicellular trichomes were observed. Starch grains present were circular to oval in shape (Fig. 3)

**Fluorescence analysis:** Fluorescence analysis of the leaf powder of *Elaeocarpus sphaericus* showed the presence of fluorescence compound which would serve as valuable information for the scientist engaged in research on the medicinal properties of this plant. Studies on physicochemical constants can serve as a vital source of information and provide suitable standards to determine the quality of this plant material in future investigations.

## CONCLUSION

*Elaeocarpus* species has been used successfully in Ayurvedic medicine for centuries, more clinical trials should be conducted to support its therapeutic use. It is also important to recognize that *Elaeocarpus* species may be effective not only in isolation, but may actually have a potentiating effect when given in combination with other herbs or drugs. The study has been an effort to standardize the leaves of *Elaeocarpus sphaericus*, a plant of importance since Vedic times. Extensive

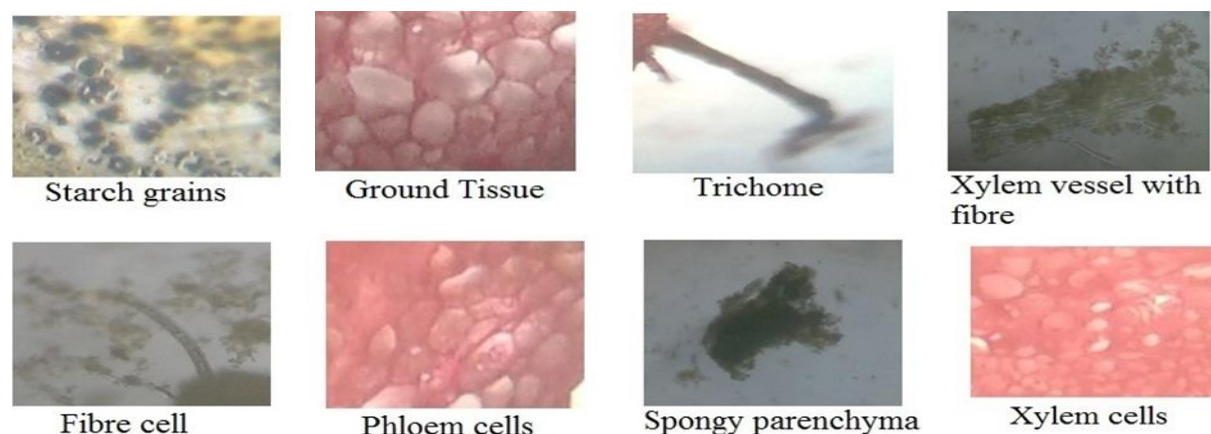


Figure 3 Powder microscopy of *Elaeocarpus sphericus*

studies are required on this important plant in order to unravel its potential. The pharmacognostic parameters could be useful in the identification and standardization of a crude drug. The data produced in the present investigation is also helpful in the preparation of the crude drug's monograph and inclusion in various pharmacopoeias.

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